

**Drawing on Self-Determination Theory: An Investigation into the Relationship Between
Core Quality Coaching and Primary School Students' Perceived Basic Psychological
Needs**

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Abstract

In line with the strengths-based approach to education, identifying and utilizing core qualities, which are the most innate, idiosyncratic, and stable strengths possessed by individuals, has shifted into the focus of attention. A potential way of incorporating a focus on core qualities into education is by enabling the teacher to coach their students in their core qualities.

However, only a few studies have investigated the effects of core quality coaching on primary school students. Drawing on self-determination theory as a theoretical framework, this study explores the potential benefits of integrating core quality coaching within the educational context and examines its impact on students' autonomy, competence, and connectedness. We investigated the outcomes of an intervention that utilized core quality coaching by comparing data from 11 primary schools from a pre-measurement group ($N = 390$) before the start of the intervention to data from a post-measurement group ($N = 245$) that was collected after the intervention was implemented for one year. Data was collected by a survey. Participants were primary school students aged eight to 13 years ($M = 10.53$; $SD = 1.03$). We did not find a significant difference between students' perceived autonomy, competence, and connectedness before and after the intervention. We did find a lot of variation in the outcomes between the primary schools. We conclude that although this study did not show significant impacts, it nevertheless represents a major contribution to the ongoing exploration of improving the school experience for students. We discuss theoretical and practical implications.

Keywords: strengths-based education, core qualities, coaching, primary school, self-determination theory

Drawing on Self-Determination Theory: An Investigation into the Relationship Between Core Quality Coaching and Primary School Students' Perceived Basic Psychological Needs

According to *self-determination theory* (SDT), fulfilling the basic psychological needs for autonomy, competence, and connectedness can tremendously affect children (Ryan & Deci, 2002). It can foster well-being and psychological growth, to only name two of the many effects (Ryan & Deci, 2000; Sheldon & Kasser, 2001; as cited in Véronneau et al., 2005). Consequently, fulfillment of the psychological needs in the school setting plays a central role in creating an empowering experience for pupils (White & Waters, 2015). Building on this, the last decade has seen an exploding appreciation and development of a strength-based approach to education that can help to fulfill these needs (Lopez & Louis, 2009). In this approach, students' efforts, qualities, and achievements are praised. Lately, especially pupils' core qualities, which are the most innate, idiosyncratic, and stable strengths we have, have received attention (Korthagen et al., 2021). A potential way of incorporating a focus on core qualities into education is by enabling the teacher to coach their students in their core qualities (Madden et al., 2011). Despite being proven to be effective for adults (McQuaid et al., 2018, pp. 71-84), to our knowledge, only a few studies investigated the effect of coaching that helps discover and apply core qualities in primary school students (e.g. Madden et al., 2011). In these studies, the qualities of primary school students were mostly assessed through formal testing, e.g. the SAI (Strengths Assessment Inventory) (Brownlee et al., 2012). In addition, there is no research on the effects of core quality coaching on perceived levels of autonomy, competence, and connectedness in primary school students yet. From non-coaching-based educational interventions, we know that receiving teaching that helps students explore their strengths and assists them in understanding how to use them in various tasks, positively affects the fulfillment of these basic psychological needs (Madden et al., 2011). Also, a

classroom environment in which primary school students see others through “strength-colored glasses” (Clifton et al., 2006, p.73, as cited in Lopez & Louis, 2009) can help to value diversity and its merit for teamwork (Lopez & Louis, 2009). In this study, we investigate the effect of receiving teacher coaching that focuses on the exploration and application of core qualities on primary school children’s perception of the fulfillment of their basic psychological needs. Currently, this teacher coaching approach has been implemented across several primary schools for one year. In this new approach, primary school students are (amongst other aspects) taught to recognize their core qualities and those of classmates and learn how to apply these in various tasks. As an intervention that uses the personal connections and understanding between students and teachers, core quality coaching might be a unique and valuable contribution to the strengths-based approach to education.

Literature Review

Strength-Based Positive Education and Core Qualities

The last decade has seen an enormous increase in interest in the effects of strengths-based positive education on students (Cabanas & González-Lamas, 2022). Arisen as an applied movement within positive psychology, the goal of positive education is to use a positive approach to teaching to increase well-being and performance among students. While standard educational techniques focus on what students need to improve and thus on the negative sides of performance, positive education focuses on strengths (Korthagen & Nuijten, 2020). This consequently shifts the focus from evoking negative feelings of “not being able to do something” to more positive feelings in students. Positive feelings increase well-being and widen students’ focus, which consequently increases performance, an effect commonly referred to as broaden hypothesis (Fredrickson & Branigan, 2005). A relatively new growing aspect of strengths-based education is focusing on students’ core qualities. *Core qualities*, often also referred to as character strengths, are characteristics that influence how we think,

feel, and act (Park et al., 2004, as cited in Ruit et al., 2019, 2021). They are innate, idiosyncratic and remain stable over time (Korthagen et al., 2021). It is crucial to distinguish core qualities from skills and talents. While skills are task-specific and can be developed, core qualities can apply to multiple areas of functioning, and can only be deepened but not newly emerge (Korthagen & Nuijten, 2020). If fostered, core qualities can develop into talents. The use of core qualities can help to heighten one's skill level (Madden et al., 2011). Even though others are often able to spot our core qualities from the way we act, we often remain unaware of these strengths ourselves (Petersen, 2006., as cited in Ruit et al., 2021). This state is commonly referred to as a blind spot (Luft & Ingham, 1961).

There is evidence from studies with adults, that being aware and using our core qualities can be highly beneficial. Making use of our core qualities can be motivating and vitalizing (Niemic & McGrath, 2019., as cited in Korthagen et al., 2021) and lets us experience a state of flow (Korthagen & Nuijten, 2020). Flow describes the experience of complete focus on the present task, in which challenge and skill level are balanced in a way that creates an optimal task experience (Nakamura & Csikszentmihalyi, 2012). In addition, using one's core qualities may strengthen resilience and improve mental health (Fredrickson, 2009; Peterson & Seligman, 2004). Despite our knowledge of these valuable effects on adults, only a little research investigating the effects on children in primary school age has been done. Nonetheless, so far there has been promising insight and there is evidence that children can become aware of their core qualities and use them, just as adults can (Korthagen et al., 2013). In their pioneering research, Ruit et al. (2019, 2021) found that core quality coaching positively influenced self-concept development and well-being in primary school students aged seven to twelve years. In addition, a pilot study investigating the effects of strengths-based coaching on primary school students showed that students reported higher levels of hope and engagement after receiving coaching (Madden et al., 2011). However, to our

knowledge, no research has been done on the effects of core quality coaching on primary school students' perceived fulfillment of their basic psychological needs for autonomy, competence, and connectedness. Yet, there is evidence from studies with adults, that being aware of one's core qualities increases the perception of these three basic psychological needs (Sheldon & Kasser, 2001).

The Three Basic Psychological Needs in Teaching Implementing Core Quality Coaching

SDT suggests that people have three basic psychological needs, each self-sufficiently contributing to well-being and psychological growth (Ryan & Deci, 2000, Sheldon & Kasser, 2001; as cited in Véronneau et al., 2005). These are the need for autonomy, competence, and connectedness (Ryan & Deci, 2000). In primary school students, the need for autonomy can be interpreted as the longing to make autonomous decisions and have choices in performing tasks (Conesa et al., 2022; Sheldon & Kasser, 2001). The need for competence can be described as a feeling of mastery and accomplishment in learning. Finally, connectedness reflects the desire to sympathize and build relationships with others, for example with their classmates. Rather than operating distinctively, the three basic psychological needs are highly interdependent and operate as a dynamic concept (Niemiec & Ryan, 2009). Fulfillment and thwarting of these three basic psychological needs can have tremendous effects.

Firstly, the literature reveals that the satisfaction of all three needs leads to higher well-being, better mental health, and enhanced social development (Ryan & Deci, 2000). In addition, a contemporary review of several studies by Conesa et al., (2022) suggests that need fulfillment correlates with feelings of liveliness (Müller et al., 2021; Vansteenkiste & Ryan, 2013, as cited in Conesa et al., 2022), life satisfaction, optimism and gratitude, internal locus of control (Huebner & Gilman, 2007; Sheldon & Bettencourt, 2002; Tian, Pi, et al., 2016, as cited in Conesa et al., 2022) and lower stress (Li et al., 2019, as cited in Conesa et al., 2022). On the other side, there is evidence that non-fulfillment of basic psychological needs can lead

to decreased well-being, mental health, and flow (Ryan & Deci, 2000).

Teaching that focuses on core quality coaching in primary school students was developed as an intervention and is currently being implemented in several primary schools in the Netherlands. So far, this intervention takes place for one year. During the intervention, students receive teaching that takes a coaching approach to help them become aware of and actively use their core qualities. The coaching broadly comprises three goals (Korthagen et al., 2021). (1) Primary school students recognize and experience their core qualities and those of fellow students. (2) Primary school students work with their core qualities across several situations, individually and together. (3) Primary school students learn that their and others' core qualities can be further developed and how they would like to develop them in the future. The intervention does not formally provide and expect a strict curriculum on how core qualities are implemented into learning. Rather, a different form of teaching in which core qualities take a central aspect in the teaching as a whole is applied. Teachers are provided with several exercises they can do with their classes but also receive freedom into how they would like to focus on core qualities in their lessons. To explore their core qualities, primary school students might for instance read a book in class and analyze the core qualities of the characters in the book. Afterward, they are asked whether these qualities might also apply to them. To make use of their core qualities, teachers might ask their students how they plan to use their core qualities in various tasks. Implementing teaching that includes learning about core qualities into the curriculum might affect how students perceive the fulfillment of their three basic psychological needs in school. By discovering and applying their core qualities, primary school students might feel more autonomous, competent, and connected.

Self-Perceived Autonomy in Core Quality Coaching

The need for autonomy is defined as the necessity to experience autonomy and willingness in making choices (Conesa et al., 2022; Sheldon & Kasser, 2001). Primary school

students who experience autonomy understand themselves as the generator of their behaviors and act in a manner that is in line with their values and interests (Niemic & Ryan, 2009). If students' autonomy is supported, they consequently behave more autonomously (Guay & Vallerand, 1996, as cited in Niemic & Ryan, 2009). In teaching that focuses on core qualities, teachers prompt their students to reflect on themselves in exploring their inner qualities. This reflection is individual and allows students freedom in tackling this task. Further, students are asked how they would like to use their core qualities to contribute to exercises that are performed individually or collaboratively in class. By this, primary school students become active initiators of their behavior in these exercises and are fully autonomous in what core qualities they use and to what extent they use them. We consequently expect that teaching that stimulates core quality awareness and application in primary school students will increase their perceived levels of autonomy. Supportive evidence for this comes from the implementation of autonomous teaching. In this approach, students receive teaching in which instructors listen to their wishes and offer time for self-organized working (Reeve, 2004). Moreover, pupils are encouraged to actively engage in problem-solving themselves and are praised for their successes in doing so, rather than being presented with correct answers. Autonomous teaching is similar to teaching that implements core quality coaching in the way it supports individual ways of working. Both approaches offer opportunities for self-organizing; autonomous teaching by reserving time for it in the class and core quality coaching by giving students the freedom to decide how, when, and which core qualities they would like to use. Further, both approaches stimulate students to engage in problem-solving. For example, in teaching that applies core quality coaching primary school students are encouraged to use their core qualities to overcome challenges. The autonomous teaching approach has shown that allowing pupils autonomy in the classroom increases their autonomous motivation (Reeve, 2004). Core quality coaching in teaching might further

increase this motivation, as students might start to see personal value in exercises. Based on the considerable overlap between aspects of the two approaches, we expect similar effects for teaching that applies core quality coaching. Even though core quality coaching has not been implemented in schools before, research has shown that strengths use in the work environment increase autonomous motivation in adults (Gradito Dubord & Forest, 2023).

Hypothesis 1: If the teacher takes a coaching role by coaching the primary school student in their core qualities, this will positively affect the autonomy level as perceived by the student.

Self-Perceived Competence in Core Quality Coaching

Next to affecting perceived autonomy in primary school students, we propose that core quality coaching will also positively affect their perceived levels of competence. When primary school students solve tasks using their core qualities, they might feel more competent to solve them. They understand that core qualities arise within them, making them competent. In addition, they learn that teachers and classmates can sometimes be necessary to make them aware of their core qualities but by using them, they feel that competence comes from within themselves. By becoming aware of their core qualities, students are enabled to consciously implement these qualities. This can increase their performance by helping them to discover new ways of approaching tasks differently and overcoming challenges by using their strengths. This might in turn increase their perceived competence. It is known that students who feel more competent also aim for high challenges (Boggiano et al., 1988). Moreover, in the core quality teaching approach, primary school students analyze the core qualities of fictional characters. Next to this, teachers actively ask students to help their classmates in exploring their abilities. Helping others increases one's feelings of competence (Brooks & Goldstein, 2008). By assisting others in finding their core qualities, primary school students might not only feel increasingly competent in completing tasks but also in handling core

qualities. Support for our expectations comes from findings of an intervention that was conducted in a primary school in Canada, in which Brownlee et al. (2010) found that pupils had a higher sense of competence after the intervention. The intervention focused on improving the learning experiences of Aboriginal children by use of the SAI-based strengths assessment. This increased their level of self-perceived competence. Interestingly, this effect not only held for Aboriginal children facing problems in school, but all children participating in the intervention reported feeling increasingly competent afterward. Next to this, strengths-based interventions change how pupils view themselves and their potential (Brownlee et al., 2012). There is evidence from studies with primary school students as well as university students that strengths-based education can increase confidence (Deci & Flaste, 1995; Katz, 1994; Rutter, 1985, as cited in Brooks & Goldstein, 2008; Narafshan & Noori, 2018). Confidence is a concept strongly related to feelings of competence. In line with self-efficacy theory, to feel competent to perform a task, students need to have confidence in their skills and thus think that they are self-efficient in completing the task (Rodgers et al., 2014). According to Bandura, “Self-efficacy refers to one’s beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3, as cited in Rodgers et al., 2014). Consequently, as an approach that fosters strengths in education, core quality coaching might not only directly increase competence in primary school students, but also indirectly by increasing confidence and self-efficacy.

Hypothesis 2: If the teacher takes a coaching role by coaching the primary school student in their core qualities, this will positively affect the competence level as perceived by the student.

Self-Perceived Connectedness in Core Quality Coaching

Moreover, helping fellow students not only increases feelings of competence but also a sense of connectedness (Brooks & Goldstein, 2008). In teaching that focuses on core

qualities, primary school students actively engage in helping each other to explore their core qualities. As an intervention that can be seen as a movement within strengths-based education, core quality coaching helps students understand the importance of others and their strengths in the classroom, which might further increase perceived connectedness between them (Brownlee et al., 2012). Furthermore, primary school classes experience core quality coaching together as a group and thus share a new experience. This shared experience may strengthen relationships and therefore connectedness between primary school students (Holt et al., 2019). In addition, primary school students develop a deeper understanding of the strengths, limitations and needs of fellow students and might discover that the core qualities of their classmates are similar to their own core qualities. These similarities might be found with fellow students whom they usually do not feel highly connected with. Classmates usually perceived as an outgroup might be regarded as closer to their ingroup (Reches & Feddes, 2019). In line with ingroup and outgroup bias theory (Tajfel & Turner, 1986) and the similarity attraction hypothesis (Byrne, 1971), finding positive and similar strengths in others might make students feel more connected to their classmates. However, we not only expect the interaction between primary school students to increase connectedness but also the interaction between teacher and students to have an effect. Connectedness in the classroom is strongly related to students' feeling that their teacher values and appreciates them (Niemic & Ryan, 2009). In core quality coaching teachers stress the individual strengths of students, which might make them feel more valued and thus increase their perceived connectedness to the teacher.

Hypothesis 3: If the teacher takes a coaching role by coaching the primary school student in their core qualities, this will positively affect the connectedness level as perceived by the student.

Method

Participants

The pre-measurement group included 425 primary students in the highest grades of primary school (groepen zes tot acht in the Dutch system) and were recruited via their teachers to take part in the questionnaire. Participants were collected from 10 different primary schools in the province of Zeeland. After deleting 25 datasets for missing values and 10 datasets for other reasons (see Table 1 in Appendix C), 390 participants were considered for the analysis. The age of the primary school students ranged from eight to 13 years ($M = 10.46$; $SD = .97$). Gender was divided into 45.40% girls, 49.70% boys, and 4.90% other. The post-measurement group initially included 257 primary school students. After deleting 2 datasets for missing values and 10 datasets for other reasons (see Table 2 in Appendix C), we ended up with 245 participants in the post-measurement group. Primary school students' age ranged from eight to 13 years ($M = 10.64$; $SD = 1.12$). Gender was divided into 43.40% girls, 52.00% boys, and 4.50% other. Due to the recruitment of partially distinct participant groups for the pre-and post-measurements, no attrition rate was computed.

Procedure

Primary school students were recruited through their teachers, who shared the study information with the students and their legal guardians. Participants for the pre-measurement were recruited in January 2022, before the start of this specific bachelor thesis research. In February 2022, the implementation of the innovation started. Participants for the post-measurement were recruited in April 2023, after the innovation took place for one year. Data collection for the post-measurement started at the end of May 2023. Participants were again gathered through their teachers from the same primary schools. However, primary school students from 'groep acht' had graduated from primary school before the second measurement was collected. Similarly, new students had moved up to 'groep zes'. This resulted in an altered sample group for the post-measurement. All primary school students

were provided a document giving information on the procedure of the research. Thereafter, online questionnaires were sent to the school principals who distributed them to the teachers, who then shared them with their students. When opening the questionnaire, participants were asked for consent and whether their data was allowed to be used for research purposes. Following this, primary school students were able to fill in the online questionnaire. Both, the pre-measurement group, and the post-measurement group received the same survey. The duration of the questionnaires was approximately 20 minutes and could be completed during regular school hours. The questionnaires and all communication regarding the study were in Dutch.

The student questionnaire measured four dependent variables, namely personal development possibilities as provided by the teacher, basic psychological needs, happiness, and general self-description. Next to this, we also collected demographic data on students. These were gender, age, school name, class name, and combination group. We also assessed whether children sometimes worked on tasks together with older or younger students in their combination group and if so, how often. Students completed this questionnaire up to three times. They first filled it in about the teacher that was present that day. Then, if applicable, children also answered the same questionnaire about their other teacher not being present on the day of the assessment. Lastly, if applicable, pupils answered the questionnaire for their teaching assistant. Primary school students did not receive any compensation for their participation. Participant data was modified to ensure the anonymity of participants. This research plan was approved by the Ethics Committee of Psychology of the University of Groningen.

Measures

The scale measuring basic psychological needs was based on a measurement from Evelein (2005) and adapted to be used with children. This measurement comprised three

measures, namely autonomy, competence, and connectedness. Each measure was assessed with four items, resulting in a 12-item scale for basic psychological needs. A sample item from the autonomy scale was “In class, I am allowed to do tasks my way”. The competence scale included items such as “In class, I feel that I use my qualities well”. The connectedness scale was measured with items such as “In class, I feel that I have a good relationship with the other children”. Answers on each scale were rated on a 5-point Likert scale (1 = *absolutely not*, 5 = *very much*). See Appendix D for all items. Cronbach’s alpha in the pre-measurement was 0.715 for the autonomy scale, 0.747 for the competence scale, and 0.834 for the connectedness scale. Cronbach’s alpha in the post-measurement was 0.772 for the autonomy scale, 0.772 for the competence scale, and 0.865 for the connectedness scale. Thus, all scales were found to be reliable.

Results

Excluded Data

To examine potential outliers in the data, we created boxplots for the pre-and post-measurement data of autonomy, competence, and connectedness. For each of the three variables, we identified outliers in the pre-and post-measurement that were considerably below the interquartile range. However, the responses of most of these participants looked realistic (no extreme or repetitive neutral responses). Thus, we concluded to keep this data in our analysis and interpret it as extreme scores on our variables. In the pre-measurement, one participant was excluded for answering one on every item, and another participant was excluded for responding with extreme scores such as five or seven to every item. In addition, data from one participant was excluded from the post-measurement for filling in one for every item. Boxplots illustrating the duration taken by participants to fill in the surveys showed extremely long durations for four participants in the pre-measurement and five participants in the post-measurement. These participants were excluded from further analysis. No extremely

short durations were detected. Moreover, in the pre-measurement 24 participants did not complete the survey and were consequently removed from further analysis. In the post-measurement, two participants were removed for this reason. Next, four participants from the pre-measurement and three participants from the post-measurement gave unserious answers for the item measuring gender and were excluded from further analysis. Lastly, three participants were excluded from the post-measurement for indicating unserious answers for age. No participants were removed from the pre-measurement for this reason. These exclusion criteria resulted in an overall sample size of $N = 390$ for the pre-measurement and $N = 245$ for the post-measurement. A list of all excluded participants is shown in Appendix B.

Assumption Checks

Assumptions were checked after removing participants from the dataset. We initially planned to conduct a paired samples t-test to compare the scores of participants from the pre-measurement to the post-measurement. However, since participants were not assigned anonymous identification codes as planned, there was an inability to link participants across measurement points. Consequently, for the context of this Bachelor thesis, we decided to switch to an independent samples t-test to examine the differences between the two groups. Despite the limitations associated with this change in analysis approach, it allowed for the examination of group differences in the absence of paired data. Some students finished primary school after the pre-measurement took place and thus did not participate in the post-measurement. In addition, students moved one class up between the first and second measurements and were thus old enough to participate in the second measurement but not always in the first one. Nevertheless, many but not all students who participated in wave one also participated in wave two. Altogether, seven classes from five different schools participated in both waves. 20 classes participated in the pre-or post-measurement only.

Hence, the assumption of independent samples was violated. Moreover, participants in this study were not randomly sampled into the pre- or post-measurement condition.

Prior to conducting the independent samples t-test, assumptions of normality and equal variances were assessed. Normality was examined by visual inspection of histograms. Levene's test was employed to assess the assumption of equal variances. Upon visual inspection of the histograms, we concluded that the distribution of autonomy, competence, and connectedness was approximately normal in both the pre-measurement and the post-measurement. Thus, normality was met. For examination of equal variances, the variables from the pre-and the post-measurement were combined into one variable. Pre-measurement was coded zero, and post-measurement was coded one. Levene's test revealed that the variances of the variable autonomy in the pre-and post-measurement were equal ($F(1, 390 + 245) = .004, p = .951$). Likewise, the variances of the variable competence in the pre-and post-measurement were equal ($F(1, 390 + 245) = .094, p = .759$). The same applied to the pre-and post-measurement of the variable connectedness ($F(1, 390 + 245) = .456, p = .500$). Consequently, the assumption of equal variances was satisfied. We accepted these outcomes and started inspecting the data.

Preliminary Analysis

We calculated descriptive statistics and bivariate correlations for the pre-and post-measurement groups for autonomy, competence, and connectedness, as well as for gender and age. The correlation matrix for these variables is displayed in Table 1. We found a strong positive correlation between all three variables assessing basic psychological needs in the pre-measurement. Autonomy was strongly positively related to competence ($r = .53, p < .01$) and connectedness ($r = .45, p < .01$). Likewise, competence and connectedness were strongly positively related ($r = .46, p < .01$). Marginally stronger correlations for the variables became apparent in the post-measurement. This indicates that students who score high on one of the

three basic psychological needs are also more likely to score high on the other two variables. In line with our expectations, this supports the presumption that the three basic psychological needs are interdependent and operate as a dynamic concept. Gender was slightly negatively related to all three variables measuring basic psychological needs in the pre-and post-measurement. However, save from competence in the post-measurement ($r = .14, p = .01$), all correlations were not significant at the $p < .05$ level. Gender was coded one = “boy”, two = “girl”, three = “different”, and four = “I prefer to not say this”. The results indicate that boys showed modestly higher levels of autonomy, competence, and connectedness than girls or students who indicated “different”. However, since most of these correlations were not significant, we decided to not control for gender in our main analysis. There were no considerable correlations for age.

Table 1*Means, Standard Deviations, and Correlations Between Study Variables and Demographic**Data*

Variable	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Autonomy_W1	3.7	0.7	1	.53**	.44**	.05	-.03	-	-	-	-	-
2. Competence_W1	3.6	0.7		1	.46**	-.07	-.08	-	-	-	-	-
3. Connectedness_W1	3.9	0.7			1	-.12*	-.03	-	-	-	-	-
4. Age_W1	10.5	0.97				1	-.05	-	-	-	-	-
5. Gender_W1	1.6	0.7					1	-	-	-	-	-
6. Autonomy_W2	3.7	0.7	-	-	-	-	-	1	.63**	.51**	-.03	-.06
7. Competence_W2	3.6	0.7	-	-	-	-	-		1	.45**	-.02	-.14*
8. Connectedness_W2	3.9	0.7	-	-	-	-	-			1	-.03	-.05
9. Age_W2	10.6	1.1	-	-	-	-	-				1	.04
10. Gender_W2	1.6	0.7	-	-	-	-	-					1

Note. Variables 1-5 represent data from the pre-measurement and are marked by “W1”, and variables 6-10 represent data from the post-measurement and are marked by “W2”.

Gender was coded 1 = “boy”, 2 = “girl”, 3 = “different”, and 4 = “I prefer to not say this”.

** Correlation is significant at the $p < .001$ level (2-tailed). * Correlation is significant at the $p = 0.05$ level (2-tailed).

Inferential Statistics

We did an independent samples t-test to analyze the differences in means for autonomy, competence, and connectedness between the pre-measurement group and the post-

measurement groups. In addition, we calculated descriptive statistics for all three variables in both groups. Results of the t-tests for autonomy, competence, and connectedness are presented in Table 2. Based on the non-significant t-values, the large p-values, and the modest effect sizes in the results, we concluded that there were no significant differences between the means from the pre-measurement group and the post-measurement group for all three variables. These findings suggest that the intervention did not have a statistically significant effect on students' perceived autonomy, competence, and connectedness. Hence, hypotheses one, two, and three were not supported.

Table 2

Results of Independent Samples t-Test for Autonomy, Competence, and Connectedness

Variable	Group_pre	Group_post	<i>t</i>	<i>df</i>	<i>p</i>	Cohens' <i>d</i>
	M (SD)	M (SD)				
Autonomy	3.7 (0.7)	3.7 (0.7)	-0.18	633	.86	0.72
Competence	3.6 (0.7)	3.6 (0.7)	0.07	633	.94	.71
Connectedness	3.9 (0.7)	3.9 (0.7)	0.67	633	.50	.78

Note. Group_pre represents the pre-measurement group. Group_post represents the post-measurement group.

Exploratory Analysis

Since there was reason to suspect that not all eleven participating primary schools implemented the intervention equally well, we conducted a two-way ANOVA which made it possible to explore differences between the scores of the 11 participating primary schools. We found no significant interaction between the effects of school type and measurement group on autonomy ($F(8,605) = .857, p = .553$), competence ($F(8,605) = .903, p = .513$), and connectedness ($F(8,605) = .762, p = .637$). Nonetheless, we found a significant main effect for school type for all three variables (autonomy: $F(10,605) = 3.94, p < .001$; competence: F

(10,605) = 6.10, $p < .001$; and connectedness: $F(10,605) = 4.38, p < .001$). The significant main effect indicates that there were considerable differences in self-perceived autonomy, competence, and connectedness between the different primary schools, irrespective of whether primary school students were measured before or after the intervention. Based on the results of a Tukey post hoc test we concluded that there were significant differences for all three basic psychological needs between some primary schools, but no significant differences for most of them. A table summarizing all significant differences is presented in Appendix A. High variability in mean scores for autonomy, competence, and connectedness after the intervention became apparent through profile plots. While the mean scores on all three variables increased for a considerable number of schools, some schools showed decreased scores on these variables after the intervention. This indicates that primary school students' perceived fulfillment of their basic psychological needs seems to vary between schools and there might be other unknown variables influencing the effectiveness of the intervention. Profile plots are presented in Appendix B.

Discussion

This study investigated the effects of receiving coaching by teachers that focuses on core qualities on the perception of the three basic psychological needs in primary school children. In line with existing literature, we hypothesized that core quality coaching would increase students' self-perceived autonomy, competence, and connectedness. However, we did not find statistically significant results for these effects. Exploratory analysis revealed that there were general differences in how students perceived the fulfillment of their basic psychological needs between primary schools. Further, while mean scores for basic psychological needs increased in some schools, they decreased in other schools. The findings of our study must be interpreted in light of several important aspects that may have influenced the outcomes that we will touch upon in the next section. Importantly, our findings align with

the prevailing notion that basic psychological needs are dynamic and interdependent (Niemiec & Ryan, 2009). In our study, primary school students who scored high on one of the three basic psychological needs also tended to score high on the other two needs. According to existing literature, adults seem to show higher levels of autonomy, competence, and connectedness when becoming aware of their core qualities (Sheldon & Kasser, 2001). However, we did not find similar effects for primary school students. No research has explicitly investigated the effects of core quality coaching on primary school students' basic psychological needs yet. Therefore, our findings venture into uncharted territory and do not directly contradict existing literature.

Nevertheless, our findings indirectly challenge existing assumptions for the development of autonomy, competence, and connectedness in the classroom. Firstly, considering that our coaching approach incorporated many elements of autonomous teaching as described by Reeve (2004), one would anticipate an increase in autonomy after the intervention. Secondly, our results deviate from the findings of Brownlee et al. (2010), who observed increased competence in primary school children after formal strengths assessment. Given that our study did not make use of formal testing, this suggests that different assessment methods seem to have varying effects. Thirdly, even though core quality coaching created a group experience for students and taught them the importance of fellow students, it did not enhance perceived connectedness as suggested by prior research (Brownlee et al., 2012; Holt et al., 2019). Despite these indirect contradictions, it is intriguing to note that primary school students in our study generally reported high levels of fulfillment across all three basic psychological needs. The mean level of need fulfillment exceeded a score of three and a half out of five on all three scales. This suggests that all participating primary schools likely employ a teaching style that fosters high levels of autonomy, competence, and connectedness in students. Consequently, it becomes crucial to investigate how these high

basic levels of need fulfillment might affect the effectiveness of receiving core quality coaching for primary school students.

Contextual Factors

The following contextual aspects should be considered when interpreting our findings. Firstly, teachers did not follow a strict curriculum when delivering core quality coaching to students. Although goals and materials were available to teachers, teachers received the freedom to implement these in class how they saw fit. While this allowed teachers to adapt the coaching to their teaching style, it also likely resulted in considerable variability in how teachers implemented the coaching intervention. This variability could have created inconsistencies and potentially affected the effectiveness of the intervention and may have contributed to the relatively large variation in effects between schools. Moreover, the principles of some primary schools might have stressed implementation more than others. This might explain why perceived autonomy, competence, and connectedness in students increased in some schools but not in others. In addition, since teachers might have experimented with the new concept of core quality coaching between the measurement points, it is possible that they changed their coaching style between the pre-measurement and the post-measurement. This change in coaching style might have affected students' perceived autonomy, competence, and connectedness and could have influenced the outcomes. Furthermore, the occurrence of school inspections during the intervention period is an important contextual factor to consider. Inspections may have created pressure for teachers to prioritize students' performance. This could have limited teachers' capacity to fully implement the coaching intervention and consequently influenced outcomes measured in our study.

Theoretical and Practical Implications

Despite the lack of significant results in this study, the practical implications of the findings suggest that the intervention has the potential to be beneficial. Higher levels of

autonomy, competence, and connectedness may affect overall student well-being but could also impact life-long trajectories such as school-dropout or academic performance (e.g. Buzzai et al., 2021). However, it is crucial to recognize that changes are necessary for the intervention to yield significant results. Most importantly, additional investigation is needed to understand when and why an increase in basic psychological needs was created for some schools, and how a decrease in scores for other schools happened. Qualitative interviews with students and teachers may shed light on potential influencing factors. In addition, administering school climate assessments could be useful to understand how the social dynamics in schools might have influenced the outcomes. Moreover, perhaps clear guidelines and more intensive training programs for teachers need to be implemented to ensure the intervention's effectiveness. Clear outlines can help teachers effectively implement coaching strategies and consequently provide them with the necessary tools to let students experience the positive aspects of the intervention more often.

From a theoretical perspective, our study represents a new starting point to add to the existing literature investigating how coaching interventions can impact students' experiences in the educational setting. Although not significant, our findings contribute to the strength-based approach to education. Investigating one's core qualities through interaction with peers and coaching through teachers is a new method that widens the focus from formal testing of core qualities to active exploration through the primary school student. Next to this, our study illustrates how the fulfillment of basic psychological needs as theorized by SDT is important to make school an empowering experience for primary school students.

Strengths and Limitations

This study possesses notable strengths. The first strength is the large sample size and available data from 11 different participating primary schools. These schools employ a wide variety of schooling philosophies, such as public schools or schools based on the Montessori

concept. This positively affects the generalizability of our results across the Netherlands. A second strength is the utilization of a relevant sample group by selecting primary school students as participants. This enhances the external validity of our results. Thirdly, child-friendly questionnaires equivalent to the children's developmental and cognitive status ensure the understandability of questions for the children and that they could answer to the best of their abilities.

Next to several strengths, this study has limitations. The most significant limitation of our study is the inability to match participant data from the pre-measurement to participant data from the post-measurement. In addition, since we did not foresee this inability to match participants, we had to switch from the intended within-subject repeated-measures design to a between-subject independent two samples design. Consequently, the assumptions of independence of observations and random sampling are heavily violated, which significantly impacts our outcome measures. To overcome this limitation, future studies should assign participants anonymous IDs to make matching across measurement points possible. Moreover, to allow as many students as possible to benefit from the positive effects of the intervention, this study did not include a control group in its investigations. However, future research may apply a semi-experimental design in which schools start the intervention at different time points to compare the development of students between different stages of the intervention. Overall, we suggest that more research is needed to explore the robustness of the three variables autonomy, competence, and connectedness. Another important aspect is the utilization of self-report questionnaires to measure primary school students' perception of the fulfillment of their basic psychological needs. While this measurement type provides important insights into personal perceptions, it might be influenced by social desirability bias or decreasing concentration during the completion of the questionnaire. Consequently, a more

objective approach could increase the validity of the findings. To implement this, students could be observed during class.

Future Directions

To offer students a more comprehensive picture of their core qualities in future interventions, it might be advantageous to combine formal strengths assessment methods as introduced by Brownlee et al. (2012) with self-exploration exercises and peer coaching as utilized in our intervention. This combined approach might allow for capturing a broader range of information on students' core qualities. Moreover, collecting more measurement points along the intervention could increase understanding of how primary school students' perception of the three basic psychological needs develops during the intervention. Collecting more data points would enable us to observe how these perceptions evolve and identify possible critical time points during the intervention. In addition, adopting a more person-centered approach may bring valuable additional insights into how the perception of the three basic psychological needs develops for the individual. Recognizing that each student has unique needs would allow us to tailor the intervention to these individual needs and lead to more effective outcomes. Ecological Momentary Assessment (EMA) could be utilized to collect several individualized measurements per person.

Next to adjustments in the study design, future research should explore other factors that might influence the effectiveness of the intervention. The impacts of principals' or teachers' motivation to implement core quality coaching within their teaching might influence student motivation for participation (Atkinson, 2000). Moreover, the cultural or socio-economic contexts of primary school students could shed light on possible additional variables influencing intervention outcomes (Miller, 2002). Lastly, personality might have a considerable impact on the way primary school students receive coaching (Stewart et al., 2008).

Conclusion

Core quality coaching could be a potential tool for meeting the basic psychological needs in the school setting and thereby help to make primary school an empowering experience for pupils. This study investigated to what extent receiving teaching that focuses on core qualities affects the perception of autonomy, competence, and connectedness in primary school students. Moreover, we explored how the possible effects of core quality coaching can be interpreted in the context of self-determination theory. For our research, we compared primary school children's fulfillment of the basic three psychological needs before and after a one-year intervention that focuses on integrating core quality coaching into teaching practices. Even though this study did not find a significant difference between our two measurement points, it presents a substantial contribution to the newly emerging field of strength-based education and calls for further investigation of core quality coaching in the school setting. Future research is needed to control for contextual factors, explore the variability between effects across primary schools, and to investigate potential other factors that influence the efficiency of core quality coaching.

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Appendix A

Differentiation per School

Table 3

Multiple Comparisons for Autonomy, Competence, and Connectedness Comparing Post-Measurement Group Minus Pre-Measurement Group per Primary School Type

Autonomy	M difference	SE	Sig	95%CI
I - J	I - J			
School 2 – school 3	0.4	0.1	.016	[-1.146, -1.149]
School 2 – school 4	0.6	0.1	.002	[0.145, 1.146]
School 2 – school 6	0.5	0.1	<.001	[0.143, 0.887]
School 3 – school 8	-0.4	0.1	.016	[-0.851, -0.045.]
School 4 – school 7	-0.5	0.1	.039	[-0.962, -0.017]
School 4 – school 8	-0.6	0.2	.004	[-1.093, -0.115]
School 6 – school 7	-0.4	0.1	.032	[0.694, 0.015]
School 6 – school 8	-0.5	0.1	.001	[-0.831, -0.114]
Competence				
M	SE	Sig	95%CI	
I - J	I - J			
School 2 – school 3	0.4	0.1	.038	[0.010, 0.79]
School 2 – school 6	0.6	0.1	<.001	[0.208, 0.927]
School 3 – school 7	-0.5	0.1	<.001	[-0.862, -0.14]
School 3 – school 8	-0.4	0.1	.022	[-0.787, -0.031]
School 5 – school 7	0.5	0.1	.021	[0.036, 0.886]
School 6 – school 7	-0.7	0.1	<.001	[-0.997, -0.34]
school 6 – school 8	-0.6	0.1	<.001	[-0.923, -0.23]
School 6 – school 11	-0.4	0.1	.009	[-0.671, -0.05]
School 7 – school 10	0.5	0.1	.032	[0.021, -0.05]
Connectedness				
M	SE	Sig	95%CI	
I - J	I - J			
School 1 – school 2	-0.7	0.2	.035	[-1.32, -0.023]
School 1 – school 8	-0.7	0.2	.015	[-1.354, -0.075]
School 2 – school 6	0.5	0.1	.001	[0.123, 0.93]
School 6 – school 8	-0.6	0.1	<.001	[-0.959, -0.180]
School 6 – school 11	-0.4	0.1	.003	[-0.786, -0.089]

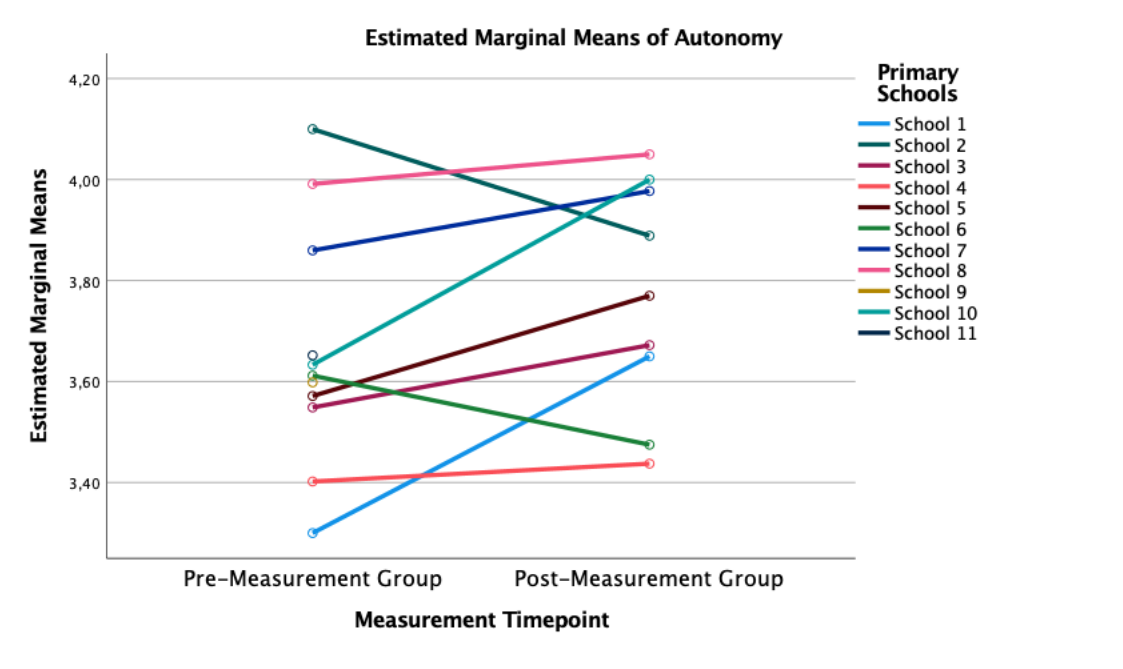
Note. Only differences that are significant at the $p < .05$ level are provided.

Appendix B

Tables of Exploratory Analysis

Figure 1

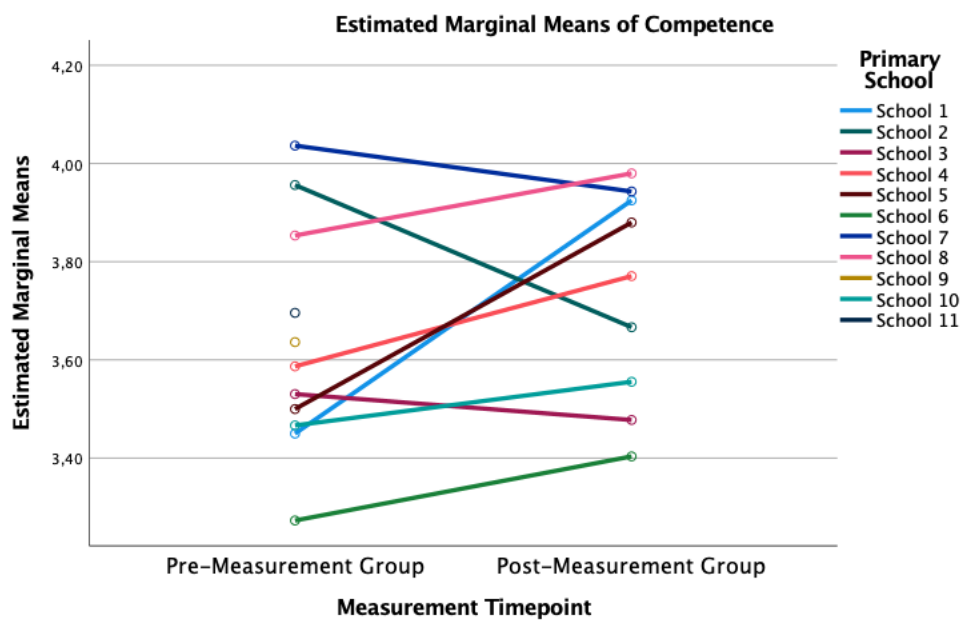
Change in Means of Perceived Autonomy between Pre-Measurement and Post-Measurement per Primary School



Note. Schools 9 and 11 did participate in the first measurement only, hence no means for these schools are plotted for the second measurement.

Figure 2

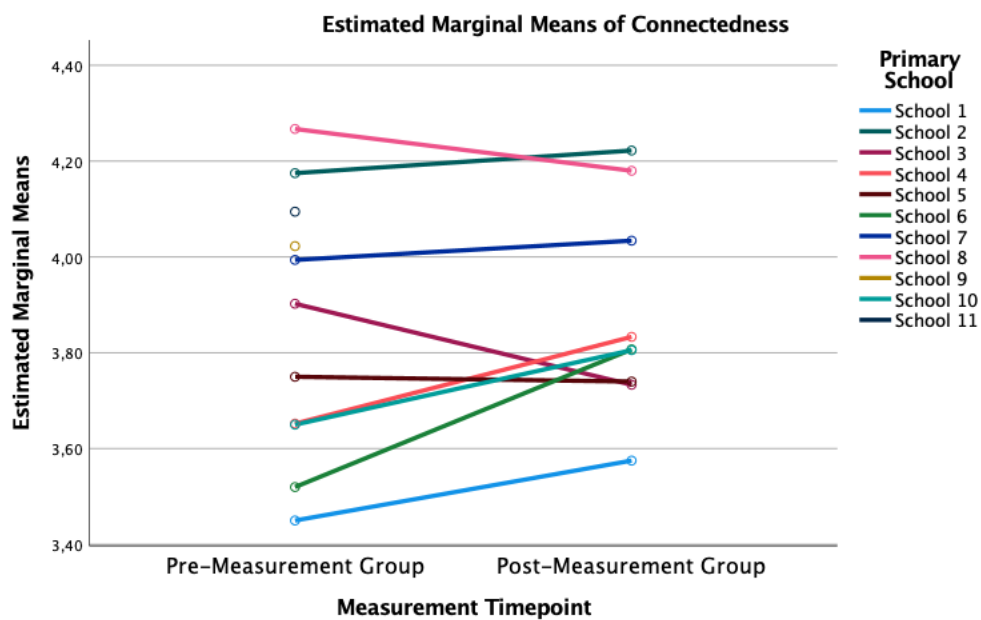
Change in Means of Perceived Competence between Pre-Measurement and Post-Measurement per Primary School



Note. Schools 9 and 11 did participate in the first measurement only, hence no means for these schools are plotted for the second measurement.

Figure 3

Change in Means of Perceived Connectedness between Pre-Measurement and Post-Measurement per Primary School



Note. Schools 9 and 11 did participate in the first measurement only, hence no means for these schools are plotted for the second measurement.

Appendix C

Excluded Participants

35 participants were excluded from the pre-measurement group and 12 participants were excluded from the post-measurement group. This resulted in a total exclusion of 47 participants from the data set. The reasoning behind exclusion is presented for each participant. Participants are identified by anonymous response IDs.

Table 3

Exclusion Criteria for the Pre-Measurement Group

Exclusion Criteria	
Participants showed missing data	<ol style="list-style-type: none"> 1. R_3oC0H7qXIyNF0rc 2. R_2sYbS07kTkRphmK 3. R_wTUSFyuYkc6zApb 4. R_1faac5v6HtQc5p0 5. R_2dgX6dPiQsuMZho 6. R_9WCqewSop16PZrb 7. R_31HMfuqhGEQE9nP 8. R_2WT5qWzGiSUIVdn 9. R_1EWEFskvPSPMFNW 10. R_1K7JaUDu8yrfZ6B 11. R_1oBcIK1wbzjitHY 12. R_2tLRKqZrYgwhApx 13. R_br1q0pfZJHCKKU9 14. R_1j9BQbGF1YAG4hn 15. R_3Cp1kczbczRAbJf 16. R_262vPCqmuRnC5By 17. R_2D85uMNVyQkbLhH 18. R_3ey6V6uOULPtBjK 19. R_2wjkjtFRRshrnnE 20. R_3hrqed85LKFcsGx 21. R_BSywh7WzX0IJ3ID 22. R_3RwnehCQdUNRNTq 23. R_3RrLHMb0Z9DTVne 24. R_24y77LiJIKn9iWR 25. R_3hAR3fzEkz6uBPk
Participants indicated unserious answers on Q7_3 Gender	<ol style="list-style-type: none"> 1. R_3e8KK1LYqNc6WM5 2. R_2tsSvTGQ4ODAAzW 3. R_00uKRn6GR9uanXr 4. R_3NBYBHfaJIYGohC
Participants filled in the highest or lowest possible score on all items	<ol style="list-style-type: none"> 1. R_OBSkCu5O4vKy9Xj 2. R_STva9y8hHw3Lwgp
Participants completion time of the survey was considerably outside the interquartile range and considered an outlier	<ol style="list-style-type: none"> 1. R_2uR6jh4LZM2y0zq 2. R_2q4akoCGzSlwDVm 3. R_2rUsisHrPyT5WtX 4. R_3gXYS3DHHu6E563

Table 4*Exclusion Criteria for the Post-Measurement Group*

Exclusion Criteria	
Participants showed missing data	<ol style="list-style-type: none"> 1. R_3nC8Sp6gJ6Wicj 2. R_1Ca1uv6UEsDzw44
Participants indicated unserious answers on Q7_3 Gender and/or Q9 Age	<ol style="list-style-type: none"> 1. R_3fPfHweFYkRYcX7 2. R_u30gRQetKdZfhv3 3. R_12mQSWkylCjEzPn 4. R_3rTgbdQYfPfyQxS 5. R_rrOOVmBKK4o9EaZ
Participants filled in the highest or lowest possible score on all items	<ol style="list-style-type: none"> 1. R_2B4HqKIT8PwYAjb
Participants completion time of the survey was considerably outside the interquartile range and considered an outlier	<ol style="list-style-type: none"> 1. R_1PTqSkfMK1Z3hBH 2. R_2R4COLjSVdVhGrU 3. R_24uOU34TPH9dbFy 4. R_3lWhvEaE2P2qX3K

Appendix D

Survey Instrument

The survey was based on the dissertation research of Evelein (2005) and adapted to be used with primary school students. All items were answered on a five-point Likert scale. Participants could choose between (1) “absolutely not”, (2) “a little bit”, (3) “sometimes yes, sometimes no”, (4) “a lot”, and (5) “very much”.

Items Measuring Autonomy

- (A) In class, I can choose things that suit my interests.
- (B) In class, I am allowed to do tasks in my way.
- (C) In class, I am allowed to do things that are important to me.
- (D) In class, I can be the way I am.

Items Measuring Competence

- (A) In class, I feel that I use my qualities well.
- (B) In class, I feel that I manage to do difficult things well.
- (C) In class, I feel I can do difficult tasks well.
- (D) I feel that I can handle a lot.

Items Measuring Connectedness

- (A) In class, I feel good contact with the other children.
- (B) In class, I feel I have a good relationship with the other children.
- (C) In class I feel that I belong.
- (D) I feel that other students like me.