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The importance of pre-measurements of wellbeing and achievement for students' current wellbeing

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Educational effectiveness research focuses not only on cognitive output but also on affective student outcomes. Student wellbeing has to be addressed as an important output variable of the educational process. The focus in this study is on student wellbeing at the end of Grade 10 and its relationship to current achievement, and pre-measurements of student wellbeing and achievement. Student characteristics and motives for attending school are taken into account. Moreover, within classroom environment research, student perceptions of psychosocial characteristics within the classroom are considered as an important factor in the explanation of student wellbeing. Data from 429 students at 13 different secondary technical and vocational training schools in Flanders (Belgium) are used. The results indicated that pre-measurements of student wellbeing and achievement are positively related to student wellbeing at the end of Grade 10. No relationship was found between student wellbeing and achievement when both are measured at the end of Grade 10. Furthermore, students feel better when they perceive their teacher's interpersonal behaviour in the classroom as tolerant/authoritative and not as authoritarian.

Introduction

For many years traditional educational effectiveness research considered academic achievement as the sole output factor in the assessment of educational processes (Reynolds & Teddlie, 2000). An increase in student achievement was considered the main goal, while factors including time on task, the opportunity to learn, and instruction functioned as explanatory variables. Within the last few decades, the importance of affective output factors has been integrated into educational effectiveness research, alongside the original cognitive factors (Knuver & Brandsma, 1993; Samdal, Wold, & Bronis, 1999; Konu, Litonen, & Autio, 2002; Opdenakker & Van Damme, 2000). Scheerens' (1990) CIPO model is an example of this integration, as it includes both cognitive and affective factors as part of the output component. Attention to the more subtle, but important aspects of school life, such as student wellbeing, has also emerged within classroom environment research (Fraser, 2007; Fraser & Walberg, 1991; den Brok, 2001). In this approach, the relationship between student perceptions of psychosocial characteristics of the classroom and student outcomes is examined (Fraser, 2007; Fraser *et al.*, 1991; Fraser, 1994; Wubbels, Brekelmans, den Brok, & Tartwijk, 2006). More specifically, by taking into account the student's perceptions of the teacher's interpersonal behaviour, the educational process can be studied from an interpersonal perspective (den Brok, 2001).

In current educational effectiveness research, as well as classroom environment research, there is a need for multiple measures of schooling out-

comes. Since a harmonious development of students' cognitive, affective, and social outcomes is the ideal, it is important to include these variables into the analysis and evaluation of schooling outcomes. However, the operationalization of non-cognitive outcomes (i.e. affective outcomes) is quite diverse. According to Knuver and Brandsma (1993) affective outcomes refer to attitudes the student has towards school and learning. Several research studies use student wellbeing as an affective outcome (Knuver & Brandsma, 1989; Samdal *et al.*, 1999; Opdenakker *et al.*, 2000). Explaining student wellbeing is not as straightforward as it may seem; such non-cognitive output factors are difficult to measure. Findings and their significance often depend on the precise way affective components have been defined (Knuver *et al.*, 1993; Samdal *et al.*, 1999; Tymms, 2001). Engels, Aelterman, Schepens, and Van Petegem (2004a) define student wellbeing as "a positive emotional state that is the result of a harmony between the sum of specific context factors on the one hand and the personal needs and expectations towards the school on the other hand" (p.128). This definition reflects dynamic involvement and positive change (Seligman & Csikszentmihalyi, 2000; Arthaud-Day, Rode, Mooney & Near, 2005; Schaufeli & Bakker, 2001), and also refers to a person-environment fit condition (Kristof, 1996).

We believe that including affective variables such as student wellbeing into educational research can further our understanding of student outcomes. Numerous studies report a lack of motivation, or decrease in positive school related attitudes, of students in secondary education (Eccles, Lord, & Midgley, 1991; Anderman & Maehr, 1994). This decline has been attributed to psychological changes associated with puberty and the school environment (Anderman *et al.*, 1994; Eccles *et al.*, 1991; Midgley, Feldlaufer, & Eccles, 1989). According to the differentiation-polarization theory, low-stream students, or students of technical and vocational training schools, develop an anti-school culture in comparison with high-stream students who develop a positive school culture (Hargreaves, 1967; Van Houtte, 2006; Van de gaer, Pustjens, Van Damme, & De Munter, 2006). As a consequence, students from low streams are less motivated and drop out of school more frequently.

The relationship between wellbeing and academic achievement is often studied as a component of educational quality. The ideal is to strive for high achievement (cognitive output) and student wellbeing (affective output), which would then start a positive cycle enhancing each realized output. Indeed, such a reciprocal relationship between student wellbeing and achievement is assumed in other research (Knuver *et al.*, 1993; Samdal *et al.*, 1999; Tymms, 2001): satisfaction at school can be a result of successful academic experiences, and can also stimulate further achievement. In literature, this is described as 'the good circle'; high achievement scores increase student wellbeing, which helps create better student motivation which again leads to higher achievement scores (Samdal *et al.*, 1999).

Schools can be effective on both cognitive and affective levels (Knuver *et al.*, 1993). Opdenakker *et al.* (2000) state that wellbeing and achievement are

two separate output factors and are relatively independent. We believe that it is essential to maintain a balanced focus on both components. The relationship found between student's affective and cognitive experience varies significantly depending on the level of analyses. Context characteristics rarely have the same effect on both affective and cognitive output factors; some characteristics appear to correlate with the cognitive component, while having no effect on the affective component, and vice versa (Opdenakker *et al.*, 2000). In the present study we will take into account the student's perceptions of psychosocial classroom characteristics when explaining student wellbeing. These perceptions describe the type of interpersonal relationship that has emerged between teachers and students, and are an important factor in determining classroom climate (Van Houtte, 2005; Fraser, 2007; Fraser, 1994; Maslowski, 2001). Climate factors, such as the social system in the classroom, have been incorporated in other effectiveness models and have been shown to exert a direct influence on student outcomes (Creemers & Reezigt, 1999; Creemers, 1994). For students to classify their perceptions, we use Wubbels, Brekelmans and Hooymayers' (1991) typology of the teacher's interpersonal behaviour, which was developed on the basis of the systems approach to communication (Watzlawick, Beavin, & Jackson, 1967) and Leary's (1957) study of interpersonal diagnosis of personality.

In this study we investigate whether student wellbeing (at the end of Grade 10) can be explained by current achievement as well as pre-measurements of wellbeing and achievement. We specifically focus on students of the lower streams, i.e. students attending vocational and technical secondary schools. We chose this group of students since previous research suggests that they have a lower wellbeing score in comparison with students enrolled in academic schools (Engels, Aelterman, Schepens, & Van Petegem, 2004a). Since the student-teacher relationship is an important dimension of the classroom environment and climate (Tagiuri, 1968; Maslowski, 2001), we have operationalized climate factors as students' perceptions of the teacher's interpersonal behaviour (Anderson, Hamilton, & Hattie, 2004). These are measured at the beginning of Grade 9, and their relationship with student wellbeing is examined. This can be done because these students have the same teachers during Grades 9 and 10. Furthermore, in this study a distinction is made between student perceptions of interpersonal behaviour for practical and academic teachers because attitudes regarding these subjects can differ (Van de gaer *et al.*, 2006; Doppelt, 2006; Van Den Broeck, Opdenakker, & Van Damme, 2005). Moreover, technical and vocational training focuses on learning by doing, which often leads to these students being more interested in practical courses than in theoretical ones (De Maeyer, Rymenans, Daems, Van Petegem, & Van den Bergh, 2003).

Method

Sample

The participants in this study were 429 students of 13 technical and voca-

tional training schools in Flanders (Belgium). A four-stage sampling strategy was used. First, a sample of 20 schools in Flanders (Belgium) was drawn from a database of the inspectorate that consists of all technical and vocational training schools inspected in the school year 2003–2004. Second, within all these schools, 129 classes of the 10 most common study options were selected. Third, data of all 1 701 students in those classes within technical and vocational training schools was gathered. Fourth, only those students (N = 429) who could participate at both measuring moments were selected. Of this sample, 334 (78%) were male; the mean age was 14.5 years; and 386 (90%) were native Belgian.

Instruments

Student wellbeing was measured at the beginning of Grade 9 and at the end of Grade 10. By means of an exploratory factor analysis, nine items with the highest factor loadings were selected out of the original Wellbeing Inventory of Secondary Education (WISE) (Engels, Aelterman, Van Petegem, Schepens, & Deconinck, 2004b). Wellbeing is calculated as the sum score of these nine items. Each item is scored on a 5-point Likert scale, from 1 (totally disagree) to 5 (totally agree). The reliability and validity of this instrument is satisfactory, and described in an earlier study of Engels *et al.* (2004b). Below, the items are listed in the order of regression weight estimates from the highest to the lowest:

Item 1: Are you satisfied with teachers' attitudes towards the students? (λ = .72)
Item 2: Are you satisfied with the way the school board directs the school? (λ = .69)
Item 3: Are you satisfied with the support staff's attitude towards students? (λ = .67)
Item 4: Can you participate enough at school? (λ = .60)
Item 5: Do students with problems receive enough support? (λ = .57)
Item 6: Are you satisfied with the didactical materials used during the lessons? (λ = .57)
Item 7: Do you learn at school what you want to learn about? (λ = .51)
Item 8: Do you respect all school rules? (λ = .45)
Item 9: Are your teachers too strict? (λ = .28)

These items provide a simple measure for student wellbeing. Furthermore, construct validity is met, as the items still reflect the multidimensional character of wellbeing. Items about satisfaction, feelings, and behaviour are included. A Cronbach's alpha of .74 for student wellbeing represents a reliable scale. Questions regarding student demographics, such as gender, nationality, and student motivation for attending school are included in the introduction of the Wellbeing Inventory of Secondary Education. Student motivation is measured by five separate questions. Students are asked to confirm or deny each question: (1) I attend school because my friends are there; (2) I attend school to learn; (3) I attend school to obtain a diploma; (4) I attend school

because I find the courses interesting; (5) I attend school because I have to.

Academic achievement is measured by administering language and mathematics tests at the beginning of Grade 9 and at the end of Grade 10 and calculating the mean scores on the tests. The tests administered were specifically constructed for the Longitudinal Research in Secondary Education Project (Van Damme & Onghena, 2002) and are composed of curriculum relevant multiple-choice items, approved by a board of inspectors and teachers. Different versions of the tests were constructed to address the differences in curricula for Dutch and mathematics (Van Damme & Van Landeghem, 2002). Because of a partial overlap in items between the different versions, the scores on the different versions were made comparable using IRT analysis (Van Damme & Onghena, 2002). This was done for the different versions used at one measuring moment, as well as for different versions used at different measuring moments (i.e. at the beginning of Grade 9, and the end of Grade 10). The mathematics tests consist of numeric and geometrical knowledge. The language tests measure spelling, grammar, language usage, and reading comprehension. An extensive description of the construction, validity and reliability of these tests is included in Van Damme, De Troy, Meyer, Minnaert, Lorent, Opdenakker *et al.* (1997).

The Questionnaire on Teacher Interaction (QTI; Wubbels, Créton, Brekelmans and Hooymayers, 1987) is used to measure student perceptions of the teacher's interpersonal behaviour. This questionnaire consists of 77 items and distinguishes between different types of teachers. Items are scored on a 5-point Likert scale ranging from 1 (never) to 5 (always). The use of this questionnaire is linked with the model of interpersonal teacher behaviour, which can be considered as circumplex (den Brok, 2001; Kyriakides, 2005) in that it can be reduced to two dimensions: influence and proximity. The degree to which a teacher leads classroom communication distinguishes dominant teachers from submissive teachers (influence dimension). The distance in the relationship between teacher and students is characterized by cooperation or opposition (proximity dimension). These two dimensions are independent as indicated by the orthogonal relationship between both dimensions. The eight sectors of the typology are expected to be ordered with equal distances to each other on a circular structure and maintain equal distances to the middle of the circle. Within a circumplex model there is a strong interdependency between the eight sectors. If we wish to create a more pragmatic and usable operationalization of the teacher's interpersonal behaviour, to include as a variable within future research, a simplification of the entire model is necessary.

To do this, we started with an analysis (with Permap) to look for item clusters. The results showed that a simplification from eight sectors into four quadrants was indicated. Notwithstanding the fact that a detailed operationalization of the teacher's interpersonal behaviour in eight sectors gives the most truthful representation of practice, our simplification increases the usefulness

of the model in other analyses. From a theoretical perspective, such simplification is more feasible.

As such, four quadrants can be distinguished, i.e. dominant-cooperative (DC), submissive-cooperative (SC), submissive-opposite (SO), and dominant-opposite (DO). Each quadrant is related to the teacher's specific interpersonal behaviour. Items from each quadrant include: 'This teacher explains things clearly' (DC), 'We can influence this teacher' (SC), 'This teacher thinks that we don't know anything' (SO) and 'This teacher is impatient' (DO). The reliability and validity of the QTI has been confirmed in several studies (Brekelmans, Wubbels, & Créton, 1990; Fisher, Fraser, & Wubbels, 1993; Wubbels & Levy, 1991).

Procedure

Students were approached at the beginning of Grade 9 and again at the end of Grade 10. At the beginning of Grade 9 each student filled out the WISE, the QTI, and a language and a mathematics test. The WISE, the language and mathematics tests are administered once, and the QTI is filled out three times; once for their practical teacher, once for their mathematics teacher, and once for their language teacher. At the end of Grade 10, the WISE and a language and mathematics test were administered again. Since the interpersonal style of a teacher remains relatively stable (Wubbels *et al.*, 2006), the QTI is not administered again at the end of Grade 10.

Variables

Questions about student characteristics, such as gender, nationality, and motives for attending school are included in the introduction of the Wellbeing Inventory of Secondary Education. Only the information gathered at the beginning of Grade 9 is used in the analysis. Gender is taken into account because other studies have found differences between boys and girls in wellbeing or achievement (Engels *et al.*, 2004a; Knuver *et al.*, 1993; Van de gaer *et al.*, 2006; Konu *et al.*, 2002). According to these studies the wellbeing of girls is significantly higher than the wellbeing of boys. Achievement scores also seem to differ for boys and girls, and are often related to the subject (Bosker, Kremers, & Lugthart, 1990; Van de gaer *et al.*, 2006; Knuver *et al.*, 1993; Sally & Sammons, 1997; De Maeyer *et al.*, 2003). Students' nationality is taken into account because other studies have found differences in achievement based on ethnicity (Sally *et al.*, 1997). Students' nationality is sometimes replaced by language spoken at home to examine the relationship with achievement on language tests (Van de gaer *et al.*, 2006; Knuver *et al.*, 1993). Student motivation has been taken into account as a control variable. Student motivation seems to be related with not only aspects of classroom climate (i.e. student wellbeing), but also with student achievement (Anderson *et al.*, 2004; Van Den Broeck *et al.*, 2005). Related to this, school can be considered as a learning and living environment, or a place where students want to feel good (van der Veen, 1989). Motivation and demographic variables are dummy coded.

Data analysis

Student wellbeing and achievement are measured at the beginning of Grade 9 and at the end of Grade 10. For all other variables, i.e. demographics, motives, and perceptions of the teacher's interpersonal behaviour, measurements at the beginning of Grade 9 are used. A regression analysis is executed to examine which variables can explain student wellbeing at the end of Grade 10. The model is built hierarchically. In step 1 student demographics such as gender and nationality are introduced. In step 2 student motives for attending school are added to the model. In step 3 student perceptions of the teacher's interpersonal behaviour are included next to the motives that are shown to be significant in step 2. In step 4 the relationship with other student outcomes are the focus. Student wellbeing and achievement at the beginning of Grade 9 and student achievement at the end of Grade 10 are added to the model next to student motives and perceptions that are significant. In step 5 we examine if the relationship between student wellbeing and achievement at the end of Grade 10 is disguised by the pre-measurement of student achievement. In step 6 interaction effects between student wellbeing and achievement are explored.

Results

Table 1 shows the descriptive statistics regarding student wellbeing for categorical variables; gender, nationality, and motivation taken at the beginning of Grade 9. Results indicate that most students report 'obtaining a diploma' as their strongest motive for attending school. The student's interest in the courses seems to be the least important motive for attending school. Furthermore, Table 1 shows the mean wellbeing scores of students according to their gender, nationality, and motives for coming to school. When students indicate that they come to school to learn, their wellbeing score is the highest (M = 30.78: SD = 5.2). When they feel obliged to come to school, their wellbeing score is the lowest (M = 28.74: SD = 5.4). The mean wellbeing score of all students is approximately 30 (SD = 5) on a scale from 9 to 45.

Table 2 shows statistics of each quadrant of the typology of interpersonal teacher behaviour for both the practical and academic teachers. Results indicate that most of the students perceive their teachers as dominant-cooperative (DC), while the lowest score can be found for submissive-opposite teacher behaviour (SO). Student perceptions of the teacher's interpersonal behaviour seem to be quite similar for both practical and academic teachers. However, we wish to examine the relationship between student's perceptions and wellbeing. Based on other studies (Midgley *et al.*, 1989; Doppelt, 2006; Van Den Broeck *et al.*, 2005), we expect that the relationships between the four quadrants and student wellbeing will differ for practical and academic courses; this is because students tend to harbour different attitudes towards different courses. Such attitudes can be reflected in their perceptions of the teachers' interpersonal behaviour in the classroom, and determine the relationship with student wellbeing.

Table 1 Mean scores and standard deviations of student wellbeing for the different categorical variables at the beginning of Grade 9

Student characteristic	Categories	N	Mean wellbeing	*SD*
sex	boys	334	29.80	5.4
	girls	95	30.42	4.8
nationality	Belgian	386	29.94	5.3
	non-Belgian	43	29.92	5.1
motive friends	no	134	30.02	5.6
	yes	295	29.89	5.1
motive learn	no	216	29.10	5.2
	yes	213	30.78	5.2
motive diploma	no	65	29.36	5.2
	yes	364	30.04	5.3
motive interest	no	307	29.71	5.4
	yes	122	30.51	5.0
motive obliged	no	290	30.51	5.1
	yes	139	28.74	5.4

Table 2 The minimum and maximum value, mean, and standard deviation of each quadrant of the typology of interpersonal teacher behaviour for the practical and the academic teacher

	Quadrant	Minimum	Maximum	Mean	*SD*
Practical teacher	DC	0.08	0.94	0.62	0.11
	SC	0.13	0.77	0.52	0.07
	SO	0.07	0.79	0.35	0.08
	DO	0.08	0.82	0.47	0.08
Academic teacher	DC	0.23	0.94	0.63	0.11
	SC	0.15	0.86	0.51	0.08
	SO	0.07	0.57	0.31	0.08
	DO	0.19	0.76	0.46	0.09

Note: DC = dominant-cooperative SC = submissive-cooperative
SO = submissive-opposite DO = dominant-opposite

Table 3 shows the results of the hierarchical regression analysis, with student wellbeing at the end of Grade 10 as the dependent variable. In the first step in the analysis, no significant relationship is found between student wellbeing at the end of Grade 10 and student gender or nationality. This means that there is no difference in student wellbeing between males and females or between Belgian and non-Belgian students.

Student motives for attending school are added to the model in step 2 and there is a significant relationship between some student motives, and student wellbeing at the end of Grade 10: when students indicate that they are interested in their courses, their wellbeing increases. A significant but negative

relationship is found between the motive 'obliged' and student wellbeing: when students feel obliged to come to school, their wellbeing decreases.

In step 3 student perceptions of the teacher's interpersonal behaviour are introduced into the model. A distinction is made between student perceptions of the practical and academic teacher. Each teacher is situated within the four quadrants of the typology of the teacher's interpersonal behaviour. The results indicate that when students perceive the interpersonal behaviour of their practical teacher as dominant-cooperative (DC), student wellbeing increases. When the practical teacher's interpersonal behaviour is perceived as submissive-cooperative (SC) by the students, a negative relationship with student wellbeing at the end of Grade 10 is found. However, this relationship is no longer significant when, in the next step, other student outcomes are included in the model. Students who perceive the teacher's interpersonal behaviour of their academic teacher as submissive-cooperative (SC) also score higher on the wellbeing scale, but when they perceive the interpersonal behaviour of their academic teacher as dominant-opposite (DO) their wellbeing decreases at the end of Grade 10.

In step 4, pre-measurements (taken at the beginning of Grade 9) of student wellbeing and achievement, and current measurements (at the end of Grade 10) of student achievement, are included into the model. The results indicate significant positive relationships between student wellbeing at the end of Grade 10, and pre-measurements of student wellbeing and achievement. No significant relationship is found between student wellbeing and achievement at the end of Grade 10. This indicates that student wellbeing is based on previous experiences.

To examine whether the relationship between student wellbeing and achievement at the end of Grade 10 is disguised by the pre-measurement of student achievement, this last variable is deleted in step 5 of the model represented in Table 3. Still no significant result is found for the relationship between student wellbeing and achievement at the end of Grade 10. This suggests that student wellbeing can be explained by pre-measurements of student wellbeing and achievement but not by current achievement.

In step 6 the relationships between student wellbeing at the end of Grade 10 and interaction effects of student wellbeing and achievement are examined. The results indicate that the relationship between student achievement at the beginning of Grade 9, and student wellbeing at the end of Grade 10, are moderated by student wellbeing at the beginning of Grade 9. However, the model represented in step 6 of Table 3 is not significantly better than the previous ones, which means that including these interaction terms is not meaningful.

When the same analysis is performed, but the two values of achievement (one at the beginning of Grade 9 and one at the end of Grade 10) are replaced by their difference score, no significant relationship is found with student wellbeing. This means that there is no relationship between differences in achievement and student wellbeing at the end of Grade 10. Interaction terms of student outcomes and gender are also not significant when included in the analyses.

Table 3 Hierarchical regression analysis with student wellbeing at the end of Grade 10 as the dependent variable

Model: Predictor	*B*	*SE*	*β*	*p*
Step 1 of the hierarchical regression. $F(2, 426) = .363$, $p > 0.01$; $R^2 = .002$				
Sex	.498	.586	.041	.396
Nationality	.007	.910	.000	.993
Step 2 of the hierarchical regression. $F(7, 421) = 3.208$, $p < 0.01$; $R^2 = .051$				
Sex	.660	.587	.055	.261
Nationality	−.016	.805	−.001	.985
Motive friends	.093	.533	.009	.862
Motive learn	.303	.246	.060	.218
Motive diploma	−.015	.224	−.003	.948
Motive interest	.346	.135	.125	.011*
Motive obliged	−.304	.104	−.142	.004**
F Change = $F(5, 421) = 4.341$, $p < 0.01$; $\Delta R^2 = .049$				
Step 3 of the hierarchical regression. $F(12, 416) = 14.187$, $p < 0.01$; $R^2 = .290$				
Sex	−.325	.514	−.027	.528
Nationality	.133	.699	.008	.849
Motive interest	.328	.119	.118	.006**
Motive obliged	−.243	.091	−.113	.008**
DC practical	18.227	4.150	.397	.000**
SC practical	−10.636	5.121	−.157	.038*
SO practical	1.135	4.340	.018	.794
DO practical	−3.123	3.552	−.052	.380
DC academic	−.030	4.193	−.001	.994
SC academic	11.260	4.991	.189	.025*
SO academic	1.391	3.993	.023	.728
DO academic	−16.689	3.366	−.297	.000**
F Change = $F(8, 416) = 17.827$, $p < 0.01$; $\Delta R^2 = .239$				

Table 3 Continued

Model: Predictor	*B*	*SE*	*β*	*p*
Step 4 of the hierarchical regression. F (11, 417) = 17.043, $p < 0.01$; R^2 = .310				
Sex	−.336	.505	−.028	.506
Nationality	.064	.681	.004	.926
Motive interest	.316	.118	.114	.007**
Motive obliged	−.218	.090	−.102	.016*
DC practical	14.089	3.680	.307	.000**
SC practical	−4.989	5.240	−.074	.342
SC academic	6.406	3.209	.107	.047*
DO academic	−14.354	2.797	−.256	.000**
Wellbeing Grade 9	.112	.051	.118	.027*
Achievement Grade 9	.053	.021	.121	.010*
Achievement Grade 10	.015	.022	.031	.491
F Change = F (3, 417) = 4.333, $p < 0.01$; ΔR^2 = .020				
Step 5 of the hierarchical regression. F (10, 418) = 17.831, $p < 0.01$; R^2 = .299				
Sex	−.328	.508	−.027	.519
Nationality	.083	.686	.005	.904
Motive interest	.312	.118	.112	.009**
Motive obliged	−.216	.091	−.101	.017*
DC practical	15.098	3.684	.329	.000**
SC practical	−8.891	5.054	−.131	.079
SC theoretical	7.801	3.186	.131	.015*
DO theoretical	−15.418	2.785	−.274	.000**
Wellbeing Grade 9	.114	.051	.120	.026*
Achievement Grade 10	.027	.022	.056	.206
F Change = F (2, 418) = 3.095, $p < 0.05$; ΔR^2 = .011 (step 4 – step 5)				

Table 3 Continued

Model: Predictor	*B*	*SE*	*β*	*p*
Step 6 of the hierarchical regression. F (13, 415) = 14.803, $p < 0.01$; R^2 = .317				
Sex	−.343	.505	−.028	.497
Nationality	.137	.683	.008	.842
Motive interest	.318	.118	.115	.007**
Motive obliged	−.218	.090	−.102	.016*
DC practical	10.581	2.261	.236	.000**
SC theoretical	6.379	3.197	.107	.047*
DO theoretical	−14.002	2.801	−.249	.000**
Wellbeing Grade 9	.121	.050	.127	.017*
Achievement Grade 9	.063	.020	.142	.002**
Achievement Grade 10	.015	.022	.030	.507
Wellb. Grade 9 × Achiev. Grade 9	.007	.004	.086	.048*
Wellb. Grade 9 × Achiev. Grade 10	−.005	.004	−.055	.194
Achiev. Grade 9 × Achiev. Grade 10	−.001	.002	−.032	.476
F Change = F (3, 415) = 1.651, $p > 0.05$; ΔR^2 = .007 (step 4 − step 6)				

Note: ** significant (p = .01); * significant (p = .05)

Discussion

In the present study we investigated whether student wellbeing (at the end of Grade 10) can be explained by current achievement as well as pre-measurements of wellbeing and achievement. In our analysis student demographics, motives for attending school, and student perceptions of the teacher's interpersonal behaviour were taken into account. A positive correlation between student wellbeing at the beginning of Grade 9, and student wellbeing at the end of Grade 10 was found. A positive correlation between student achievement at the beginning of Grade 9, and student wellbeing at the end of Grade 10 was also found. There was no significant relationship between student wellbeing and student achievement at the end of Grade 10. This suggests that student wellbeing is not affected by current cognitive outcomes. Similarly, the results of Opdenakker *et al.* (2000) indicate that student wellbeing and achievement, measured at the same time, can be considered as relatively independent constructs. This means that an increase in one of the outcomes is not necessarily at the expense of the other. This is in contrast with the assumptions of Leune (1993), who states that an increase in affective outcomes is associated with a decrease in cognitive outcomes, and vice versa. In general, the positive relationship between student wellbeing at the end of

Grade 10 and pre-measurements of student wellbeing and achievement fits the idea that wellbeing can be considered as a trait, and not only as a state (Costa, McCrae, & Zonderman, 1987). Pre-measurements of affective as well as cognitive student outcomes are important in explaining later wellbeing.

When explaining student wellbeing at the end of Grade 10, the motive 'interest in the courses', has a positive relationship with wellbeing. This result is important because, as shown in Table 1, 'interest in the courses' is the least popular motive for students to come to school when asked at the beginning of Grade 9. A possible reason for this is the cascade system, whereby many students have former failing experiences before they end up in technical and vocational training. Based on these findings it is crucial that students be allowed to choose their own stream and study option at the beginning of Grade 9 based on their interest as it motivates them. Anderson, Hamilton, and Hattie (2004) also found a relationship between student motivation and various aspects of classroom climate. They found a positive relationship with student wellbeing, and that motivation can be considered as an important prerequisite for learning (Opdenakker *et al.*, 2000; Van Damme & Van Landeghem, 2002). Related to motivation, we find that students' wellbeing increases when school is not experienced as an obligation. A positive attitude towards school is crucial for their wellbeing. This condition is also reflected in the definition of student wellbeing where the focus is on 'a positive emotional state' (Engels *et al.*, 2004a).

Our results indicate a positive relationship between student perceptions of the teacher's interpersonal behaviour and student wellbeing: that is, the proximity dimension of the typology of the teacher's interpersonal behaviour correlates with wellbeing, which offers support to the findings of Brekelmans (1989). Students feel better when they perceive their practical teacher's behaviour as dominant-cooperative (DC). The dominant-cooperative behaviour corresponds, in Brekelmans' typology of the teacher's interpersonal behaviour (Brekelmans, 1989), with the tolerant/authoritative type of teacher. This teacher develops close relationships with students, which are characterized by a strong cooperative component. A lot of attention is paid to the needs and expectations of the students. Apart from clearly structured teaching, students get much freedom and responsibility; discipline is present, and students work on their task because they view it as pleasant and interesting. Students of technical and vocational training are positively oriented towards this type of practical teacher. Other research (Van Petegem, Aelterman, Rosseel, & Creemers, 2007) indicates that students feel good when the teacher directs the communication in the classroom, and when the teacher and students are cooperating.

For academic teachers, interpersonal behaviour that is perceived by the students as the submissive-cooperative type (SC) is positively related with student wellbeing, while there is a negative relationship between student perceptions of the dominant-opposite teacher (DO) and student wellbeing. Within the typology of interpersonal teacher behaviour, this means that students like the tolerant type and do not like the authoritarian type. The tolerant academic teacher allows students to participate a lot. The teacher is less

leading, but very cooperative, and there is an agreeable classroom climate. The aims and needs of the students are taken into account; students can participate and feel responsible. The personal involvement of the teacher motivates students, in comparison with the authoritarian type of teacher who dominates the whole class. The main focus of the authoritarian type of teacher is on cognitive output, and thus the classroom climate is less friendly. Student initiative has no place here, and the distance in the relationship between the teacher and students is large.

The differences in student perceptions can be attributed to either the fact that students of technical and vocational training have a different relationship with their practical teacher than with their academic teacher, or that student attitudes simply differ towards certain courses or subjects (Midgley *et al.*, 1989; Van Den Broeck *et al.*, 2005). In practical courses the subject matter is approached far less theoretically or academically. In technical and vocational training, student motivation for practical courses is often higher than for academic courses. The choice for a certain subject or direction can be an important determinant, and practical teachers can interact differently with their students to better succeed in stimulating student motivation. The importance of motivation to increase student wellbeing has already been indicated in this discussion. These findings make us conclude that the classroom climate is not only important in its own right, but it also determines student perceptions of the classroom environment.

The added value of this study for educational effectiveness research is that student wellbeing has been considered as a valuable goal next to achievement. Cognitive and affective outcomes seem to be relatively independent constructs when measured at the same time but a relationship of these outcomes is found with later wellbeing at school. In general, attention should be given to factors that increase student achievement as well as creating an agreeable classroom climate where students feel good.

The importance of student wellbeing as indicator of educational quality is reflected in the education inspectorate's interest in it. In our study we focused on students attending vocational and technical secondary schools, since previous research suggests that they have a lower wellbeing score in comparison with students enrolled in academic schools (Engels *et al.*, 2004a). Overall our results suggest that even in technical and vocational training schools, student wellbeing is not very problematic, with a mean score of about 30 on a scale from 9 to 45.

Conclusion

Our purpose in this study was to examine whether student wellbeing can be explained by current achievement and pre-measurements of affective as well as cognitive outcomes. Pre-measurements of student wellbeing and achievement are positively related to student wellbeing at the end of Grade 10, but no relationship is found between student wellbeing and achievement at the end of Grade 10. Based on these results, we conclude that working on high cognitive as well as high affective outcomes is important for students' later affective outcomes, i.e. student wellbeing can be considered as a trait and not

only as a state. Furthermore, the results indicate that students' interest in their courses is crucial for their wellbeing. When students experience school as an obligation, a negative relationship with student wellbeing is found. Students' perceptions of the teacher's interpersonal behaviour are also related to student wellbeing.

Further research should examine factors, other than pre-measurements, that may be relevant to the stimulation of student wellbeing. Student achievement and wellbeing seem to be relatively independent constructs when measured at the same time. Because characteristics can align themselves differently with the affective component than with the cognitive component it is important to integrate diverse research approaches to further our understanding of student outcomes in general. Educational effectiveness research is an important knowledge base, but findings from classroom environment research can also be useful, specifically when investigating student wellbeing. The present study has certain limitations. Firstly, only variables at the student level were included in the analyses. It would be interesting for future research to examine the relationship between student wellbeing and variables at the teacher/classroom or the school level. Such research would give more insight into the complexity of educational processes. Secondly, our sample consisted of mostly males. A replication of this study should attempt to use a sample with more equal representation of males and females to further examine whether differences in wellbeing or achievement are found between boys and girls.

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