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**Abstract**

There is an increased focus on students' non-academic outcomes of schooling and its long-term impact on the adolescents' later life. Teachers are viewed as the most significant factor in schools for improving student learning and development. Little is known on effects of teacher qualifications on students' non-academic outcomes, as this area has had little attention in previous research. The most well-known and widely used measure of non-academic outcomes in adolescence is global self-esteem (GSE). Using data from the National Educational Longitudinal Study (NELS:88) this study investigates how teacher qualifications in terms of certification, educational degree and employment status affect students' development in GSE. Effects of teacher qualifications influence on students' development in GSE over time is modelled using growth curve analysis. Results show that elements in teacher certification, educational degree and employment status have a minor but significant effect on students' GSE. Some of these effects differ between boys and girls, showing that boys react positively to teachers with high levels of content knowledge, while girls react positively to teachers with a higher degree of pedagogical competences. The results indicate that students internalize teachers' behaviour differently, as the reaction to having a part-time teacher differs across gender. Results are discussed in light of current theories of teacher quality.

**Resumen**

Actualmente están aumentando el número de estudio focalizados en en los resultados no académicos de los estudiantes y el impacto de los mismos a largo plazo en la vida de los adolescentes. El profesor es considerado el factor más importante en relación con la mejora del aprendizaje y el desarrollo de loss estudiantes. Sin embargo, se sabe muy poco sobre la relación entre las cualificaciones de los profesores y los resultados no-académicos de los estudiantes, debido a que se ha prestado poca atención a este aspecto en estudios previos. La medida mejor conocida y la que más se usa para los resultados no-académicos de los adolescentes es la autoestima global (global self-esteem GSE). Empleando datos del National Educational Longitudinal Study (NELS:88), el presente estudio investiga de qué manera las cuaificaciones de los profesores en relación a su titulación, el nivel educativo alcanzado y el estatus de trabajo, afecta el desarrollo del GSE en el estudiante. El efecto de la influencia de las cualificaciones de los profesores en el desarrollo del GSE del estudiante a lo largo del tiempo ha sido modelado usando análisis de curva de crecimiento. Los resultados muestran que algunos elementos de la titulación, el nivel educativo alcanzado y el estatus de trabajo del profesor, tienen un efecto menor pero significativo en el GSE de los estudiantes. Algunos de estos efectos difieren entre niños y niñas, mostrando que los niños reaccionan positivamente a profesores con un alto grado de conocimiento de contenido, mientras que las niñas reaccionan positivamente a profesores con un grado más alto de competencias pedagógicas. Los resultados indican además que los estudiantes internalizan el comportamiento de los profesores de diferente manera, ya que la reacción a profesores de tiempo parcial difiere para el sexo. Los resultados son debatidos a la luz de las teorías sobre la calidad de los profesores.

**Keywords**

Teacher qualifications; Global self-esteem; Growth curve analysis

**Palabras clave**

Cualificaciones de los profesores; Autoestima global; Análisis de la curva de crecimiento

## 1. Introduction

Teachers play a significant role for students' academic outcome and social and emotional development (Muijs & Reynolds, 2011; OECD, 2010), and are described as the most significant in-school factor for student success (Geringer, 2003; Muijs et al., 2014; Rivkin, Hanushek, & Kain, 2005). Relatively little is however known on what teacher characteristics that matter, as studies have shown little or no effect of teachers' education in terms of teacher degree, licensing or certification and average marks from teacher education (Darling-Hammond, Berry, & Thoreson, 2001; Goldhaber & Brewer, 2000; Palardy & Rumberger, 2008; Shuls & Trivitt, 2015). Most of the research focus on student academic outcome (Goldhaber & Brewer, 2000; Rockoff, 2004; Shuls & Trivitt, 2015), while little is known on effects of teacher qualifications on students' non-academic outcomes (Blazar & Kraft, 2017; Muijs et al., 2014).

One of the most widely used measures of non-academic outcomes in adolescence is global self-esteem (GSE) (Donnellan, Trzesniewski, & Robins, 2011), which is seen as a reliable indicator of well-being and as a marker of whether developmental tasks of adolescence are successful (Craven & Marsh, 2008). Research has shown that GSE is developed through adolescence and that the school plays a significant role in this development (Eccles et al., 1993; Steinberg & Morris, 2001). These studies have, however, focused on students own reporting of school variables, without inclusion of teachers' actual qualifications.

With an aim for better education and challenges due to high levels of teacher attrition and shortage in some areas, there has been an increased focus on effects of teacher qualifications and on what elements to stress in formal teacher certification and licensing (Bastian & Marks, 2017; Shuls & Ritter, 2013). To get a better understanding of how teachers affect student development, different models of teacher quality and the relation between teachers and students learning and development have emerged during the last years (Jennings & Greenberg, 2009; Rimm-Kaufman & Hamre, 2010). These models stress the importance of viewing students' emotional and behavioural development in line with their academic outcomes as these are found to go hand in hand, and consequently both be linked to quality of teaching. This paper will examine how different formal teacher qualifications affect students' non-academic development in terms of GSE.

## 2. Previous research

### 2.1. Teacher effects

The past decades of school research have stressed the importance of teachers as *the* most significant resource in schools for improving learning and development, as the classroom level is found to explain more of the variance among student outcomes than the school level (OECD, 2010), and a large proportion of this variance could be explained by what teachers actually *do* in the classroom (Muijs & Reynolds, 2011). Research in the outcomes of schooling have traditionally looked at academic gains, but are increasingly including other areas of students development, as focus on the development of the whole child has grown (Simon, Ercikan, & Rousseau, 2013). While school effectiveness research have been looking at implications of teacher qualifications on students' academic outcomes, models of teacher quality and classroom learning have looked at the outcome of schooling from a broader perspective, emphasising other outcomes beside the academics and increasing the focus on teachers' and students' actual behaviour in the classroom (Jennings & Greenberg, 2009; Rimm-Kaufman & Hamre, 2010). The tradition from the human capital literature to look at input into schooling and subsequent output have thus been broadened to also look at what actually happens in the classroom, and how teachers adapt to this based on their qualifications. The research on how teachers contribute to students learning has been summarized in three relatively recent reviews from different perspectives, and the essence of their findings will briefly be presented below.

According to Rimm-Kaufman and Hamre (2010), with point of departure for their model in psychological and developmental science, it is necessary to look at teacher quality in a broader

perspective, and include the *teacher practices* that teachers exhibit in the classroom and their *interactions with students*; elements that are expected both to influence students' academic learning and their social and emotional development. Input thus needs to be seen in relation to teacher practices and interactions, as they are both influenced by teachers' formal qualifications as well as the professional development and psychological attributes that teachers enter with. Therefore the more formal parts of inputs into teacher quality, certification and teacher education (or, to use the phrasing from Rimm-Kaufman & Hamre (2010), teachers professional development and experience), are influenced by teachers psychological attributes and personal development. Within their *Comprehensive Model of Teacher Quality* Rimm-Kaufman and Hamre (2010) emphasise the importance of teachers' personality and relationship history as elements that influences how teachers' formal qualifications manifest in teacher quality.

Jennings and Greenbergs (2009) *Prosocial Classroom model* takes a classroom perspective on the relation between teacher input and student outcome. According to the model students' social, emotional and academic outcome are shaped by the teacher's ability to establish a healthy and prosocial classroom climate. Based on a selective literature review, the model suggests that teachers primarily influence student outcomes (both social-emotional and academic) through their ability to establish healthy teacher-student relationships, implement effective classroom management and effective application of social and emotional learning. The teachers ability to establish these preconditions are, besides through teacher education and experience, influenced by the teachers own social and emotional competences, well-being and how the teacher adapts to the specific challenges he or she meets in the classroom. These adaptations are influenced by individual characteristics such as personality, experience, demographics and other dispositions (Jennings & Greenberg, 2009). According to the literature reviewed, teachers' adaptations play a relatively large role as some of the central elements in the model are only partly taught during teacher training (Hargreaves, 1998; Jennings & Greenberg, 2009). Therefore, certification are expected to play a minor role for teachers influence on students' social-emotional development, while other teacher characteristics such as gender and employment status, and educational characteristics like holding specific educational or psychological qualifications could be more important for student development.

Reviewing the research on effective teaching Muijs et al. (2014) found, that some general features are present for teachers who have higher student outcomes in the academic area. Across studies they found that the teachers' ability to increase time-on-task and secure the students' opportunity to learn, their instruction and interaction with students, ability to establish a good classroom climate and lastly ability to express expectations to students are indicators of higher academic outcomes. According to Muijs et al. (2014), the teacher effectiveness field is not strong in literature on student outcomes outside the area of the academics. Though, for non-cognitive outcomes they found three overall tendencies, namely: 1) effects in this area are consistently smaller than in the academic area; 2) the teacher characteristics with influence seem to concur with those in the cognitive area; hence no evidence is found for a contradiction between teaching to succeed in cognitive and social and emotional development; 3) the area of non-cognitive outcomes suffers under a lack of consistency in key constructs to reliably and validly measure and compare these.

Across research from these three different perspectives, it seems reasonable to assume, that students' non-cognitive outcome could be strengthened by teachers' pedagogical knowledge in terms of abilities in relation to establish good teacher-student relationships, implement good classroom management practices and hold a focus on the goal for students learning – elements that Hargreaves (1998) concluded seldom are taught to a greater extent in teacher education.

## 2.2. Teacher qualifications

Teacher qualifications have traditionally been viewed in light of licensing and certification with the purpose of ensuring that only qualified teachers enter the teaching profession (Shuls & Trivitt, 2015). In continuation of this Shuls and Trivitt argue that besides keeping unqualified people from the profession licensing and certification also hinders qualified people from entering the branch of teaching, as they are an obstacle to overcome before entrance into the

profession, and hence some qualified people are expected not to become teachers. Whether the teaching profession is demanding certification and how it is achieved, differs between countries and states (Postlethwaite, 1995).

Within the area of certification, the discussion is on what constitutes the best qualifications of teachers, and whether *pedagogical knowledge* or *content knowledge* is most important (Shuls & Ritter, 2013). On the one hand it is argued that a focus on content knowledge could attract teachers with better skills within the specific subjects, and thereby support students' academic growth. On the other hand it is argued, that pedagogical knowledge should be stressed, as teaching is a profession requiring, for example, knowledge of students' development, educational theory and classroom management.

Little evidence has been put forward for the relation between teachers' certification and students' academic outcome. Goldhaber and Brewer (2000) found that certified teachers have a positive influence on students' performance in mathematics, while little evidence was found for a relation between certification and performance in other areas – results comparable to those are found in later studies (Palardy & Rumberger, 2008; Shuls & Trivitt, 2015). Recent research has though demonstrated that it is other teacher qualities that affects non-academic student outcomes such as attitudes and behaviour than those that supports academic growth (Blazar & Kraft, 2017).

### 2.3. Global self-esteem

GSE in adolescence is seen as an indicator of whether developmental tasks of adolescence are successful (Craven & Marsh, 2008) and is proven to have significant relation to later life-time outcomes, including physical and mental health, criminal behaviour and life time income (Trzesniewski et al., 2006). In addition a higher level of GSE in adolescence is associated with later stability in GSE during adulthood (Marsh, 1993). Research has shown how GSE develops through adolescence and that schooling plays an important role in this development (Eccles et al., 1993; Steinberg & Morris, 2001).

Historically two different conceptual understandings of how self-esteem develops have been promoted addressing different causes of self-esteem. William James (1895 [1892]) stressed the importance of "*the cognitive prerequisites in that perceived success in domains deemed important is weighed against perceptions of actual accomplishments*" (Harter, 2015 p. 17). Within this view, self-esteem is expected to rise if actual accomplishments are in line with own expectations. Charles Horton Cooley (1902) advocated for a different perspective with his "*looking-glass-self*", stating that self-esteem is formed by internalization of the opinions of significant others, and hence formed by e.g. students relations to their teachers.

Research has found three major contexts that influence the formation of GSE in adolescence: family relationships, peer relationships and friendships, and school experiences (Greene & Way, 2005). Previous research on the role of school experience in the formation of GSE has conceptualized this component in different ways, focusing on different aspects such as realistic goal achievement, bonding climate and teacher-student relationships, concluding that for adolescents' school experiences play a significant role (Donnellan et al., 2011). This research has however not taken into account how teacher qualifications influence this development, as measures have been based solely on students self-reporting of school factors.

The theoretical origins of GSE thus indicate two ways in which teachers could influence students' development in GSE. On the one hand, teachers could play a role as significant others to the student, hence supporting the student's development in GSE as the student internalizes the teachers view upon him or her, including the teacher's ability to establish a positive teacher-student relationship, form a supporting classroom climate and support students social and emotional learning. This would address the teachers' pedagogical knowledge. On the other hand, teachers' are expected to influence students' performance and view upon what are realistic academic accomplishments. This would to a higher degree address the teachers' content knowledge.

The empirical research on adolescents has found that the high school years is a period where there is a possibility for change in self-esteem. According to Morin, Maïano, Marsh, Nagengast and Janosz (2013) “*Secondary schools play a crucial role in the development of adolescents’ self-esteem. During this period, youths evolve in a context where they implicitly and explicitly learn about themselves, while experiencing the major physical, cognitive, emotional, and social changes of adolescence*” (p. 1967). For many adolescents, educational settings are a place where they meet important significant others outside the family, that contributes to the formation of the adolescent (Tatar & Da’as, 2012), and earlier studies have shown that students who relate well with their teachers tend to have higher levels of GSE (Deihl, Vicary, & Deike, 1997; Greene & Way, 2005; Roeser & Eccles, 1998; Way, Reddy, & Rhodes, 2007).

There is general agreement on the position that a positive school climate and school experiences, positive teacher-student relationships and classroom climate results in a higher level of GSE (Deihl et al., 1997; Hirsch & DuBois, 1991; Hoge, Smit, & Hanson, 1990; Morin et al., 2013; Roeser & Eccles, 1998). With reference to the instructional component of adolescents’ school experience, Morin et al. (2013) argues in accordance with the postulate from William James (1985 [1892]) that students have a need for competence and achievement. In line with previous studies they found that the instructional climate had an influence on the development in GSE. These studies rest solely on students’ experience of school or teacher quality without any information on teachers’ actual or formal qualifications.

#### **2.4. Research questions**

The present study examines whether formal teacher qualifications in term of teachers’ certification and educational degree affects students’ development in GSE. Further, it is investigated whether teachers’ employment status affects students’ development in GSE. More precisely, the following comprises the research questions addressed in the study:

*Research question 1:* Do traditionally certified teachers and teachers with other types of certification support students’ development in global self-esteem differently?

*Research question 2:* Do teachers educational degree affect students’ development in global self-esteem?

*Research question 3:* Do teachers’ employment status affect students’ development in global self-esteem? Thus, the first research question addresses the influence of teachers’ formal qualifications in terms of certification affect on students’ GSE. The second question addresses whether different types of education provide teachers with different abilities to support students’ development in GSE, and thereby test if there are differences in students’ development in GSE that could be subscribed to differences in pedagogical and content knowledge. Lastly, the third question addresses whether the teachers affiliation to the school or the occupation as a teacher in terms of employment status influences how the teacher is perceived as a significant other by the student, as this from a theoretical point of view is expected to influence support of students’ development in GSE.

### **3. Methods**

#### **3.1. Sample**

The study uses data from the first three waves of the National Educational Longitudinal Study (NELS:88) conducted in the United States and made public by the National Center for Education Statistics (NCES). This dataset was developed to assess various developmental and psychological aspects of student development from 8<sup>th</sup> grade in 1988 with data collected for the same students in two subsequent waves in 10<sup>th</sup> and 12<sup>th</sup> grade. The base year of the study used a stratified, clustered national probability sample of 24,599 8<sup>th</sup> graders from 1,052 schools (public and private). The dataset is described thoroughly elsewhere (National Center for

Education Statistics, 2014). The three waves include measures of students GSE combined with measures of student background characteristics. Further, the dataset includes a teacher questionnaire with information on one of the students' main teachers in 8<sup>th</sup> grade, thus the dataset is considered well suited for studying relationships between teacher qualifications and students' subsequent development in GSE.

Parts of the sample were lost due to missing data on questionnaires or tests. After deleting cases with missing observations on students or teachers, the dataset consists of observations on 12,658 students in wave 1; 12,484 students in wave 2; and 11,319 students in wave 3.

In the first wave a little more than half of the final sample (50.8 %) was female students. The majority were Whites (74.6 %) while the remaining parts of the sample were Hispanic (10.6 %), African American (9.0 %) and Asian American/Pacific Islanders (5.9 %). The final sample diverges a little corresponding to the original sample as fewer students with white origin had missing data points in the later waves.

#### 4. Measures

Measures in the dataset were self-reported by students and teachers respectively. The following measures were used. Descriptive statistics are given in Table 1.

##### 4.1. Global self-esteem

GSE was measured using seven of the ten items from the Rosenberg self-esteem scale (Rosenberg, 1965, 1979). The same seven questions were used in all three waves of data collection. The seven items were part of a questionnaire section with 13 (in second wave 14) questions, the other measuring students locus-of-control. A factor analysis of the 13 questions for each wave confirmed the existence of the same two factors in all three waves with the same seven questions constructing GSE. On basis of the recoded scores of the seven items, a GSE score was created as the sum of the seven items giving values of GSE ranging between 7 and 28. This construction of a measure of GSE on basis of the seven questions is in line with the practice used by Yin & Fan (2003), Ross & Broh (2000) and Coladarchi & Cobb (1996). Descriptive statistics of the variation in GSE in the sample over the three waves are provided in Table 2.

##### 4.2. Teacher qualifications

Teacher qualifications were measured through the teacher questionnaire delivered to one of the student's teachers in the baseline survey, familiar with the student from teaching at least one subject. The following variables on teachers were included:

*Type of teacher certificate held.* Teachers were asked "What type of teacher certification do you hold from the state where you teach?" with the possible answers: "Regular/standard"; "Probationary"; "Temporary"; or "Not certified" and used as a categorical variable comparing effect of the different answers to 'Regular/Standard certificate'. In the United States, licensing of teachers is administered at state level. As a consequence, each state has its own set of requirements for holding a teaching certificate. However, all states require a bachelor's degree to obtain a teacher's license (International Bureau of Education, 2006).

*Educational degree.* Teachers were asked "What is the highest academic degree you hold?" The possible answers were "Lower than Bachelor's degree"; "Bachelor's degree"; "Master's degree"; "Education Specialist"; or "Ph.D. or First Professional". 'Bachelor's degree' was used as base category.

*Employment status.* Teachers were asked "What is your employment status in this school or school system?" The answers covered the categories "Regularly Full-time"; "Regularly Part-time"; "Substitute"; and "Other". Due to a low number of responses, the categories "Substitute"

and “*Other*” were merged into one response category. ‘Regular Full-time employment’ was used as base category.

*Teacher gender.* ‘Male’ was used as reference category.

### 4.3. Student background

To control for student characteristics known to affect adolescents GSE development, a range of control variables were included to cover known influences from school, family and peers. The following variables were used:

*Student gender.* ‘Boys’ was used as reference category.

*Race.* Due to the relative few students who had indicated an American Indian or Alaskan Native background these were coded as missing. ‘Whites’ was used as reference category.

*Socio-economic status* constructed by NCES and provided with the dataset (for further explanation of the construction of the variable, see Ingels, 1995).

*School type.* To control for differences between public and private schools, a variable coded ‘Public school’, ‘Private religious school’ or ‘Private non-religious school’ were generated. ‘Public school’ was used as reference category.

*Transition.* Indicates whether a student experienced a transition between 8<sup>th</sup> and 10<sup>th</sup> grade, as this have been shown to affect students GSE in cross-sectional studies (Eccles et al., 1993; Twenge & Campbell, 2001).

*Achievement test score.* An average achievement test score at baseline was constructed for each student using the four standardized test scores in reading, mathematics, science and history/citizenship/geography provided by NELS as part of the data collection (National Center for Education Statistics, 2014). The measure was constructed across all four subjects to include all areas of student achievement and hence address problems with measuring only one side of academic competences (Gamoran, 1992).

*Dropout.* Student’s dropout status in 12<sup>th</sup> grade.

*Classmate status.* An indicator of the student’s internalization of fellow students’ perception of him/her was constructed using four questions from the baseline student questionnaire. Based on factor analysis the following four questions were found to form a factor and included in a reflective index (Sønderskov, 2015): “*How do you think other students in your classes see you? A) As popular? B) As athletic? C) As a good student? D) As important?*” All four questions could be answered “*very*”, “*somewhat*” or “*not at all*”.

### 4.4. Analysis

To examine effects of teachers on students’ development in GSE, growth curve analysis was applied to the data using the *xtmixed* command in Stata 12.1 (Rabe-Hesketh & Skrondal, 2012) with observations nested in students nested in schools. This method, also used by Greene and Way (2005), draws on both within and between person information, and has the advantage of being able to handle missing data for some students in one or two of the waves (Singer & Willett, 2003). Besides the here mentioned advantages, growth curve modelling was selected as it provides an easily and intuitively interpretable method to model teachers influence on students development in GSE.



**Table 1.**  
Descriptive statistics

Variable		8 <sup>th</sup> grade	10 <sup>th</sup> grade	12 <sup>th</sup> grade
Global Self Esteem		21.82 (3.36)	21.39 (3.37)	22.00 (3.46)
<i>Teacher characteristics</i>				
Type of Teacher Certificate	Regular/standard	11,420	11,268	10,224
	Probationary	225	222	209
	Temporary	484	475	408
	Not certified	529	519	478
Employment status	Regularly full-time	12,371	12,200	11,062
	Regularly part-time	158	157	144
	Substitute/other	129	127	113
Educational degree	Below BA	33	35	30
	Bachelor's degree	7,003	6,871	6,184
	Master's degree	4,722	4,682	4,286
	Education Specialist	828	826	754
	Ph.D. or first degree	72	70	65
Teacher gender	Female	51.6 %	51.5 %	51.5 %
<i>Student characteristics</i>				
Student gender		50.8%	51.3 %	51.7 %
Race	Asian	746	740	681
	Hispanic	1,338	1,304	1,167
	African-American	1,137	1,076	984
	European-American	9,437	9,364	8,487
Dropped out in 12 <sup>th</sup> grade		561	522	598
School type	Public school	10,455	10,311	9,303
	Private religious	1,440	1,423	1,350
	Private non-religious	763	750	666
Socio-Economic Status		0.01 (0.78)	0.02 (0.78)	0.02 (0.78)
Achievement test score		-0.01 (1.00)	-0.00 (1.00)	0.02 (1.00)
Classmate status		-0.00 (1.00)	0.00 (1.00)	0.00 (1.00)
<b>n</b>		12,658	12,484	11,319

Teachers were having the students in their class from the first wave. Eventual effects of teacher characteristics on students' development in GSE are thus expected to be seen already at the baseline, as teachers at this time have been linked with students for a period of the school year. As a consequence of this, effects are expected to be seen as differences in intercepts between students of teachers with different characteristics (Singer & Willett, 2003). As Donnellan et al. (2011) notes, effects on GSE could be expected to be relative small, and are in general easily controlled out when covariates for student characteristics are introduced. Models with time interactions for teacher characteristics are not shown, as none of these were found to be significant. Model development took place in three steps. First, unconditional means models and unconditional growth models were developed. As development in GSE is expected to take different trajectories for boys and girls, models for the full sample and separately for boys and girls were developed. Second, explanatory teacher variables were added to the unconditional growth model. Third, controls for student characteristics were added to the model.

As previous research and theory about GSE indicates that a linear development should not be expected (Donnellan et al., 2011), time is modelled as categorical dummy variables, comparing students in 8<sup>th</sup> grade to 10<sup>th</sup> and 12<sup>th</sup> grade respectively. As most of the variables have a categorical character these were used with the mode value as base, which were also the expected values for most of the variables. To allow for calculation of precise confidence intervals and hence be able to conduct relevant hypothesis tests with the stratified sampling strategy used in NELS:88 bootstrapping with 80 repetitions were carried out (Efron & Tibshirani,

1994). Model selection between different models was done based on deviance statistics, a widely accepted method for comparing model fit (Singer & Willett, 2003; Steele, 2013).

## 5. Results

Descriptive statistics of teacher and student variables are given in Table 1, and variance decomposition of students GSE in Table 2. Unconditional means and growth models are shown in Table 3. As expected based on previous research, the overall level of GSE decreases from 8<sup>th</sup> to 10<sup>th</sup> grade, and increased again to 12<sup>th</sup>.

Table 4 shows growth models of students development in GSE conditioned on teachers qualifications, and the same models extended with control for student characteristics.

**Table 2.**

Descriptive statistics of variation in Global Self-Esteem (GSE).

Self-esteem	Mean	SD	Observations
<b>Overall</b>	21.73	3.41	N = 36,461
<b>Between</b>		2.80	n = 13,307
<b>Within</b>		1.97	Avg. num. of observations = 2.74

Compared to certified teachers, no difference was found for development in GSE for students having a teacher with probationary certification or teachers that were not certified. For teachers with a temporary certification, a positive effect was found ( $B = 0.304$ ;  $p < 0.001$ ). Looking at the separate models for boys and girls, it is seen that the effect was driven from a positive effect for boys ( $B = 0.416$ ;  $p < 0.001$ ) while the effect although positive was insignificant for girls.

Teachers' educational degree was found to affect boys and girls differently. Teachers with a Ph.D. or First degree had a positive effect on GSE development for the whole sample ( $B = 0.460$ ;  $p < 0.01$ ), but the effect was found to be different when looking at the models for boys and girls separately. While the effect was stronger for boys than for the whole sample ( $B = 0.635$ ;  $p < 0.01$ ), it was found to be insignificant when looking at the model for girls alone ( $b = 0.249$ ;  $p > 0.10$ ). Looking at the model for girls, a positive effect was seen for girls' development in GSE if they had a teacher with a degree as Education Specialist compared to a teacher with a bachelor's degree ( $0.227$ ;  $p < 0.01$ ), while no effect was found for boys for this type of education.

**Table 3.**

Unconditional Means model and Unconditional Growth model of students GSE

	Unconditional Means Model			Unconditional Growth Model		
	All	Boys	Girls	All	Boys	Girls
<i>Fixed effects</i>						
1.Wave				-0.430*** (0.043)	-0.552*** (0.051)	-0.310*** (0.051)
2.Wave				0.178*** (0.033)	-0.014 (0.050)	0.366*** (0.049)
Constant	21.727*** (0.014)	22.249*** (0.018)	21.210*** (0.019)	21.821*** (0.030)	22.441*** (0.035)	21.206*** (0.034)
<i>Random effects</i>						
Level 1 error	2.473 *** (0.019)	2.472*** (0.033)	2.474*** (0.021)	2.249*** (0.045)	2.236*** (0.051)	2.261*** (0.054)
Student intercept	2.276 *** (0.014)	2.115*** (0.021)	2.313*** (0.020)	2.446*** (0.020)	2.266*** (0.026)	2.467*** (0.034)
Student slope				0.993 (0.013)	1.017 (0.019)	0.960* (0.019)
School intercept	0.557***	0.498***	0.580***	0.563***	0.512***	0.590***

	(0.019)	(0.051)	(0.042)	(0.023)	(0.042)	(0.045)
Covariance				-0.292***	-0.282***	-0.278***
				(0.010)	(0.016)	(0.014)
Observations	36461	17781	18680	36461	17781	18680
df	4	4	4	8	8	8
Deviance	185761.1	89961.5	95347.6	185062.5	89582.9	94979.5

# p<0.10, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Teachers' employment status affected boys' and girls' level of GSE differently. For the full sample, students whose teachers' employment status was 'substitute or other', had a significantly negative effect on students' level of GSE (B = -0.422; p < 0.01). Comparing models for boys and girls, this effect was found to be driven by an effect for boys (B = -0.622; p < 0.01) while the effect for girls of having a teacher employed in the category as substitute or other was insignificant (B = -0.186; p > 0.10). Comparing the two genders, it is seen that the effect of a part-time teacher is different. While boys with a part-time employed teacher had a positive significant effect on their level of GSE compared to a full-time teacher (B = 0.350; p < .05), the opposite effect was seen for girls, as the model predicts a negative effect for girls if they had a part-time teacher compared to a full-time employed teacher (B = -0.466; p < 0.05).

**Table 4.**

Growth model of students GSE conditioned on teacher characteristics and controlling for student background

	Teacher model			Full model		
	All	Boys	Girls	All	Boys	Girls
10 <sup>th</sup> grade	-0.430*** (0.037)	-0.552*** (0.054)	-0.310*** (0.056)	-0.552*** (0.052)	-0.552*** (0.054)	-0.312*** (0.053)
12 <sup>th</sup> grade	0.178*** (0.039)	-0.014 (0.045)	0.365*** (0.046)	-0.019 (0.045)	-0.020 (0.055)	0.362*** (0.050)
<i>Teacher characteristics</i>						
Teacher gender	0.076** (0.024)	0.087# (0.045)	0.156*** (0.040)	0.023 (0.027)	0.022 (0.039)	0.044 (0.039)
<i>Certification</i>						
Probationary	0.011 (0.104)	-0.085 (0.139)	0.044 (0.154)	-0.125 (0.105)	-0.167 (0.115)	-0.046 (0.156)
Temporary	0.390*** (0.067)	0.453*** (0.096)	0.168 (0.119)	0.304*** (0.073)	0.416*** (0.105)	0.128 (0.106)
Not certified	0.692*** (0.072)	0.690*** (0.092)	0.481*** (0.132)	0.099 (0.079)	0.179# (0.105)	-0.052 (0.136)
<i>Educational degree</i>						
Lower than BA	-0.537* (0.252)	0.633 (0.388)	-0.714# (0.388)	-0.160 (0.293)	0.248 (0.432)	-0.244 (0.355)
Master's degree	0.062* (0.028)	0.042 (0.041)	0.064 (0.039)	0.031 (0.027)	0.011 (0.036)	0.056 (0.046)
Education specialist	0.066 (0.054)	-0.067 (0.091)	0.275*** (0.078)	0.068 (0.056)	-0.106 (0.088)	0.227** (0.081)
Ph.D or First degree	0.702*** (0.176)	0.750*** (0.188)	0.508* (0.222)	0.460** (0.152)	0.635** (0.197)	0.249 (0.278)
<i>Employment status</i>						
Part-time	0.088 (0.135)	0.461** (0.156)	-0.473* (0.196)	-0.018 (0.107)	0.350* (0.155)	-0.466* (0.193)
Substitute/Other	-0.526*** (0.133)	-0.781*** (0.213)	-0.277 (0.201)	-0.422** (0.133)	-0.622** (0.192)	-0.186 (0.186)
<i>Student characteristics</i>						
<i>Gender</i>						
Girl				-1.116*** (0.049)		
10 <sup>th</sup> grade * girl				0.240***		

12 <sup>th</sup> grade * girl				(0.071)		
				0.381***		
				(0.069)		
Race						
Asian				-0.154*	-0.279***	-0.019
				(0.060)	(0.071)	(0.077)
Hispanic				0.498***	0.306***	0.755***
				(0.043)	(0.073)	(0.058)
African American				1.292***	0.878***	1.705***
				(0.046)	(0.075)	(0.065)
Socio-Economic-Status				0.021	-0.016	0.057*
				(0.021)	(0.032)	(0.027)
Schooltype						
Private religious school				-0.011	-0.005	0.008
				(0.044)	(0.080)	(0.056)
Private, non-religious				0.502***	0.494***	0.551***
				(0.078)	(0.089)	(0.102)
Transition				0.148***	0.059	0.248***
				(0.033)	(0.046)	(0.061)
Achievement test score				0.493***	0.463***	0.517***
				(0.017)	(0.022)	(0.021)
Dropout, 12th grade				-0.207**	-0.159#	-0.231**
				(0.066)	(0.094)	(0.072)
Peer-relations				0.890***	0.814***	0.976***
				(0.016)	(0.019)	(0.018)
Constant	21.710***	22.331***	21.064***	22.061***	22.204***	20.770***
	(0.036)	(0.050)	(0.051)	(0.047)	(0.059)	(0.071)
<i>Random effects</i>						
Level 1 error	2.249***	2.236***	2.261***	2.251***	2.237***	2.264***
	(0.037)	(0.057)	(0.060)	(0.040)	(0.053)	(0.054)
Student intercept	2.446***	2.266***	2.469***	2.033***	1.968***	2.087***
	(0.019)	(0.029)	(0.027)	(0.018)	(0.026)	(0.027)
Student slope	0.993	1.017	0.960*	0.982	1.014	0.953**
	(0.011)	(0.019)	(0.017)	(0.011)	(0.018)	(0.016)
School intercept	0.527***	0.458***	0.567***	0.337***	0.264	0.336***
	(0.023)	(0.038)	(0.043)	(0.030)	(0.429)	(0.106)
Covariance	-0.292***	-0.281***	-0.278***	-0.201***	-0.211***	-0.191***
	(0.009)	(0.016)	(0.014)	(0.011)	(0.017)	(0.014)
Observations	36461	17781	18680	36461	17781	18680
df	18	18	18	31	28	28
Deviance	185027.3	89547.1	94966.0	182192.3	88518.4	93607.8

# p<0.10, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 5 offers an overview of model fit based on deviance statistics. As expected, the unconditional growth model and a model only including student covariates (covariate model available by contact to the author) were significantly better predictions of students' development in GSE than the unconditional means models for both the full sample and for models separated on boys and girls. The model including teacher variables was, for the whole sample and for boys, also found to be better predictions than the unconditional growth model, while the model for girls was not a significantly better fit to data than the unconditional growth model. Adding control variables for students, none of the models including teacher characteristics were a better fit to data than a model only including student variables.

**Table 5.**  
Deviance statistics

	All			Boys			Girls		
	$\Delta D$	$\Delta df$	p-value	$\Delta D$	$\Delta df$	p-value	$\Delta D$	$\Delta df$	p-value
Unconditional Means Model									
Unconditional Growth Model <sup>1</sup>	698.7	4	0.000	378.7	4	0.000	368.1	4	0.000
Teacher model <sup>2</sup>	35.2	10	0.000	35.7	10	0.000	13.5	10	0.199
Model only including student variables <sup>2</sup>	2858.4	13	0.000	1047.3	10	0.000	1364.6	10	0.000
Full model <sup>3</sup>	11.7	10	0.303	17.1	10	0.073	7.0	10	0.724

<sup>1</sup> Decrease in deviance compared to the unconditional means model.

<sup>2</sup> Decrease in deviance compared to the unconditional growth model.

<sup>3</sup> Decrease in deviance compared to the model only including student variables.

## 6. Discussion

This study investigated whether teachers' formal qualifications in terms of certification and educational degree influenced students' subsequent development in GSE and whether teachers' employment status influenced GSE development. Regarding research question 1 on teachers' certification, it was found that teachers with a temporary certification had a positive influence on students' level of GSE compared to teachers with a regular or standard certification, an effect driven by boys. With regard to research question 2 on teachers' education, it was found that teachers with a degree as education specialist had a positive influence on girls' level of GSE, while teachers with a Ph.D. or First degree had a positive influence on boys' GSE compared to teachers holding a bachelor's degree. In relation to research question 3 on teachers' employment status it was found that, compared to teachers with full-time employment, boys and girls reacted differently to part-time teachers. While boys had a significantly higher level of GSE, girls with a part-time teacher had a significantly lower level of GSE. Further, boys with a teacher in the substitute or other category had significantly lower levels of GSE compared to boys with a full-time employed teacher. Although each of the results were significant, the magnitude of the findings are small, as the models with teacher variables and control for student characteristics were not better predictions of students' GSE development than a model only including controls for student characteristics.

Overall, the results found here could be seen as in line with previous research on adolescents' development in GSE and in line with previous research on teachers' formal qualifications. Small effects of a single variable on GSE are common (Donnellan et al., 2011) and the size of the effects found here seem to be at the same level as most of the student characteristics controlled for – characteristics that have been found to be important factors in relation to adolescents' development in GSE (Eccles et al., 1993; Twenge & Campbell, 2001; Donnellan et al., 2011) – e.g. comparing the effects found here to the effects of the student control variables for transition and drop-out indicates effects of the same magnitude. Further, the significance of the results should be seen in the light of the extent to which students have been exposed to the teachers in the study. The study only draws on data from one of the students' teachers, while other teachers having the student in their class probably have had other characteristics.

It is remarkably that the only effect of teacher certification was a positive effect on boys from teachers holding a temporary teacher certification, while the lack of a regular certification did not seem to affect students' development. This is partly in line with other research on teacher certification, finding no or very small effects of a certificate on students' academic development (Goldhaber & Brewer, 2000). The results indicate that the formal certification of a teacher does not make any differences, but that it is the teachers' other personal qualifications that has an influence on students' development – qualifications that the certification should be a warrant for.

This interpretation would be in line with the teacher and classroom oriented models of teacher quality and student development, not stressing the formal qualifications for meeting the student, but the personal dispositions teachers hold on which they act in the classroom (Jennings & Greenberg, 2009; Rimm-Kaufman & Hamre, 2010).

Looking at teachers' education, it is noticeable that no difference in students' GSE level was found for students with a teacher holding a masters' degree compared to a bachelor's degree. Teachers with an educational degree above master' degree had though a significant and positive effect on students' development in GSE. The effects found here was not identical across gender. Boys were found to benefit from having a teacher with a Ph.D. or First degree, whereas girls benefitted from having a teacher with a degree as Education specialist. These two different types of educational degree point at two different elements in the theoretical underpinning of the GSE concept. Holding a Ph.D. or First degree could be expected to be associated with a high degree of content knowledge, which in line with James (1985 [1892]) approach to the self-esteem concept, should lead to higher developments in GSE. Holding a degree as Education specialist are associated with more knowledge on the pedagogical elements in the teaching profession such as classroom management, teacher-student relationships and the ability to support students' social and emotional learning – and therefore in line with the approach to self-esteem suggested by Cooley (1902) being better able to take the position as significant other to the student. The inference of this interpretation would be that boys and girls react differently to the teachers' ability to support their development. Previous research in GSE, although minor differences have been found between boys and girls (Donnellan et al., 2011), does not indicate a gendered support for how Cooley's 'looking-glass-self' (1902) compared to James suggestion of the more accomplish based approach, valuing one's own (academic) accomplishments against own expectations (James & Allport, 1985 [1892]). An obvious conclusion would be to interpret this result in relation to gender roles and its relation to self-esteem. In this view, the results confirm the findings from Morin et al. (2013) that boys value academic structures based on personal achievement and competition to a greater extent than girls, who are expected to a higher degree to value cooperative academic objectives and structures. In a more abstract perspective, femininity or communion is found to be related to some aspects of self-esteem, while masculinity or agency is strongly and positively related to other elements of the concept (Helgeson, 2012).

The different consequences for boys and girls level of self-esteem based on the teachers' employment status should probably be interpreted in lines according to those of the origin of the concept as well. Teachers with part-time employment were found to have a negative effect on girls' level of GSE and a positive effect on boys' level. A possible explanation for this could be that boys and girls internalize the role of being part-time employed differently, as this is often gendered (Helgeson, 2012). Hence, having a part-time teacher might lead girls to internalize a view on themselves as part-time workers over a career, while boys could be supported in the notion that they are expected to make a career or in other ways not be obliged to accommodate to others expectations. This interpretation would be in line with research on the relation between men and women's division of work in and outside the household, and its relation to health and distress (ibid.).

A negative effect from teachers employed as 'substitute or other' was also found for boys' level of GSE. As the precise content of the category is unknown, the mechanism behind is not clear. However, it seems plausible, that boys and girls react differently to the less predictable environment that must be presumed to be provided in a classroom with a substitute teacher. Thus, the effect could be due to boys lacking clear guidance for their learning process when taught by substitute teachers. Other explanations are possible as well, e.g. that boys react differently to the lack of a stable relationship to teachers.

Overall, the results showed some differences between boys' and girls' reaction on teachers' formal qualifications. The data used does not contain measures of participating students' gender identity, and hence it is not possible to assess to which degree these relations are due to the students degree of having masculine or feminine traits (Helgeson, 2012) which could be expected to play a different role for how development in GSE is affected by the teacher, or

whether it is due to teachers reacting differently to students' gender and hence support GSE development based on their expectations to the adolescents sex. Consequently, it is recommended that future research delves further into this question, as this could provide relevant insights into how teachers could support students' development.

## 7. Limitations

This study used data from the National Educational Longitudinal Study (NELS:88) where information on teachers formal qualifications in 8<sup>th</sup> grade were used to model students development in GSE. As only information on one of the students' teachers is included, the variation in teacher qualifications the individual student experienced that was included in the analyses was relatively small and hence much of the effects of teachers' qualifications that students meet during the data collection period is not included in the models. GSE is an outcome that is expected to be influenced not only by the teacher in one subject, but across the whole spectrum of significant adults that the adolescent meets in the school. Hence, the results found here should be interpreted as a relatively conservative estimate of effects of teacher quality. The relatively little amount of student-teacher contact could explain the fact that only effects on the intercept of students growth in GSE were found, while no relations to the slope of the growth curves was found in this study. This is not surprising, as it in general is easier to establish the relation from a variable to the intercept than to the slope of a growth curve (Singer & Willett, 2003).

This study included the best available control variables in the dataset to control for known influences on students GSE. However, it could not be ensured that some of the effects found could be due to selection bias into the study of students with specific GSE characteristics to schools with teachers holding.

## 8. Conclusion

This study demonstrated that teachers' formal qualifications play a minor although significant role for students' development of GSE. Most crucial was it that boys and girls seem to respond differently to these qualifications. This finding is relevant for the knowledge on adolescents internalization of significant others behaviour, as gender seems not only to be related to a focus on achievement as demonstrated in other studies (Morin et al., 2013), but also to how gender affects the adolescents internalization of the behaviour of the teachers acting as significant others to the students.

From the results found here, it seems relevant to further investigate how teachers' qualifications and teacher quality affect students' development in GSE and other non-cognitive outcomes, and that measures of school or teacher quality should not only be students' self-reporting, as teachers actual qualities and qualifications seems to have a part to play for students development. With improved measures of teacher level factors, it would be possible to gain a better understandings of how teachers could actively support students healthy development of GSE throughout adolescence, as models of teacher and classroom quality indicates, that teachers actual behaviour in the classroom in relation to the student could play a major role for the students development (Jennings & Greenberg, 2009; Rimm-Kaufman & Hamre, 2010).

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