The mediating role of socio-motivational support in the association between individual school self-concept and achievement motivation amongst adolescent students

Olga Bakadorova · Diana Raufelder

Abstract It is now well known that adolescence is frequently marked by a decline in students' achievement motivation, which in turn is often associated with a decline in individual school self-concept. Less is known about the mediating role of socio-motivational support in the association between individual school self-concept and achievement motivation. The current study examined the interplay of individual school self-concept, socio-motivational support and achievement motivation in a large sample of seventh and eighth grade students (N=1,088; M_{Age}=13.7) in secondary schools in Brandenburg, Germany. Structural equation modeling was used to test the associations between individual school self-concept, socio-motivational support, and achievement motivation. The results showed that the teacher–student relationship as well as "teachers as positive motivators" mediated the association between individual school self-concept and achievement motivation. In contrast, neither "peers as positive motivators" nor the student–student relationship mediated this association. These results support the notion that maintaining a positive teacher–student relationship as well as encouraging teachers in the role of positive motivators could be an effective starting point for prevention and intervention programs aimed at offsetting the decline in individual school self-concept and achievement motivation during adolescence.

Keywords Individual school self-concept · Social relationships · Achievement motivation · Socio-motivational support · Structural equation modeling · Mediation

For a substantial number of students in Western societies, adolescence is marked by a downward tendency characterized by decreased achievement motivation, academic failure, and eventual school dropout (Ladd et al. 2009; Dohn 1991; Finn 1989, 2006). As previous research has

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shown, student motivation begins to decline after the transition to secondary school, reaching its lowest point in the ninth grade (Eccles et al. 1998; Watt 2004; Zusho and Pintrich 2001; Peetsma et al. 2005). These problematic outcomes have spurred research efforts to identify possible prevention and intervention strategies to strengthen students' achievement motivation. In the literature, motivation is often conceptualized as a multi-dimensional construct resulting from interdependencies between and among many variables (Waugh 2002; Weiner 1990), one of which is the individual school self-concept (Shrout and Bolger 2002).

The individual school self-concept taps students' perceptions of their academic standing by comparing present abilities to those in the past. According to Nicholls (1984) and Harter (2012), it is a useful construct for evaluating one's own academic progress. A high individual school self-concept means that present abilities are evaluated higher in comparison to those in the past; in contrast, a low individual school self-concept shows a decline in the evaluation of abilities over time. Most research on school self-concept (often used interchangeably with the term "academic self-concept") is based on its relationship to academic achievement. After decades of debate addressing whether school self-concept causes changes in academic achievement or vice versa (see Marsh and Köller 2003), in 1990, Marsh proposed an integration of the two theoretical models that dominated the debate. He integrated the approaches of the self-enhancement and skill development model into the so-called reciprocal effects model of academic self-concept. This model postulates that academic self-concept and academic achievement are reciprocally related and mutually reinforcing (March and Craven 2005). In other words, improved academic self-concepts lead to better academic achievement, and improved academic achievement leads to better academic self-concept (March and Craven 2005). Therefore, teachers should strive to improve both academic self-concept and achievement because the effects of improving only one will be short-lived (March and Craven 2005). Based on this model, Areepattammannil (2012) examined the mediating role of achievement motivation in the association between school self-concept and academic achievement in adolescent students. Her findings suggest that motivation indeed mediates the association between school self-concept and academic achievement, meaning that high levels of school self-concept help students to be more motivated about school and academics. The earlier work of Guay et al. (2010) also provides support that autonomous academic motivation mediates the association of academic self-concept and achievement among high school students. Additionally, Eckert et al. (2006) have documented that students' positive academic self-concepts are particularly important in buffering the potentially negative influences of failure on subsequent performance.

The development of academic skills and thus the individual school self-concept is bolstered by achievement motivation, which can be defined as an aggregate of achievement drive, perseverance, and effort and fear of success. The first "learned drive" theory from Atkinson (1974) defined achievement motivation as a learned drive, aimed at achieving success and avoiding failure. All theories that currently dominate the field of motivation research[1] are generally based on Atkinson's germinal approach. Decades of research have confirmed that the development of academic abilities and consequently, better performance is associated with perseverance and effort (Petermann and Winkel 2007), and is negatively influenced by fear of success (Horner 1972). While perseverance and effort are positive factors associated with the development of academic abilities, fear of success is an avoidance behavior, which is motivated by a desire to evade failure, and/or a desire to avoid success. Individuals typically want to avoid success due to the expected negative reactions from those in

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[1] (Cognitive attribution theory of Weiner (1985); self-worth theory of achievement motivation of Covington and Berry (1976); achievement goal theory of Elliot (1997) and Pintrich (2003); self-determination theory (Deci and Ryan 1985; Ryan and Stiller 1991), and social-cognitive theory (Bandura 1986; Pajares 1996; Schunk 1984))

their social surroundings (Tresemer 1977; Weiner 1994). As recent studies have shown, motivation can be enhanced or undermined by various social factors such as teacher–student relationship, student–student relationship, and the peer group (Deci and Ryan 1985; Reeve et al. 2004).

According to Wentzel et al. (2010, 1998), positive social relationships at school support academic achievement and motivation. Based on the increasingly complex nature of social relationships during adolescence (Bukowski et al. 2011), both teacher–student and student–student relationships become essential for students' achievement motivation (Wentzel 2009a, Wentzel 2009b; Wentzel et al. 2010; Harter 1996; Flanagan et al. 2008; Raufelder and Mohr 2011; Wentzel 1998) as well as personal development (Harter 1996; Birch and Ladd 1996; Erikson 1959). Teachers, due to their special role in the learning process, provide students with academic support and monitoring (Régner et al. 2009) as well as opportunities to increase their motivation (e.g., through tasks, activities, verbal appraisal, or reward (Dörnyei 2001; Kochhar 1985)). Moreover, teachers provide support from an adult other than a parent (Raufelder 2007) and act as role models for students and as well as communicate their more general approval or disapproval for the student as a person (Birch and Ladd 1996), which can affect students' sense of identity (Birch and Ladd 1997, 1998; Alerby and Hertting 2007; Jennings and Greenberg 2009) and therefore students' school self-concept.

The student–student relationship is also essential for students' well-being, because adolescents turn to their friends for, among other things, intimacy, support, understanding, advice, and comfort (Harter 1996; Rubin et al. 2006; Rubin et al. 2009; Ladd et al. 2009; Juvonen and Wentzel 1996; Wentzel 2009a, b; Wentzel et al. 2010; Kindermann 1993), and academic achievement (Ladd and Kochenderfer 1996; Birch and Ladd 1996; Achermann et al. 2006; Kindermann et al. 1996).

Interestingly, students tend to choose a peer group with academic characteristics similar to their own; thus, high achievers and low achievers tend to belong to different peer groups, which can have a significant influence on their motivation. Research has shown that students who belong to high-achievement groups, show fewer declines in achievement motivation in early adolescence in comparison to those in low-achievement groups (Ryan 2001; Bouffard et al. 2001). In addition, results from longitudinal studies (i.e., Ollendick et al. 1992; Coie et al. 1992; DeRosier et al. 1994) suggest that students who have troubled relationships with their peers, which are often associated with social withdrawal, low academic achievement, low self-worth and psychosocial maladjustment (Buhs et al. 2006), as well as compromised emotional well-being (Bukowski et al. 2010; Schwartz et al. 2005; Newcomb et al. 1993), later show poor school performance and higher rates of truancy.

In order to enhance our understanding of the abovementioned constructs (school self-concept, socio-motivational support, and achievement motivation) and the ways in which they are related, we have examined whether socio-motivational support can be an effective external starting point to strengthen students' motivation and individual school self-concept.

Current study

Based on the theoretical and empirical background outlined above, the current study examines the mediating role of socio-motivational support in the association between individual school self-concept and achievement motivation in adolescent students. In the study, we examined the following two hypotheses:

Hypothesis 1 We hypothesized that there is *an association between individual school self-concept*, *socio-motivational support*, *and achievement motivation*. Specifically, we

hypothesized positive associations between individual school self-concept and the two variables of achievement motivation (achievement drive, perseverance/effort), and a negative association between individual school self-concept and the third variable of achievement motivation, namely fear of success. Furthermore, we hypothesized positive associations between all four socio-motivational support variables (1) "teacher–student relationship" (TSR), (2) "student–student relationship" (SSR), (3) "teachers as positive motivators" (TPM), and (4) "peers as positive motivators" (PPM) and achievement drive (AD), perseverance and effort (PE), as well as individual school self-concept (ISSC). In contrast, a negative association between all the socio-motivational support variables and fear of success was expected.

Hypothesis 2 Socio-motivational support functions as a mediator in the association between individual school self-concept and achievement motivation. We hypothesized that PPM, TPM, TSR, as well as SSR would mediate the association between individual school self-concept and achievement motivation for the sample of adolescent students.

Method

Participants

The participants (N=1,088, male=501; female=587) were 12- to 15-year-old seventh and eighth grade students (Mean$_{age}$=13.7 years; SD=0.53). This age range was chosen based on past research (Eccles et al. 1998; Watt 2004; Zusho and Pintrich 2001) showing the dramatic decline of motivation during the first 3 years after transition to high school. The quantitative survey was conducted in Brandenburg, Germany in the autumn term of 2011, at the beginning of the German school year. The 23 schools that participated in the research were randomly selected out of a pool of all 124 secondary schools in the state of Brandenburg, Germany and were asked to voluntarily participate in the study. Five of the participating schools were in the biggest cities of Brandenburg (i.e., Potsdam, Cottbus, Frankfurt Oder, Brandenburg, Prenzlau) and 18 of the participating schools were in rural areas. Information about socio-economic status is not available due to German laws that prohibit asking a first party for information about a second party (e.g., asking students about the income of their parents). Ethnicity data were not collected, due to the very low percentage of ethnic minorities in Brandenburg (2.6 %).

Procedure

Firstly, the permission to conduct the study was granted by the government's Department of Education, Youth, and Sport of Brandenburg. Following this, agreements from the schools as well as parental permissions were obtained. All students were informed that participation in the study was voluntary, that all of their answers would be confidential, and that they were not obliged to answer any of the questions. Trained instructors introduced the questionnaires to the participating students and explained how to use the Likert scales and record their responses. The data were collected on two consecutive days during regular class time at each school.

Measures

Individual school self-concept In order to evaluate the ISSC, we used a subscale of the SESSKO, a self-report measure developed by Schoene et al. (2002). The ISSC subscale (α=0.89) consisted of six items measuring students' perceptions of change in their academic

abilities and intelligence (e.g., "learning new things at school is…."). Answers were rated on a 5-point Likert scale ranging from "more difficult for me now than before" to "much easier for me now than before".

Achievement motivation Achievement motivation was assessed with three subscales of the Achievement Motivation Questionnaire for Students in the seventh to thirteenth grade (Petermann and Winkel 2007): (1) PE, (2) AD, and (3) fear of success (FS). Each subscale consisted of eight items with answers ranging from "(1) it is not true at all" to "(5) it is absolutely true" on a 5-point Likert scale. The PE subscale addressed conscious concentration, time management, self-control, and discipline (e.g., "I plan a lot of time to get ready for exams") (α=0.75). The AD subscale consisted of items measuring one's performance goals relative to others (e.g., "At school I want to belong to the best students") (α=0.83). Finally, the FS subscale was used to evaluate the fear of possible negative peer reaction as a result of one's academic success (e.g., "No one wants to have something in common with those students who have better grades than the majority in the class") (α=0.73).

Socio-motivational support Socio-motivational support was measured along two dimensions as follows: (1) perceived quality of the social relationships at school and (2) perceived positive role that peers and teacher play in students' motivation. In order to assess the first dimension, the following two scales were used (1) the SSR questionnaire and (2) the TSR questionnaire. The SSR was a part of the Program for International Student Assessment (PISA) of the OECD (Kunter et al. 2002). The participants rated statements about the social climate in class (e.g., "Many students are envious, if others have better grades"). The scale ranged from 1 (definitely does not apply) to 4 (definitely applies) and had an α=0.70. As the original scale measured negative SSR, the items were recoded for ease of interpretation. The TSR was also a part of the PISA 2003 battery (Kunter et al. 2002). The students were asked to rate such statements as "Most teachers treat me fairly" or "Most teachers care about the students' well-being in school". The scale ranged from 1 (definitely does not apply) to 4 (definitely applies) and showed an internal reliability of α=0.78.

In order to measure the perception of teachers and peers as positive motivators, we used two subscales of the Relationship and Motivation (REMO) scale (Raufelder et al. 2013): the (1) TPM (α=0.78) subscale, which consisted of 6 items (e.g., "When the teacher approves that I have tried my best, I will try to give my best again in the future.") and the (2) PPM (α=0.80) subscale, which was comprised of 11 items, (e.g., "When my friends learn a lot, I am also motivated to learn more.") Responses for both subscales were scored on a 4-point Likert scale ranging from "strongly disagree" to "strongly agree."

Statistical analyses

Structural Equation Models with Mplus version 7.0 (Mplus 7.0; Muthén and Muthén 1998–2012) and maximum likelihood estimation on a correlation matrix were used to assess the hypothesized relationships between the variables of interest. In these models, latent variables were used to test the mediating role of peer and teacher support in the association between individual school self-concept and achievement motivation (Hypothesis II). We conducted structural equation models (SEM) accounting for nesting in classes using the approach proposed by Asparouhov (2005) for complex survey data (type is complex). This multilevel approach corrected standard error biases created by the nested nature (students/class) of our data (MacKinnon 2008). The "type is complex" code specified that the sampling is complex, meaning that the data were clustered in groups (school classes); here, clustering occurred in 72

school classes. In addition, we conducted a bootstrapping analysis to assess the effects of mediators by constructing confidence intervals around the estimates (Christ and Schlüter 2012; MacKinnon 2008; Preacher and Hayes 2008a, b). This procedure reduced bias caused by the non-normality in the sampling distribution of indirect effects (Shrout and Bolger 2002).

Model fit was estimated in Mplus using five primary fit indices for the model fit as recommended by Hu and Bentler (1999): chi-square test of model fit (χ^2), root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI), and standardized root mean square residuals (SRMR). In order to test for partial versus full mediation, two models were run as follows: (1) a baseline model (without direct effects between individual school self-concept and the variables of achievement motivation), and (2) a less restrictive model (with direct effects between individual school self-concept and the variables of achievement motivation). The model fit of the baseline model was compared to the model fit of the less restricted model by conducting the χ^2 difference test (Geiser 2010; Yuan and Bentler 2004).

To account for missing data, models were estimated with Mplus full information maximum likelihood using Mplus version 7.0. (Mplus 7.0; Muthén and Muthén 1998–2012).

Results

Bivariate correlation

The correlational analyses were conducted with the statistics software Mplus 7.0 (Muthén and Muthén 1998-2012) (see Table 1). They revealed that the higher students evaluated the level of their ISSC, the more they endorsed their teachers as motivators (r (1,068)=0.086; $p<0.001$) and the higher they scored on the quality of the teacher–student relationship (r (1,039)=0.294; $p<0.001$). In contrast, there was no significant correlation between the ISSC and neither the quality of the student–student relationship nor peers as positive motivators. Moreover, there was a positive correlation between ISSC and AD (r(1,067)=0.306; $p<0.001$) as well as between ISSC and PE (r (1,067)=0.290, $p<0.001$). In other words, students with higher levels of ISSC also had higher achievement motivation. In contrast, there was no significant correlation between ISSC and fear of success. Additionally, the correlations showed that students with higher socio-motivational support from teachers also had higher levels of achievement drive as follows: TPM–AD (r (1,087)=0.343, $p<0.001$), TSR–AD (r (1,042)=0.219, $p<0.001$). Whereas "peers as motivators" were positively correlated with achievement drive (r (1,087)= 0.294, $p<0.001$), the correlational analysis revealed a negative correlation between the student–student relationship and AD (r (1,048)=−0.180, $p<0.001$), but the same variable was positively correlated to perseverance and effort (r(1,048)=0.092, $p<0.001$). Furthermore, the more students perceived the quality of the student–student relationships to be positive, the less fear of success they tended to have (r (1,048)=−0.312, $p<0.001$). The same was true for the correlation between teacher–student relationship and fear of success (r (1,042)=−0.175, $p<0.001$). In contrast, the peers and teachers as positive motivators were not significantly correlated with fear of success.

Structural equation modeling

In order to test our hypotheses, two separate structural equation models were run as follows: (1) model addressing the quality of socio-motivational support (SSR and TSR) as mediators and (2) model approaching the motivational role played by peers and teachers (PPM and TPM) as mediators. Before conducting SEM, a confirmatory factor analysis (CFA) for each model was run in order to evaluate which combination of items was suitable for the models. In terms of

Table 1 Means, standard deviations, and intercorrelations between individual school self-concept, variables of socio-motivational support, and motivation

Measure	2	3	4	5	6	7	8	Range	M	SD
1. PPM	0.411**	−0.093**	0.189**	0.055	0.176**	0294**	−0.031	1–4	2.55	0.51
2. TPM	–	−0.156**	0.233**	0.086**	0.226**	0343**	0.003	1–4	3.08	0.50
3. SSR		–	0.193**	0.036	0.092**	−0.180**	−0.312**	1–4	2.65	0.53
4. TSR			–	0.294**	0.376**	0.219**	−0.175**	1–4	2.85	0.50
5. ISSC				–	0.290**	0.306**	−0.027	1–5	3.25	0.85
6. PE				–	–	0.423**	−.080**	1–5	3.04	0.71
7. AD						–	0.013	1–5	3.13	0.72
8. FS							–	1–5	2.07	0.60

All measures are standardized

PPM peers as positive motivators, *TPM* teachers as positive motivators, *SSR* student–student relations, *TSR* teacher–student relations, *ISSC* individual school self-concept, *PE* perseverance and effort, *AD* achievement drive, *FS* fear of success

*p<0.05

**p<0.001

an economic model, the number of items was reduced, such as low-loading (α<0.40) and cross-loading items were excluded from our analysis. Finally, every latent variable consisted of three items, respectively. The CFAs showed a good model fit for model 1.

(χ^2 (120)=268.12, p<0.001; CFI=0.95, TLI=0.94, RMSEA=0.03 (0.03–0.04); SRMR=0.04) as well as for model 2 (χ^2 (120)=262.41, p<0.001; CFI=0.96, TLI=0.94, RMSEA=0.03 (0.03–0.04); SRMR=0.04).

Model 1: SSR and TSR as mediators

Based on the results of the correlations, two-structural equation models were constructed as follows:

(1) A baseline model (see Fig. 1) including direct paths (a) from individual school self-concept to socio-motivational support (SSR, TSR); and (b) from socio-motivational support (SSR, TSR) to achievement motivation (AD, PE, FS). The analysis showed that the baseline model had a good fit: (χ^2 (123)=282.45, p<0.001; CFI=0.95, TLI=0.94, RMSEA=0.04 (0.03–0.04); SRMR=0.04) and that the indirect path from individual school self-concept to perseverance and effort through TSR was found to be significant (B=0.24, β=0.20, SE=0.04, 95 % CI [0.168, 0.320]), as well as the indirect path from individual school self-concept to achievement drive through TSR (B=0.86, β=0.11, SE=0.03, 95 % CI [0.037, 0.135]), and the indirect path from individual school self-concept to fear of success through TSR (B=−0.04, β=−0.07, SE=0.01, 95 % CI [−0.064, −0.010]). In contrast, SSR did not function as a mediator (none of the three indirect paths was found to be significant).

(2) In order to test for partial versus full mediation, pathways were added between individual school self-concept and the three subscales of achievement motivation. The results of this less restrictive model showed a good fit (χ^2 (120)=268.12, p<0.001; CFI=0.95, TLI=0.94, RMSEA=0.03 (0.03–0.04); SRMR=0.04). The chi-square difference test between the (1)
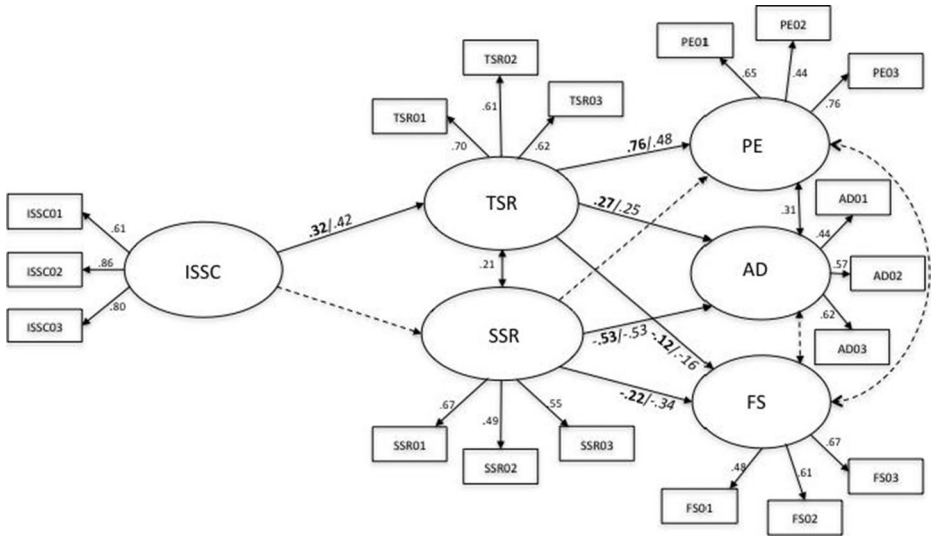
Fig. 1 Baseline Model TSR and SSR as Mediators; *SSR* student–student relationship, *TSR* teacher–student relationship, *ISSC* individual school self-concept, *PE* perseverance and effort, *AD*=achievement drive, *FS* fear of success; Significant effects shown as unstandardized coefficients (*B*) in *bold face* and standardized coefficients (*β*) in *italics*, *bold pathways* are significant at *p*<0.05; *dotted pathways* are not significant. Covariance values are standardized. Indirect effects are described in the text

baseline model and the (2) less restrictive model reached the level of significance (χ^2 (3)=14.61, *p*<0.001), meaning that the less restrictive model fits better (see Table 2). Though the test revealed that the association between ISSC and AD was partially mediated by the teacher–student relationship, the additional direct effects between ISSC and AD in the less restrictive model were still significant. In contrast, the direct effect between ISSC and fear of success, as well as the direct effect between ISSC and perseverance and effort were not significant, which means that the teacher–student relationship functioned as a full mediator in these associations. This less restrictive model with the direct paths between ISSC and achievement model was considered the final model and is described in detail below (direct and indirect effects).

Direct effects: this final model included direct effects: (a) of ISSC on both TSR and SSR; (b) of TSR and SSR on the three subscales of achievement motivation and (c) of achievement motivation on ISSC (see Fig. 2). Consistent with our hypotheses, we observed the following direct effects: the effect of teacher–student relations on perseverance and effort (*B*=0.71, *β*=0.45, *SE*=0.10, *p*<0.001); as well as the effects of social relationships and individual school self-concept on achievement drive (TSR: *B*=0.15, *β*=0.14, *SE*=0.06, *p*=0.018; SSR: *B*=−0.48, *β*=−0.50, *SE*=0.07, *p*<0.001; ISSC: *B*=0.14, *β*=0.18, *SE*=0.04, *p*<0.001). Moreover, we observed significant direct effects between social relationships and fear of success (TSR: *B*=−0.16, *β*=−0.23, *SE*=0.06, *p*<0.001; SSR: *B*=−0.21, *β*=−0.32, *SE*=0.06, *p*<0.001). Another important direct effect was that of the individual school self-concept on teacher–student relationships (*B*=0.31, *β*=0.41, *SE*=0.04, *p*<0.001).

Indirect effects: consistent with our hypotheses, we observed significant indirect effects of ISSC on PE mediated by TSR (*B*=0.22, *β*=0.18, *SE*=0.04, 95 % *CI* [0.142, 0.300]). The indirect effects of ISSC on AD mediated by TSR (*B*=0.05, *β*=0.06, *SE*=0.02, 95 % *CI* [0.005, 0.088]) and indirect effects of ISSC on FS mediated by TSR (*B*=−0.05, *β*=−0.10,

Table 2 Model fit indices comparing baseline model and less restrictive model—TSR and SSR as mediators

Measure	Baseline model	Less restrictive model
χ^2—test of model fit (df[+])	282.45 (123)	268.12 (120)
$p(\chi^2)$	<0.001	<0.001
CFI/TLI	0.95/0.94	0.95/0.94
RMSEA (90 % CI)	0.03 (0.03, 0.04)	0.03 (0.03,0.04)
SRMR	0.04	0.04

[+] *df* degrees of freedom

SE=0.02, 95 % CI [−0.087, −0.016]) were also significant. In contrast, the SSR did not prove to be a mediator in our models. The identified final model explained 30.3 % of variance of achievement motivation (R^2=0.303) and 21.7 % of variance of perseverance and effort (R^2=0.217), as well as 16.8 % of variance of fear of success (R^2=0.168). In the next step, a second model was run to test if PPM and TPM act as mediators in the association between ISSC and achievement motivation.

Model 2: PPM and TPM as mediators

Based on the results of the correlations, another two-structural equation models were constructed: (1) a baseline model (see Fig. 3) included direct paths (a) from individual school self-concept to socio-motivational support (PPM, TPM); and (b) from socio-motivational support to achievement motivation (AD, PE, FS). The analysis showed that the baseline model had a good fit (χ^2 (123)=287.74, p<0.001; *CFI*=0.95, *TLI*=0.94;
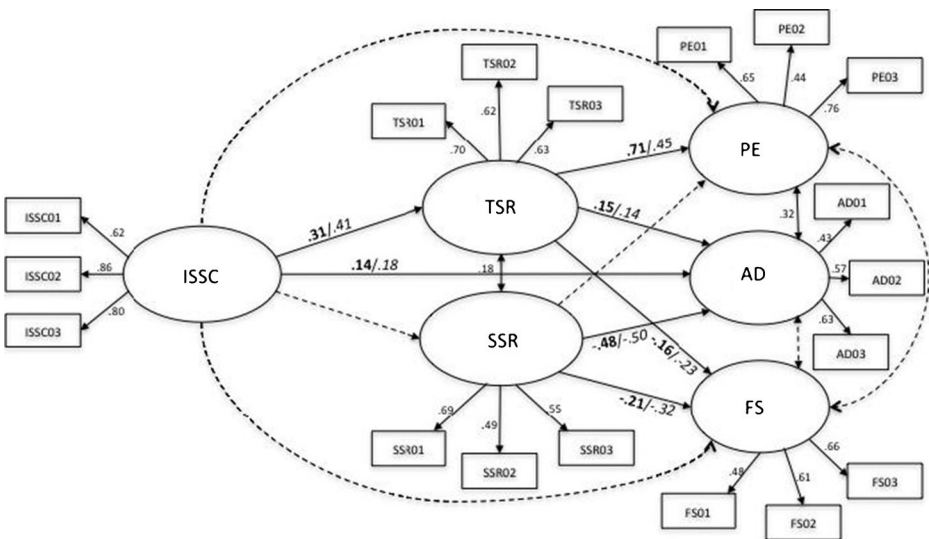

Fig. 2 Less restrictive Model SSR and TSR as mediators. *SSR* student–student relationship, *TSR* teacher–student relationship, *ISSC* individual school self-concept, *PE* perseverance and effort, *AD* achievement drive, *FS* fear of success; Significant effects shown as unstandardized coefficients (*B*) in *bold face* and standardized coefficients (*β*) in *italics*, bold pathways are significant at *p*<0.05; dotted pathways are not significant. Covariance values are standardized. Indirect effects are described in the text
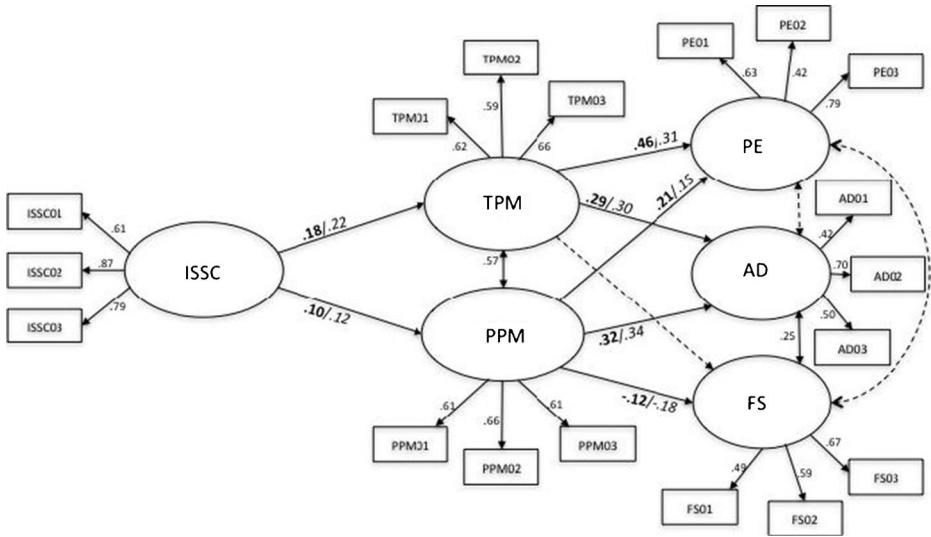
Fig. 3 Baseline model PPM and TPM as mediators. *PPM* peers as positive motivators, *TPM* teachers as positive motivators, *ISSC* individual school self-concept, *PE* perseverance and effort, *AD* achievement drive, *FS* fear of success; Significant effects shown as unstandardized coefficients (*B*) in *bold face* and standardized coefficients (*β*) in *italics*, *bold pathways* are significant at *p<0.05*; *dotted pathways* are not significant. Covariance values are standardized. Indirect effects are described in the text

RMSEA=0.04 (0.03–0.04); SRMR=0.04). The indirect path from ISSC to AD through PPM was found to be significant (*B*=0.03, *β*=0.04, *SE*=.01, 95 % *CI* [0.004, 0.058]). The same was true for the indirect path from ISSC to AD through TPM (*B*=0.05, *β*=0.07, *SE*=0.02, 95 % *CI* [0.016, 0.089]). Additionally, the indirect path from ISSC to PE through TPM (*B*=0.08, *β*=0.07, *SE*=0.03, 95 % *CI* [0.028, 0.135]) was significant. In contrast, PPM did not function as a mediator in the association between ISSC and PE. Finally, the indirect path from ISSC to FS through PPM was found to be significant (*B*=−0.01, *β*=−0.02, *SE*=0.01, 95 % *CI* [−0.023, 0.000]). For this path, TPM did not function as a mediator.

(2) In order to test for partial versus full mediation, pathways were added between individual school self-concept and achievement motivation (three subscales). This less restrictive model showed a good fit as well (χ^2 (120)=262.42, *p*<0.001; *CFI*=0.96, *TLI*=0.94; *RMSEA*=0.03 (0.03–0.04); *SRMR*=0.04). The chi-square difference test between the (1) baseline model and this (2) less restrictive model reached the level of significance (χ^2 (3)=24.68, *p*<0.001), which meant that the less restrictive model had a better fit (see Table 3). Though the test revealed that the association between ISSC and achievement

Table 3 Model fit indices comparing baseline model and less restrictive model—TPM and PPM as mediators

Measure	baseline model	less restrictive model
χ^2—Test of model fit (df[+])	287.74 (123)	262.42 (120)
$p(\chi^2)$	<0.001	<0.001
CFI/TLI	0.95/0.94	0.96/0.94
RMSEA (90 % CI)	0.04 (0.03, 0.04)	0.03 (0.03, 0.04)
SRMR	0.04	0.04

[+] *df* degrees of freedom

motivation was partially mediated by PPM and TPM, the additional direct effects between ISSC and the three scales of achievement motivation in the less restrictive model were still significant. This less restrictive model with the direct paths between ISSC and achievement model is our final model and is described below in detail (direct and indirect effects).

Direct effects: This final model included direct effects (a) of ISSC on both PPM and TPM, (b) of PPM and TPM on the three subscales of achievement motivation, and (c) of achievement motivation on ISSC (see Fig. 4). We observed direct effects between teachers as positive motivators and perseverance and effort ($B=0.37$, $\beta=0.25$, $SE=0.08$, $p<0.001$) and between peers as positive motivators and perseverance and effort ($B=0.24$, $\beta=0.17$, $SE=0.10$, $p=0.038$) as well as between individual school self-concept and perseverance and effort ($B=0.20$, $\beta=0.17$, $SE=0.06$, $p<0.001$).

Both motivational relationships and the individual school self-concept had direct effects on achievement drive as well (TPM: $B=0.24$, $\beta=0.25$, $SE=0.06$, $p<0.001$; PPM: $B=0.34$, $\beta=0.36$, $SE=0.07$, $p<0.001$; ISSC: $B=0.12$, $\beta=0.15$, $SE=0.03$, $p<0.001$). In addition, the effect of peers as positive motivators on fear of success was statistically significant FS on PPM ($B=-0.12$, $\beta=-0.18$, $SE=0.05$, $p=0.021$). In contrast, both the direct effect between fear of success and teachers as positive motivators, as well as the direct effect between fear of success and individual school self-concept were not significant. Finally, there was a small but significant direct effect between the individual school self-concept and peers as positive motivators ($B=0.08$, $\beta=0.10$, $SE=0.03$, $p=0.006$), and between individual school self-concept and teachers as positive motivators ($B=0.15$, $\beta=0.19$, $SE=0.03$, $p<0.001$).

Indirect effects: consistent with our hypotheses, we observed a significant indirect effect of ISSC on PE mediated by TPM ($B=0.06$, $\beta=0.05$, $SE=0.02$, 95 % CI [0.020, 0.093]). Furthermore, the indirect effects of ISSC on AD mediated by PPM ($B=0.03$, $\beta=0.04$, $SE=0.01$, 95 % CI [0.004, 0.050]) and TPM ($B=0.04$, $\beta=0.05$, $SE=0.01$, 95 % CI [0.010, 0.063]) were also significant. In contrast, both PPM and TPM did not mediate the
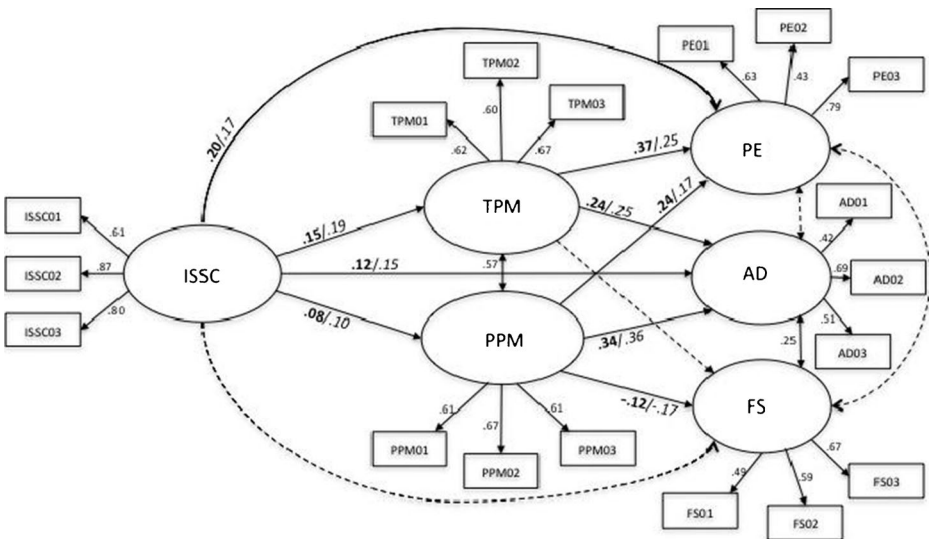

Fig. 4 Less restrictive model PPM and TPM as mediators. *PPM* peers as positive motivators, *TPM* teachers as positive motivators, *ISSC* individual school self-concept, *PE* perseverance and effort, *AD* achievement drive, *FS* fear of success; Significant effects shown as unstandardized coefficients (*B*) in **bold face** and standardized coefficients (*β*) in *italics*, *bold pathways* are significant at $p<0.05$; *dotted pathways* are not significant. Covariance values are standardized. Indirect effects are described in the text

associations between ISSC and FS and PPM did not mediate the associations between ISSC and PE. The identified final model explained 34 % of variance of achievement drive (R^2=0.340) and 19.3 % of variance of perseverance and effort (R^2=0.193), as well as 2.7 % of variance of fear of success (R^2=0.027).

Discussion

The current study examined the mediating role of socio-motivational relationships in the association between individual school self-concept and achievement motivation. Our primary aim was to test whether socio-motivational support could be an effective starting point for strengthening students' achievement motivation, which in turn might positively affect the individual school self-concept. Supportive socio-motivational relationships might be an effective external starting point, which can be easily implemented in daily school life and thus prevent the decline in achievement motivation that characterizes this developmental period.

In line with our first hypothesis, the findings suggested that there were associations between the individual school self-concept, socio-motivational support, and achievement motivation, however, not every expected association was confirmed. In specific, we found that students who perceived peers and teachers as positive motivators, as well as students who had a high individual school self-concept, tended to have higher scores on perseverance and effort and achievement drive. In contrast, a significant association was neither discovered between (a) individual school concept and fear of success nor between (b) peers and teachers as positive motivators and fear of success. The nature of the variables could possibly explain these insignificant effects. The variable "fear of success" estimates the belief that high school performance can be associated with negative social consequences (e.g., "students who try harder at school are disliked by others"). In other words, the motivational concept behind fear of success is based on social relationships, particularly within student–student relationship. Therefore, it is not surprising that solely positive teacher–student and student–student relationships were negatively associated with fear of success. Essentially, the better students perceive their student–student relationships and their teacher–student relationships, the less fear of success they possess. Although the correlation analyses did not reveal a significant association between peers as positive motivators and fear of success, in model 2 of the SEM analyses, there was a small but significant negative association between these variables. This might be due to the interdependent character and interplay of the latent variables included in the model. In sum, a positive peer relationship in the school context may be related to feelings of friendship and belonging to a community (Adams et al. 2011; Cook et al. 2007; Hodges et al. 1999), as well as perceived as motivational support, representing a protective factor against fear of success.

Interestingly, the variables "teachers as positive motivators" and the "teacher–student relationship" were related to the individual school self-concept, but the same could not be said about the variables of peer socio-motivational support. In other words, the more students perceived their teachers as positive motivators and the more they considered their teacher–student relationships to be positive, the better their individual school concept was. In comparison to that, "peers as positive motivators" and the "student–student relationship" were not related to the students' individual school self-concept. These results contradict previous findings (Harter 1996; Rubin et al. 2006; Furman and Buhrmester 1992; Buhs et al. 2006), suggesting that the role of peer relationships in maintaining the individual's school self-concept might be overestimated in the literature. It should be noted, however, that the absence of correlations between these constructs in our research might be explained by the

nature of the constructs we used. The individual school self-concept scale compared the current abilities of students to their past abilities and is therefore more related to institutional aspects of social relationships in school, (e.g., the teacher–student relationship and the perception of teachers as positive motivators). Moreover, teachers provide judgment and feedback regarding students' academic performance, which might affect the perception of students' individual school self-concept and vice versa. In contrast, peers might be essential for students' social school self-concept since they provide a comparison base. However, the present study was focused on the individual school self-concept given that previous research has shown that students prefer to compare their current academic abilities with their own past abilities (i.e., individual development) than with social others (i.e., peers) (Leahy and Hunt 1983; Nicholls 1984; Yussen and Kane 1985).

The results indicated a negative association between the student–student relationship and AD, which could be explained by the fact that AD is defined as an ambition to be better than others, desire to excel, will to win, or competitive nature, and therefore better interpersonal relationships with classmates imply a less competitive classroom climate and consequently lower levels of achievement drive amongst students (McClelland 1961). At the same time, if students perceived their peers as positive motivators rather than social companions, they tended to report higher levels of AD. In contrast, both teacher variables were positively associated with AD, due to the fact that students might perceive relationships with teacher generally in a more professional and academic way.

In sum, socio-motivational support from teachers seems to have strong positive associations with both students' individual school self-concept and their achievement motivation as compared to socio-motivational support from peers. This supports our hypothesis about the importance of a teacher's role in the association between individual school self-concept and achievement motivation as well as a teachers' role in the aspects of achievement motivation. The correlational analyses addressing associations between the role of peers and individual school self-concept did not confirm our expectations, but they did emphasize the role of peers in connection to achievement motivation. The results revealed that peers who are perceived as positive motivators contributed to more perseverance and effort as well as achievement drive during the first years of secondary school (which supports the results of Ladd et al. (2009), Juvonen and Wentzel (1996), Wentzel et al. (2010)). Furthermore, a positive student–student relationship is related with less fear of success and in this way contributes to emotional well-being (which is in line with the findings of Harter 1996; Rubin et al. 2009; Rubin et al. 2006; Furman and Buhrmester 1992).

The results of the two-structural equation models are very much in accordance with the results from the correlational analyses: in line with hypothesis II, teachers' socio-motivational support mediated the association between individual school self-concept and achievement motivation. Specifically, the teacher–student relationship partially mediated the association between individual school self-concept and achievement drive, whereas the association between individual school self-concept and fear of success, as well as between individual school self-concept and perseverance and effort were fully mediated by the teacher–student relationship. In addition, teachers as positive motivators partially mediated the association between the individual school self-concept and achievement drive, as well as between individual school self-concept and perseverance and effort. In contrast, neither student–student relationships nor peers as positive motivators functioned as a mediator. This might be due to the fact that there was no significant association between socio-motivational support from peers and individual school self-concept in general. As mentioned above, the individual school self-concept might be related to socio-motivational relationships with teachers, as they directly provide students with feedback and judgment on their individual

academic performance. Conversely, the socio-motivational relationships with peers might be related to social school self-concept, in which students assess their school self-concept in comparison to the academic abilities and performance of their peers (Schoene et al. 2002). Future research taking into account both the individual as well as the social school self-concepts might clarify these differences.

In sum, the results suggest that a strong positive relationship between a teacher and a student during the first years of secondary school can contribute to the student's achievement drive as well as improve her/his perseverance and effort in school and protect from fear of success. Moreover, perseverance and effort as well as achievement drive in relation with academic self-concept profit from the student's perception of a teacher as a positive motivator. These findings help to specify the teacher's role in the mechanisms of learning behavior and to clarify teachers' impact on different aspects of achievement motivation. In contrast, neither the student–student relationship nor the perception of peers as positive mediators acted as mediators. Therefore, our second hypothesis could only be partially confirmed.

Overall, our results underline the importance of socio-motivational support, particularly from teachers, in educational settings. The findings of the correlation analyses extend existing evidence (Montalvo and Mansfield 2007) by suggesting that students' achievement motivation and individual school self-concept not only benefit from a positive teacher–student relationship in general, but also in particular from teachers who act as positive motivators. In other words, maintaining a positive teacher–student relationship in secondary school as well as perceiving teachers as positive motivators could help students maintain their individual school self-concept and possibly prevent the decline in achievement motivation that is common for this age group.

Furthermore, even though our hypothesis that a strong student–student relationship and peers as positive motivators would serve as mediators in the association between individual school self-concept and achievement motivation was not fully supported, the findings of the correlational analyses and the direct effects in the SEM were in line with current research. In particular, the more students perceive their peers as positive motivators, the better they perceive their student–student relationship, the higher they score on achievement drive and perseverance and effort. In contrast, if peers serve a more relational as opposed to academic function as evidenced by more positive student–student relationships, adolescents tend to have less fear of success. The negative association between the variables "peers as positive motivators" and "student–student relationship" also suggests that peers can serve different functions in school context and thus have different effects on achievement motivation. While the teacher's role ("teacher–student relationship" and "teacher as positive motivators") seems to be more institutionalized and uniform and therefore connected to achievement motivation and the individual school self-concept, the role of peers should be understood in a more differentiated way: while a high quality of the student–student relationship might be good for the students' well-being (Wentzel 2009a) and reduce fear of success, it can also have a negative impact on achievement drive. However, when peers serve a more institutional and academic role as positive motivators, adolescents benefit from these relationships through increased achievement motivation (Raufelder et al. 2013).

In summary, our findings extend current research by differentiating between types of peer relationships that can differentially affect adolescents' achievement motivation. Furthermore, the results underline the important mediating role of teachers' socio-motivational support in the association between students' individual school self-concept and their achievement motivation. The evidence supports the conclusion that particularly, in adolescence, socio-motivational support perceived from teachers is a good point of intervention in efforts aimed at addressing the decreasing achievement motivation, academic failure, and school dropout.

Strengths, limitations, and future research

The present study has important theoretical, methodological, and statistical strengths. Firstly, the differentiated roles (relational and motivational) of *both* peers and teachers in adolescents' school context have been considered, whereas most studies focus on the impact of either peers or teachers (Wentzel et al. 2012). Secondly, the two-structural equation models, which have been conducted using a complex multilevel approach (Asparouhov 2005) are a clear strength of the study. Thirdly, the sample includes a large number of students and schools, which allows the generalization of the results. Finally, with regard to differences in the socio-motivational support by peers and teachers, the findings enhance our understanding of the complex nature of social relationships in the school context in adolescence.

The current research on the role of socio-motivational support in adolescents' school life has certain methodological limitations. Firstly, although we were specifically interested in students' perception of social relationships and motivation, it can be said that the study is limited in its reliance on self-report measures. However, according to Chan (2009), negative attitudes toward self-report data have taken on unjustified proportions (see also Spector 2006). By carefully considering the four main problems (construct validity of self-report data, interpreting the correlations, social desirability responding, value of data collected from non-self-reported measures) associated with self-report data, we attempted to address and consequently circumvent them. Not to mention that the problems associated with self-report data may just as easily occur with non-self-report data (Chan 2009). Secondly, the data are cross-sectional, which limits assertions about the stability of the results over time. Longitudinal research designs could illuminate important trajectories of change across the developmental phase of adolescence. Thirdly, there are limitations in the psychometric qualities of two variables: fear of success and student–student relationship. Instruments that proved to have good psychometric qualities in other studies showed restricted psychometric qualities in the present population. However, due to their substantial contribution to the models, we decided not to remove the variables.

The present results lead naturally to several research questions concerning possible inter- and intra-individual differences between students. For example, are the findings equally relevant for both girls and boys as well as for low-achieving and high-achieving students? Or, might the teacher's gender play a role in these processes? Furthermore, including class and school level variables (such as class and school climate) could possibly improve our current models. These and other questions are being addressed within the framework of our overarching longitudinal and method triangulation (quantitative, qualitative, and experimental) research initiative. In conclusion, the present findings regarding achievement motivation and individual school self-concept are directly relevant to teachers' efforts to reduce motivational decline in early adolescence in that they highlight the importance of considering both motivational *and* social factors within the school context.

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Current themes of research:

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