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On the interplay between academic achievement and educational identity: A longitudinal study



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ABSTRACT

The present three-wave longitudinal study provides empirical evidence for the mechanisms of the bright and dark sides of identity development in the academic context. First, we investigated the patterns of stability and change in educational identity and academic achievement among adolescents. Second, we examined the reciprocal associations between identity processes (i.e., commitment, in-depth exploration, and reconsideration of commitment) and academic achievement. The main results of the study highlighted that academic achievement predicts the manner in which adolescents deal with their identity issues in the academic context. Thus, high academic achievement leads to high levels of commitment (identity synthesis), while low academic achievement leads to high levels of reconsideration of commitment (identity confusion). This unidirectional pattern of effects applied equally to adolescent boys and girls, early-to-middle and middle-to-late adolescents, and to adolescents attending theoretical and vocational schools. Practical implications are discussed.

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Introduction

In adolescence, the construction of a synthesized sense of identity becomes a prominent developmental task with important implications for personal and social adjustment (Erikson, 1968). One of the key questions of identity theory is where identity springs from. According to a number of theories, a positive self-view is dependent on positive feedback from the environment to the individual. For instance, the sociometer theory (Leary, 2005) proposes that a positive self-view springs from general positive social interactions with relevant others. Expanding the sociometer theory (Leary, 2005) to the identity domain, we assumed that educational identity might be driven by the academic achievement level, which is the feedback from the environment showing students how well their educational aspirations fit to their educational performance (Coe, 2002). In the school context, academic achievement represents the gauge of students' success or failure, which might foster or threaten adolescents' social acceptance (Bakker, Denessen, Bosman, Krijger, & Bouts, 2007) and implicitly strengthen or

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weaken their educational identity (Luyckx, Goossens, & Soenens, 2006). However, a strong educational commitment may enhance students' motivation, which in turn might lead to improvements in academic achievement (Oyserman & Destin, 2010; Roeser, Peck, & Nasir, 2012). In the present study we first analyzed the developmental patterns of educational identity and academic achievement operationalized in terms of grade point average (GPA). Second, we examined the directionality of effects between these two constructs: Does GPA drive relative changes in identity or is it the other way around?

Identity development

Most of the research on identity development is rooted in Erikson's theory of identity (1968). As the first empirical attempt to investigate identity, Marcia's status model (1966) focused more on identity as an outcome that individuals should achieve by late adolescence, when identity conflicts are supposed to be solved and firm commitments assumed. Inconsistent results regarding longitudinal changes in identity statuses impelled researchers to a more granular analysis of identity development. Thus, recent approaches of identity focused on the processes underlying identity statuses (Crocetti, Rubini, & Meeus, 2008; Luyckx, Goossens, Soenens, & Beyers, 2006; Porfeli, Lee, Vondracek, & Weigold, 2011).

Compared with the identity status model, which assumes that achieving a sense of identity in adolescence includes having strong commitments preceded by an intense exploration of various alternatives, the process model developed by Meeus and Crocetti (Crocetti et al., 2008; Meeus, van de Schoot, Keijsers, Schwartz, & Branje, 2010) emphasizes that adolescent identity development implies maintaining or revising commitments that adolescents already possess when they enter this developmental period. Adolescents deal with their commitments through in-depth exploration and reconsideration (Meeus, 2011). Specifically, in-depth exploration is the process by which adolescents monitor and reflect on their current commitments, making them more aware of their choices. Reconsideration of commitment is the process by which adolescents compare their present commitments with other possible alternatives and try to change the present unsatisfactory commitments with new ones (Crocetti et al., 2008).

The associations between commitment and several positive psychosocial correlates support the idea that commitment is an indicator of positive identity development (i.e., identity synthesis; Meeus, 2011). In fact, commitment was found to be positively related to personal and social adjustment (Crocetti et al., 2008; Crocetti, Scrignaro, Sica, & Magrin, 2012; Karaś, Ciecuch, Negru, & Crocetti, 2015; Klimstra, Luyckx, Germeijs, Meeus, & Goossens, 2012; Luyckx et al., 2006) and negatively related to emotional (e.g., depressive symptoms and anxiety, Crocetti et al., 2012; Luyckx et al., 2006; Meeus, van de Schoot, Keijsers, & Branje et al., 2012) and behavioral problems (e.g., externalizing problems, Crocetti, Klimstra, Hale, Koot, & Meeus, 2013; Meeus, van de Schoot, Keijsers, & Branje, 2012).

In contrast, previous research has shown that reconsideration of commitment is indicative of an identity crisis (i.e., uncertainty, confusion), being positively related to depressive and anxiety symptoms, delinquency, poor parent–child relationships, and negatively associated with self-concept clarity, adaptive personality traits, and well-being (Crocetti et al., 2008, 2012; Karaś et al., 2015; Schwartz, Klimstra, Luyckx, Hale, & Meeus, 2012). Hence, despite the fact that it might serve positive long-term goals (i.e., through reconsideration, adolescents discard inadequate commitments and look for appropriate ones), reconsideration of commitment has negative short-term effects (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010; Schwartz et al., 2012).

While commitment and reconsideration of commitment have a clear positive and negative core respectively, in-depth exploration has a dual nature, being considered both an adaptive and a maladaptive process (Crocetti et al., 2008, 2012; Luyckx et al., 2006). Namely, in-depth exploration was found to be positively connected with adaptive psychosocial characteristics (i.e., positive personality traits, Crocetti et al., 2008; social responsibility and civic engagement, Crocetti, Jahromi, & Meeus, 2012; academic adjustment and supportive parenting, Luyckx et al., 2006), but also with maladaptive psychosocial aspects (i.e., depressive symptoms, anxiety, problematic parent–child relationships, Crocetti et al., 2008).

Academic achievement

In a period of rapid technological and economic changes, expanded educational preparation has become a necessity for adolescents. Hence, academic achievement became an important criterion for academic and socio-economic success (Kuncel, Credé, & Thomas, 2005; Poropat, 2009). So far, research on adolescent psychosocial functioning highlighted that academic achievement is an antecedent as well as a consequence of several emotional, behavioral, and social characteristics. For example, it was found that depressive problems led to poor academic achievement, which in turn enhanced depressive problems. These bidirectional associations were found only in girls (Verboom, Sijtsema, Verhulst, Penninx, & Ormel, 2014). However, prior cross-sectional results (Fröjd et al., 2008) pointed out that high academic achievement protected boys against severe depressive symptoms, the two variables being negatively related.

Previous studies also found that low-achieving students were more prone to anxiety and externalizing problems (i.e., aggression, antisocial and delinquent behavior) compared to high-achieving students. While underachieving girls were more vulnerable to anxiety problems (Pomerantz, Rydell Altermatt, & Saxon, 2002), underachieving boys were more vulnerable to externalizing problems (Hinshaw, 1992). Academic underachievement was also associated with peer rejection and discrimination, especially among underachieving girls (Bakker et al., 2007).

The grade point average (GPA) is one of the dominant operationalizations of academic achievement (Poropat, 2009). Despite the criticism about its use (e.g., grade inflation, Johnson, 2003; different grading criteria in different educational

institutions, Didier, Kreiter, Buri, & Solow, 2006), GPA was found to be a reliable indicator of academic achievement (Bacon & Bean, 2006) and also a strong predictor for several important outcomes: subsequent academic performance (Kuncel, Hezlett, & Ones, 2001), work performance (Roth, BeVier, Switzer, & Schippman, 1996), and occupational status (Strenze, 2007).

In the present study, we used the GPA (the mean of grades earned in all subject areas) as indicator of adolescents' academic achievement level. Unlike other types of achievement indicators (i.e., standardized tests of cognitive abilities), GPA reflects not only students' capacities, but also how they use these capacities in academic contexts over long periods of time (e.g., persistence and effort in learning tasks, motivation; Richardson, Abraham, & Bond, 2012).

The present study

The present three-wave longitudinal study had two main goals. The first goal was to investigate the patterns of stability and change in educational identity development and academic achievement among adolescents. The second goal was to examine the reciprocal associations between identity processes (i.e., commitment, in-depth exploration, and reconsideration of commitment) and academic achievement (i.e., GPA). In addressing both goals, we considered age-group, gender, and school type as possible moderators. The study was conducted throughout the span of one academic year, a normative time-frame for adolescent cognitive and psychosocial development, but also for adolescent development interventions (Rones & Hoagwood, 2000).

Mean-level development of identity processes and academic achievement. Recent longitudinal studies examining linear changes in identity processes found relatively stable levels of commitment and in-depth exploration (Crocetti et al., 2013; Klimstra et al., 2010) and increases in reconsideration of commitment (Crocetti et al., 2013) across five academic years, with one year between the measurement points. Studies using multiple measuring points during one academic year (Negru-Subtirica, Pop, & Crocetti, 2015) showed decreases in commitment and in-depth exploration and increases in reconsideration of commitment. Therefore, in the present study we expected to identify stable or decreasing levels of commitment and in-depth exploration and increases in reconsideration of commitments within one academic year.

In adolescence, education is regarded as an identity domain less open to change compared to other identity domains (e.g., relational identity), adolescent students being provided with a more general educational preparation and limited educational options to be explored than university students (Klimstra et al., 2010; Meeus, Iedema, Helsen, & Vollebergh, 1999). Thus, we expected the patterns of educational identity development to be similar for early-to-middle and middle-to-late adolescents in our sample.

Since previous longitudinal studies revealed that girls reach identity maturation earlier than boys (Klimstra et al., 2010; Negru-Subtirica et al., 2015), we expected girls to have higher levels of educational commitment and in-depth exploration and lower levels of reconsideration of commitment compared to boys.

The type of school attended by adolescents might also play a role in how they face educational identity issues (Negru-Subtirica et al., 2015). Thus, in the present study we considered two types of schools: (a) theoretical schools, which provide adolescents with general knowledge and prepare them for university studies and (b) vocational schools, which prepare adolescents for specific occupations (Creed, Patton, & Hood, 2010). In line with previous findings (Negru-Subtirica et al., 2015), we expected adolescents from theoretical schools to be more committed, to explore more, and reconsider less their commitments than adolescents attending vocational schools.

With respect to academic achievement, previous longitudinal studies highlighted a decreasing trend of students' GPA and grades from one academic year to the next (Brković, Keresteš, & Levpušček, 2014) and from elementary school to college (Voyer & Voyer, 2014). Thus, we expected that academic achievement levels decrease over time in our sample. We also expected to find gender differences, with adolescent girls outperforming boys, since previous research (Voyer & Voyer, 2014) pointed out girls' advantage in school grades in general, as well as in specific-domains (e.g., Math, foreign languages). In line with previous research (Jørgensen, 2015), we expected students from vocational schools to report lower levels of academic achievement compared to students from theoretical schools. We expected these differences to grow over time as students from vocational schools were more likely to become involved in non-academic educational streams (Creed et al., 2010).

Over-time links between identity processes and academic achievement. Research on identity and academic achievement is very scarce and largely limited to studies conducted with university students. So far, longitudinal evidence showed that strong educational commitments led to progress from one academic year to the next, whereas weak educational commitments led to academic delay (Klimstra et al., 2012). Moreover, students who registered academic progress reported high levels of identification with commitment, while those who registered academic delay reported high levels of reevaluation of commitment (Luyckx et al., 2006). Based on this evidence, we expected bidirectional effects between educational identity and academic achievement. Specifically, we expected educational commitment (identity synthesis) to positively predict academic achievement (i.e., GPA) and the other way around. Also, we expected reconsideration of commitment (identity confusion) to negatively predict academic achievement and the other way around.

As socio-demographic characteristics (e.g., age, gender, school type) were shown not to moderate the relations between adolescent identity formation and other variables (e.g., personality traits, Luyckx, Teppers, Klimstra, & Rassart, 2014; career adaptability, Negru-Subtirica et al., 2015), we did not expect age-group, gender, and school type to moderate the relations between identity processes and academic achievement.

Method

Participants

Data for the present study were collected as part of the ongoing longitudinal research project Transylvania Adolescent Identity Development Study (TRAIDES). Participants ($N = 1151$ adolescents, $M_{age} = 16.45$ years; $SD_{age} = 1.40$; 58.7% female) were students from the 8th to the 12th grade from seven theoretical (48.5%) and vocational schools (51.5%) in the North-West part of Romania. The total sample was divided into an early-to-middle adolescent cohort ($n = 462$, $M_{age} = 15.04$, $SD_{age} = 0.62$, age range = 13–15 years) and a middle-to-late adolescent cohort ($n = 689$, $M_{age} = 17.39$, $SD_{age} = 0.89$, age range = 16–19 years). In terms of family structure, 79.5% came from intact two-parent families, 13.4% reported that their parents had divorced, and 4.9% reported other family situation (e.g., one of the parents is deceased). The large majority of adolescents in the sample (90.8%) were living with one or both parents, while 8% were living with other students or relatives. Most of our participants were fully financially supported by their parents (85.8%), while few of them reported having some personal income (8.4%) (i.e., state-provided student allocation, scholarship) or being financially supported by relatives (1.6%).

Sample attrition was 5.51% across the three waves. Overall, 21.68% of data were missing at T1–T3. The range of missing items varied from 3.2% to 44.1% across the three waves. We compared participants with and without complete data using Little's (1988) Missing Completely at Random (MCAR) test. The MCAR test revealed a normed χ^2 (χ^2/df) of 1.31, which indicates a good fit between sample scores with and without imputations (Bollen, 1989), suggesting that data were likely missing at random. Thus, missing values were estimated in SPSS using the Expectation Maximization procedure.

Procedure

All data were collected throughout the span of one academic year (at the beginning of the first semester, at the beginning of the second semester, and at the end of second semester), with an interval of 3–4 months between measurements. Each data collection followed a school-evaluation period (i.e., initial exams at the beginning of the two semesters and final exams at the end of the second semester). At each time point, adolescents completed the same paper-and-pencil questionnaire in their classrooms, during school hours. Each participant received a unique code to ensure confidentiality. Participation in the study was voluntary. At each wave students could choose not to fill in the questionnaires and do other school activities instead. The study was approved by the Faculty of Psychology and Educational Sciences of the first author's university and by the schools' headmasters through a written collaboration protocol.

Measures

Educational identity processes. We used the Romanian version (Crocetti et al., 2015) of the Utrecht-Management of Identity Commitments Scale (U-MICS, Crocetti et al., 2008) to assess the three identity processes in the educational domain: commitment, in-depth exploration, and reconsideration of commitment. The instrument consisted of 13 items scored on a 5-point Likert-type rating scale, ranging from 1 (does not apply to me at all) to 5 (applies to me very well). Sample items include: "My education gives me certainty in life" (commitment; 5 items), "I think a lot about my education" (in-depth exploration; 5 items), and "I often think it would be better to try to find a different education" (reconsideration of commitment; 3 items). Cronbach's Alphas for the three subscales ranged from .75 to .84 at Time 1; .80 to .90 at Time 2; and .82 to .90 at Time 3.

Academic achievement. To measure academic achievement, we asked participants to self-report the grade point average (GPA) they achieved in the previous academic year (i.e., 2012–2013, at Time 1) and in the first semester of the current academic year (i.e., 2013–2014, at Time 2). We collected the GPA for the second semester of the current academic year (i.e., 2013–2014) from official school records (at Time 3). Self-reported GPA was found to be highly correlated with actual GPA (Credé & Kuncel, 2013) and to predict school outcomes similar to actual GPA (e.g., Baird, 1976). Thus, self-reported GPA is considered a reliable and valid estimate of academic achievement when students' actual GPA is not available. In the Romanian grading system, grades range from 1 (minimum) to 10 (maximum).

Results

Preliminary analyses

As a preliminary step, we examined longitudinal and across groups (i.e., age-group, gender, and school type) measurement invariance. Results indicated the establishment of configural, metric, and scalar invariance for educational identity across time and across groups.

Descriptive statistics, as well as between and within-time correlations among the study variables are displayed in Table 1.

Latent Growth Curve analyses

We conducted a multivariate Latent Growth Curve (LGC) analysis in Mplus 6.12 (Muthén & Muthén, 1998–2010) to test linear changes in educational identity and academic achievement. LGC analyses provide mean levels (i.e., intercepts) and

Table 1
Descriptive statistics and correlations among the study variables at times 1–3.

Variable	Descriptive statistics <i>M</i> (<i>SD</i>)	Correlations at times 1–3											
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.ComT1	4.12 (0.68)	–											
2.ComT2	4.02 (0.76)	.64**	–										
3.ComT3	4.00 (0.75)	.59**	.68**	–									
4.IndET1	3.22 (0.76)	.36**	.25**	.26**	–								
5.IndET2	3.16 (0.79)	.28**	.35**	.32**	.46**	–							
6.IndET3	3.23 (0.76)	.22**	.29**	.39**	.45**	.57**	–						
7.RecT1	2.13 (0.97)	–.19**	–.15**	–.19**	.21**	.15**	.12**	–					
8.RecT2	2.22 (0.95)	–.12**	–.20**	–.21**	.10**	.24**	.13**	.53**	–				
9.RecT3	2.48 (0.95)	–.14**	–.13**	–.19**	.10**	.20**	.36**	.37**	.45**	–			
10.GPAT11	8.40 (0.98)	.11**	.17**	.22**	.07*	.04	.03	–.16**	–.19**	–.18**	–		
11.GPAT2	8.23 (1.07)	.11**	.17**	.21**	.05	.04	.02	–.17**	–.19**	–.18**	.92**	–	
12.GPAT3	8.22 (1.19)	.12**	.16**	.21**	.05	.06*	.03	–.17**	–.17**	–.18**	.83**	.89**	–

Note. Com = commitment; IndE = in-depth exploration; Rec = reconsideration of commitment; GPA = grade point average. *M* = Mean; *SD* = Standard Deviation. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2
Latent Growth Curve (LGC) analyses: growth factors for educational identity and academic achievement.

	Growth factors	
	Intercept (<i>I</i>)	Slope (<i>S</i>)
	<i>M</i> (σ^2)	<i>M</i> (σ^2)
<i>Educational identity</i>		
Commitment	4.12*** (0.37***)	–0.06*** (0.06***)
In-depth exploration	3.20*** (0.28***)	0.01 (0.04**)
Reconsideration of commitment	2.12*** (0.64***)	0.17*** (0.12**)
<i>Academic achievement</i>		
GPA	8.40*** (0.97***)	–0.10*** (0.09***)

Note. ** $p < .01$; *** $p < .001$; *M* = Mean; σ^2 = Variance.

mean change rates (i.e., slopes) which are based on individual growth trajectories of all participants. We used the Maximum Likelihood Robust estimator (MLR; Satorra & Bentler, 1994) and we inspected three indices to evaluate the model fit: the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). CFI with values higher than .90 indicates an acceptable fit, while CFI with values higher than .95 suggests an excellent fit. Values lower than .08 of the RMSEA and SRMR indices suggest an acceptable fit, while values lower than .05 indicate a good fit (Byrne, 2012). Model fit indices for the growth model we tested revealed an acceptable to excellent data fit ($\chi^2(34) = 201.48, p < .001, CFI = .971, RMSEA = .065 [.057–.074], SRMR = .024$)¹. Thus, the individual linear growth trajectories were adequately estimated for both educational identity and academic achievement.

The analysis of growth factors pointed out that educational identity was characterized by high initial levels of commitment, moderately high initial levels of in-depth exploration, and low initial levels of reconsideration of commitment. Educational commitment decreased over time, while in-depth exploration remained relatively stable, and reconsideration of commitment increased (see Table 2). Academic achievement was characterized by moderately high initial levels of GPA which decreased over time.

Moreover, all the variances of the intercepts and slopes for educational identity processes and academic achievement were statistically significant, suggesting inter-individual differences in the initial levels and in the rates of change. Thus, we examined whether age-group (early-to-middle versus middle-to-late adolescents), gender, and the type of school adolescents attended (theoretical versus vocational schools) were significant moderators of these developmental patterns. To this aim, we tested whether intercept and slope parameters varied significantly across age, gender, and type of school groups by means of the Wald test (see Table 3).

Regarding gender, our findings pointed out that girls were more committed and tended to explore more their present educational choice, while boys experienced greater reconsideration of their current educational commitments. However, in-depth exploration increased in boys and slightly decreased in girls over time. Reconsideration of commitment increased in both boys and girls over time, with a sharper increase in boys than in girls. Academically, girls performed better than boys, and as time passed, GPA had a sharper decrease in boys compared to girls.

¹ We tested whether educational identity and academic achievement are better described by a linear or a curvilinear change. As the linear model was not significantly different from the curvilinear model ($\Delta\chi^2(4) = 47.901, p = 0.00, \Delta CFI = -.009, \Delta RMSEA = .008$), we retained the more parsimonious linear growth model.

Table 3
Intercepts and slopes across age, gender, and type of school groups.

	Intercepts						Slopes					
	Age		Gender		Type of school		Age		Gender		Type of school	
	Early-to-middle	Middle-to-late	Boys	Girls	Theor	Voc	Early-to-middle	Middle-to-late	Boys	Girls	Theor	Voc
Commitment	4.12	4.13	4.01	4.19	4.15	4.11	-.05	-.07	-.09	-.05	-.04	-.09
In-depth exploration	3.20	3.19	3.09	3.27	3.19	3.23	-.02	.03	.05	-.01	.02	.01
Reconsideration of commitment	2.11	2.10	2.23	2.04	1.97	2.22	.14	.20	.21	.14	.17	.19
GPA	8.54	8.45	8.08	8.65	8.94	7.82	-.17	-.05	-.15	-.07	-.06	-.15

Note. Intercepts and slopes significantly different across age, gender, and type of school groups at the Wald test ($p < .05$) are noted in bold. Theor = Theoretical schools; Voc = Vocational schools; GPA = grade point average.

Regarding age-group and type of school, results pointed out that GPA decreased over time in both early-to-middle and middle-to-late adolescents, but the decrease was sharper in early-to-middle adolescents than in the other age-group. Students from vocational schools reconsidered more their educational commitments and had lower GPA than those from theoretical schools. Furthermore, educational commitment and GPA decreased more sharply in students from vocational schools than in students from theoretical schools.

Cross-lagged analyses

To examine reciprocal longitudinal associations between adolescent educational identity and academic achievement, we conducted cross-lagged analyses in *Mplus*. Specifically, we tested for cross-lagged associations between educational identity and academic achievement (e.g., educational identity processes measured at T1 predicting academic achievement at T2 and academic achievement at T1 predicting educational identity processes at T2), controlling for: (a) 3-to-4 months stability paths (e.g., educational identity processes at T1 predicting educational identity processes at T2); (b) one-year stability paths (e.g., educational identity processes at T1 predicting educational identity processes at T3); and (c) within-time correlations among all the variables. We used multi-group tests to examine the potential moderating effects of age, gender, and type of school.

To model the reciprocal associations between educational identity and academic achievement as parsimoniously as possible, we tested whether cross-lagged effects were time invariant (i.e., assumption of stationarity), using the Wald test. Results indicated that half of the paths were time invariant (i.e., from commitment to reconsideration of commitment, from commitment to GPA, from reconsideration of commitment to GPA, from GPA to commitment, from GPA to in-depth exploration, and from GPA to reconsideration of commitment). Next, we compared the model in which half of the paths were time invariant with the model in which cross-lagged paths were free to vary. To determine significant differences between these two models at least two out of these three criteria had to be matched: $\Delta\chi^2$ significant at $p < .05$, $\Delta CFI \geq -.010$, and $\Delta RMSEA \geq .015$. Results indicated that the model in which half of the paths were time invariant was not significantly different ($\Delta\chi^2(6) = 4.076$, $p = .66$, $\Delta CFI = .001$, $\Delta RMSEA = -.007$) from the model in which these effects were allowed to vary across time. Thus, the more parsimonious partially time-invariant model was retained as the final one. This model fit the data very well ($\chi^2 = 20.688$, $df = 88$, $CFI = 1.00$, $RMSEA = .011$, $SRMR = .011$). Significant cross-lagged paths are reported in Fig. 1.

Findings of cross-lagged path analyses revealed a unidirectional effect between educational identity and academic achievement, with academic achievement predicting educational identity processes. Specifically, GPA positively predicted educational commitment and negatively predicted reconsideration of educational commitments over the three waves. No significant effects from identity processes to academic achievement were found.

We conducted multi-group analyses to test whether cross-lagged paths from educational identity to academic achievement and from academic achievement to educational identity were significantly moderated by age (early-to-middle versus middle-to-late adolescents), gender, or by the type of school (theoretical versus vocational schools). Results showed that for age ($\Delta\chi^2(18) = 24.248$, $p = .147$, $\Delta CFI = -.001$, $\Delta RMSEA = .012$) and for type of school ($\Delta\chi^2(18) = 18.134$, $p = .446$, $\Delta CFI = .000$, $\Delta RMSEA = -.002$) the unconstrained model, in which parameters were free to vary across groups, was not significantly different from the constrained model, in which the parameters were fixed across groups. With regard to gender, only one significantly different path from educational identity to academic achievement was found. Specifically, educational commitment at Time 2 was found to be a positive and significant predictor for GPA at Time 3 for boys ($\beta = .05$, $p < .05$), but not for girls. Therefore, the unidirectional pattern of effects from academic achievement to educational identity applies equally to: (a) early-to-middle and middle-to-late adolescents, (b) adolescents attending theoretical and vocational schools, and (c) boys and girls (with the only exception of the T2–T3 path from educational commitment to GPA).

Discussion

The present study sheds new light on adolescents' identity development, providing empirical evidence for the mechanism that leads adolescents towards identity synthesis and identity confusion in the academic context. We first analyzed the linear changes in educational identity and academic achievement among adolescents throughout one academic year. Second, we

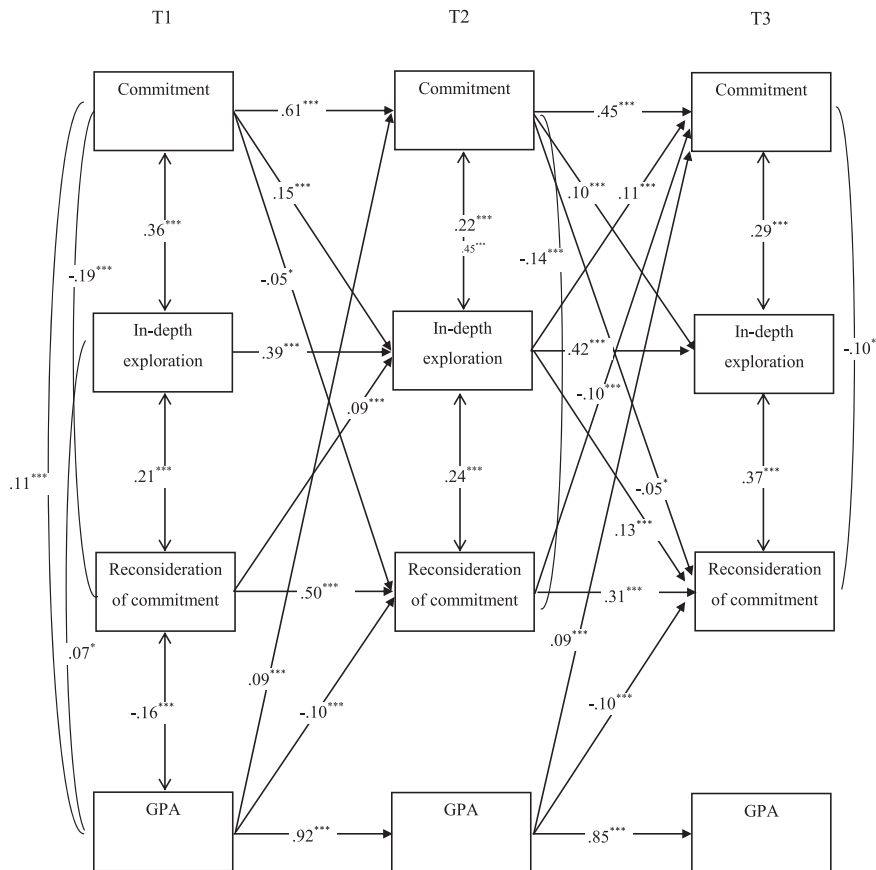


Fig. 1. Cross-lagged associations among educational identity and academic achievement variables (for the sake of clarity the one-year stability paths are not reported in the figure).

examined the directionality of effects between educational identity processes and academic achievement. In studying both issues, we tested also whether results were moderated by age-group (early-to-middle versus middle-to-late adolescents), gender (boys versus girls), and type of school (theoretical versus vocational schools).

Results reinforced previous evidence on the certainty-uncertainty dynamic of identity formation in adolescence, characterized by the interchange between commitment and reevaluation of commitments during both short-term (e.g., daily and weekly fluctuations, Klimstra et al., 2010) and long-term periods (e.g., across adolescence, Meeus et al., 2012). The adolescents from our sample started the academic year with high levels of educational commitment, moderately high levels of in-depth exploration, and low levels of reconsideration of commitment, which indicated a positive identity configuration (i.e., certainty, identity synthesis). By the end of the academic year, as adolescents face school tasks, educational commitment decreased and reconsideration of commitment increased. However, the size of both effects was small, indicating that identity uncertainty and confusion intensify slightly over time.

As expected, some of the adolescents displayed a more maladaptive identity structure compared to others. Namely, compared to girls, boys displayed higher initial levels of reconsideration of commitment which increased more sharply over time. Moreover, students from vocational schools displayed higher initial levels of reconsideration of commitment and a sharper decrease of their commitment compared to their peers from theoretical schools. Hence, boys and students from vocational schools are more at risk to face identity confusion during the academic year.

The decrease in educational commitment and the increase in reconsideration of commitment went in tandem with the decrease in academic achievement. These results are in line with previous evidence, which showed that as adolescents grow older they perform more poorly in school (Voyer & Voyer, 2014). Although their academic achievement levels at the beginning of the academic year were relatively high and similar, the GPA decreased by the end of the academic year for all students, especially for middle-to-late adolescents. As they pass from one academic level to another, adolescents have to deal with new challenges: more complex academic tasks, new teachers and schoolmates, and new performance standards. Moreover, as they approach the transition to university (at the end of the 12th grade), high-school students become more focused on specific academic subjects (e.g., subjects that are important for the admission to the university) and less interested in how well they perform in school in general.

Boys exhibited lower initial levels of GPA and also a sharper decrease of their GPA over time. In this respect it should be noted, as prior research has shown (Lenroot & Giedd, 2010), that there is a temporal gap between girls and boys in terms of cognitive maturation, with girls' advantage over boys, which might explain gender differences in GPA for adolescents of the same age. Furthermore, boys and girls approach academic achievement situations differently. While girls are focused mainly on developing their competence, boys are more performance-oriented (Negru, Pop, & Opre, 2013). Therefore, girls manage to control their behavior during classes (i.e., effort, concentration) better than boys, which contributes to their success in school (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006).

Similar to boys, students from vocational schools also displayed a decline of their academic achievement level. Namely, their initial levels of GPA were lower compared to those of students from theoretical schools and continued to decrease by the end of the academic year. In Romania, the admission to high-school (entrance into 9th grade) is based on the GPA earned by students during middle-school. As theoretical schools are more socially valued in the Romanian cultural context (Damian, Negru-Subtirica, Pop, & Baban, in press; Negru-Subtirica et al., 2015), most of the high achievers choose a theoretical school rather than a vocational school. This may be a reason why vocational schools students displayed more maladaptive achievement and identity profiles.

Importantly, the present study revealed a positive association between academic achievement and commitment and a negative association between academic achievement and reconsideration of commitment over the three waves. More specifically, the manner in which students performed in school (i.e., their GPA) triggered the development of their educational identity. In fact, high levels of GPA led to high levels of commitment (identity synthesis), while low levels of GPA led to high levels of reconsideration of commitment (identity confusion). Thus, the more they experience academic success, the more competent students feel and the more confidence they gain in their education. Instead, the more they face academic failure, the more students doubt their competence and lose confidence in their education (Bakker et al., 2007; Leary, 2005), especially when they make efforts to succeed and instead they fail. Overall, this pattern applied equally to all participants in the study, regardless of gender, age-group, and type of school. Partly, these results dovetail with previous findings (Luyckx et al., 2006) about the connections between identity and academic achievement. Nevertheless, our longitudinal findings suggest that, in adolescence, academic achievement predicts educational identity development and not the other way around, as some of the previous studies with university student samples indicated (Klimstra et al., 2012; Lounsbury, Huffstetler, Leong, & Gibson, 2005).

Practical implications

Several practical implications arise from the results of the present study. Adolescent boys and vocational schools students should be the primary targets for identity interventions, since they appear to be more vulnerable to difficulties in educational identity formation. These interventions could assist them in transitioning from identity confusion to identity synthesis in the academic domain. As our study revealed, one of the underlying mechanisms for this transition is the enhancement of adolescents' academic achievement level. Depending on the causes of their achievement problems, interventions targeting vulnerable students could include teachers and parents, as they play a key role in adolescents' personal and academic development (Levpušček & Zupancic, 2009). Adolescents at risk could also be provided with specialized support (e.g., school counseling and guidance, psychological counseling, social assistance) when their academic achievement problems are caused by psychosocial impediments.

Limitations and strengths of the present study

The present study should be considered in light of some limitations. First, academic achievement was measured using a single indicator (the GPA), while more indicators could be considered (e.g., subject grades, prizes, participation in thematic contests, academic scholarships) because some adolescents might have excellent results in specific academic subjects but still be judged as underachievers because their global GPA is low. Additionally, including other indicators of school functioning (e.g., school engagement, Fredricks, Blumenfeld, Friedel, & Paris, 2005; motivation, Duriez, Luyckx, Soenens, & Berzonsky, 2012; coping strategies, Luyckx, Klimstra, Duriez, Schwartz, & Vanhalst, 2012) may reveal different shades of identity development in the academic context. Second, a deeper analysis (e.g., a person-centered approach, Pop, Negru, & Opre, 2015) of our findings regarding the inter-individual differences in identity and academic achievement development across age-group (i.e., early-to-middle versus middle-to-late adolescents), gender (i.e., boys versus girls), and school type (i.e., theoretical versus vocational schools) might capture different developmental trajectories of both educational identity and academic achievement within each group.

Despite its limitations, the present study provides a relevant contribution to research on adolescent identity development, revealing for the first time that academic achievement is one of the precursors for educational identity. In this endeavor, we employed a longitudinal short-term design, which helped to determine the bright and the dark side of the educational identity and academic achievement interplay. We also used a domain-specific approach to identity development (i.e., education), which is more explanatory than a global approach since identity develops differently in specific life domains (Goossens, 2001; Meeus et al., 1999).

Conclusions

The present study revealed that commitment and in-depth exploration represent the bright side of identity development, while reconsideration of commitment represents the dark side. Thus, according to our findings, developing a healthy educational identity in adolescence implies choosing and strengthening educational commitments through high academic achievement levels.

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