

Developmental trajectories and reciprocal associations between career adaptability and vocational identity: A three-wave longitudinal study with adolescents

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ABSTRACT

The purpose of this longitudinal study was two-fold. First, we investigated patterns of stability and change in career adaptability and vocational identity in adolescents. Second, we examined reciprocal associations between career adaptability and vocational identity. In addressing both research aims we tested the moderating effects of gender, school-type, and age. Participants were 1151 (58.7% female) adolescents. They filled in measures that appraised career adaptabilities and vocational identity processes three times during a school year. Latent growth curve analyses highlighted slight longitudinal decreases in career concern, control, and confidence especially in boys, vocational school students, and middle-to-late adolescents. Also, over time boys and students attending vocational schools reported less in-depth occupational exploration, less identification with present vocational commitments, and more flexibility and self-doubt about their careers. Findings of cross-lagged path analyses highlighted reciprocal associations between career adaptability and vocational identity. Career adaptability positively predicted adolescents' ways of dealing with vocational exploration and commitment. Vocational commitment and reconsideration of commitment predicted career adaptabilities in time. These results indicate that career adaptability and vocational identity are dynamic and interrelated dimensions of adolescent career development. Implications for theory and practice are discussed.

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Adolescence is a critical time for vocational development, as educational and occupational paths become clearer and important career decisions are made (Zimmer-Gembeck & Mortimer, 2006). The manner in which adolescents approach career development tasks depends on their level of career adaptability and on the parameters that define their vocational identity (Savickas, 1985, 1997). It is of great importance to understand the dynamics of these dimensions through adolescence, as they scaffold personal agency and goal-setting, and contribute to positive youth development (Savickas, 2005; Skorikov & Vondracek, 2011). Specifically, more research is needed to gain an in-depth understanding of how career adaptability and vocational identity evolve in time and how they are linked longitudinally. We approached these aspects through a three-wave longitudinal study conducted during one academic year. Additionally, we investigated whether age (i.e., early-to-middle adolescence versus middle-to-late adolescence), gender, and the type of school adolescents attended moderated these relations. In terms of school type, we considered two high-school educational tracks (Creed, Patton, & Hood, 2010): theoretical (i.e., university-bound schools that provide adolescents with general knowledge in preparing them for university studies) and vocational (i.e., work-bound schools that prepare adolescents for a specific occupation).

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1.1. Career adaptability

Career adaptability stands as a central component in adolescent vocational development. It is a psychosocial construct that encompasses personal readiness and resources for dealing with present and future career problems (Savickas, 2013; Savickas & Porfeli, 2012a). In this context, career adapt-abilities are general adaptive resources and strategies that people employ in the process of career construction while approaching critical situations (e.g., age-specific developmental tasks). The four adapt-abilities, also called the 4Cs of career adaptability, are: *concern* (i.e., one's future orientation, in terms of how much he/she values and becomes involved in preparing for tomorrow), *control* (i.e., the self-discipline, autonomy, and responsibility one employs when making vocational decisions), *curiosity* (i.e., an orientation toward exploring the match between self and the world of work), and *confidence* (i.e., trust in one's abilities and an anticipation of success when dealing with problems or overcoming obstacles). Career adaptability can be captured by these four dimensions (Savickas, 2005) and research underscored their positive impact on adolescents' careers. Youth with high levels in these abilities projected themselves more into their future, perceived fewer career barriers, and were more competent in translating their career intentions into behaviors (Soresi, Nota, & Ferrari, 2012). Also, the 4Cs mediated the relation between positive emotional dispositions and adolescent satisfaction (Wilkins et al., 2014). Existing longitudinal studies (e.g., Creed, Muller, & Patton, 2003; Hirschi, 2009; Skorikov, 2007; Stringer, Kerpelman, & Skorikov, 2011) pointed out that career adaptability played a central role in facilitating educational and school-to-work transitions, in developing a sense of personal power over and satisfaction with one's life, and in achieving positive youth development.

Several factors can account for differences in career adaptability. A number of studies highlighted that girls scored higher than boys on career adaptability (Creed & Patton, 2003; Creed et al., 2010). Hence, we expected adolescent girls from our study to display higher levels of career adapt-abilities. Also, depending on the structure of the educational system for a specific culture, in predominantly vocational educational systems vocational school students displayed higher levels of career adaptability (e.g., Switzerland; Hirschi, 2009), while in more theoretically oriented ones theoretical school students displayed higher levels of career adaptability (e.g., Australia; Creed et al., 2010). Thus, as the Romanian high-school system has a strong theoretical focus (Ghinararu, Alexandru, Matei, & Pirciog, 2012), we expected theoretical school students to have an advantage over vocational school students in the level of career adaptability over time. This can be linked to the fact that students attending theoretical schools perceive and may also be given more opportunities for vocational development. Existing research (e.g., Skorikov, 2007; Stringer et al., 2011) indicated that older adolescents displayed higher levels of career adaptability, as they were gradually exposed to more complex career relevant activities. Therefore, we expected middle-to-late adolescents to display higher levels of career adaptability as the developmental task of choosing an occupational track is more salient in this age-group (Savickas, 2005). Namely, these students prepare for high-school graduation and may dwell more upon future choices. To conclude, in line with theoretical (Savickas, 1997, 2005) and empirical (Hirschi, 2009; Skorikov, 2007; Stringer et al., 2011) underpinnings on career adaptability, we expected changes in this construct over one academic year, with girls, theoretical school students, and middle-to-late adolescents displaying higher levels in the four career adapt-abilities.

Hypothesis 1. Adolescent career adaptability shows higher increases during one academic year for girls compared to boys (Hypothesis 1a), theoretical school students compared to vocational school students (Hypothesis 1b), and middle-to-late adolescents compared to early-to-middle adolescents (Hypothesis 1c).

1.2. Vocational identity

The vocational domain represents an important identity domain for adolescent global development, contributing to positive social adjustment and gradual integration in the job market (Skorikov & Vondracek, 2011). Marcia's (1966) model of identity was applied to the vocational domain and several cross-sectional studies (e.g., Hirschi, 2011; Skorikov & Vondracek, 1998; Vondracek, Schulenberg, Skorikov, Gillespie, & Wahlheim, 1995) focused on analyses of vocational identity statuses (e.g., achievement, foreclosure, moratorium, and diffusion). These studies linked vocational commitment and exploration to career indecision, vocational interests, and well-being. From a longitudinal perspective, Hirschi (2012) underscored that adolescents' life satisfaction increased when they progressed toward or maintained vocational identity commitments, whereas it decreased when they became involved in vocational exploration or experienced career crises. In the current study, we unpacked vocational identity dimensions into specific identity processes. Drawing on recent models of identity (Crocetti, Rubini, & Meeus, 2008; Crocetti, Schwartz, Fermani, Klimstra, & Meeus, 2012; Luyckx, Goossens, Soenens, Beyers, & Vansteenkiste, 2005), Porfeli, Lee, Vondracek and Weigold (2011) proposed and tested a model of vocational identity in adolescence, comprising three dimensions (i.e., commitment, exploration, and reconsideration of commitment), each defined by two processes. Commitment integrated *commitment making* (i.e., the degree of certainty about a career decision that has been taken) and *identification with commitment* (i.e., how the adolescent devotes himself/herself to a career decision that has been taken). Exploration incorporated *in-breadth exploration* (i.e., actions that help the adolescent learn about different career options) and *in-depth exploration* (i.e., activities that extend the understanding of a specific occupational choice). Reconsideration of commitment integrated *self-doubt* (i.e., the anxiety and uncertainty adolescents experience in the face of career decision-making) and *commitment flexibility* (i.e., openness to and readiness for future changes in occupational preferences and choices).

Empirical research (see Skorikov & Vondracek, 2011 for a review) brought forward that changes in vocational identity cannot be detected over short time-frames and that there is limited predictability in the individual pattern of changes for this identity domain.

Therefore, we expected few changes in vocational identity processes, as identity formation in adolescence appears to be a less dynamic process than initially proposed (for an extensive review, see Meeus, 2011). Our study occurred during one academic year, in which students had limited career-relevant experiences outside the school. Hence, we expected vocational exploration, commitment, and reconsideration of commitment processes to be rather linked to the three moderators we investigated: gender, the type of school adolescents attended, and their age. Research on gender differences shows that middle and late adolescent girls tended to be more involved in occupational exploration and had stronger vocational commitments than boys (e.g., Hirschi, 2012; Skorikov & Vondracek, 2011). Hence, in our study we expected girls to display higher levels of vocational identity exploration and commitment processes. The type of school adolescents attended also seemed to shape their vocational identity. Some studies showed that students attending vocational schools had higher levels of vocational commitment (e.g., Hirschi, 2012) and lower levels of exploration (e.g., Beyers & Goossens, 2008) compared to those in theoretical schools. In our study, we expected theoretical school students to have an advantage over vocational school students in vocational exploration and commitment processes. This hypothesis is based on the positive social perception and opportunities for vocational development given to students from this academic track in the Romanian system, which is primarily focused on theoretical high-school education (Ghinararu et al., 2012). We did not expect significant age-group differences in vocational identity processes, due to the already mentioned limited dynamics of identity formation in adolescence (Meeus, 2011; Skorikov & Vondracek, 2011). To conclude, in line with existing evidence (e.g., Creed et al., 2010; Hirschi, 2009, 2012), we expected girls and theoretical school students to display stronger vocational exploration and commitments.

To date, no longitudinal study has analyzed the dynamics of vocational reconsideration of commitments, even if this identity dimension is a cornerstone in understanding identity development in any ideological domain (Meeus, 2011). Although this study is the first to depict reconsideration of vocational commitments from a longitudinal perspective, we expected boys, vocational school students, and younger adolescents to display higher levels in this dimension. We propose this hypothesis based on existing longitudinal research on adolescent reconsideration of identity commitments in other life domains (e.g., education, personal relations), that brought forward higher levels in boys and younger adolescents (Germeijs, Luyckx, Notelaers, Goossens, & Verschuere, 2012; Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010). Additionally, we expected vocational school students to display higher levels in this vocational identity dimension, due to the more limited opportunities for career development (Ghinararu et al., 2012).

Hypothesis 2. Adolescent vocational commitment and exploration show higher increases during one academic year for girls compared to boys (Hypothesis 2a) and theoretical school students compared to vocational school students (Hypothesis 2b). No differences are expected in these processes between middle-to-late and early-to-middle adolescents (Hypothesis 2c). Reconsideration of vocational commitments is higher for boys, vocational school students, and early-to-middle adolescents (Hypothesis 2d).

1.3. Longitudinal links between career adaptability and vocational identity

We set out to analyze how career adaptability and vocational identity influenced each other over time. By employing multidimensional measures of career adaptability and vocational identity, we analyzed their longitudinal interconnections at a higher level of granularity, as the meta-competencies of identity and adaptability “give individuals a sense of when it is time to change and the capacity to change” (Savickas, 2011, p. 11). Drawing on existing cross-sectional (e.g., Creed & Patton, 2003; Creed et al., 2010; Savickas & Porfeli, 2012b) and longitudinal (e.g., Hirschi, 2009, 2012) evidence, we expected to depict positive relations between career adaptability and the exploration and commitment dimensions of vocational identity. Additionally, for reconsideration of vocational commitments we expected negative longitudinal links to career adaptability, as this identity dimension has proven to be negatively related with indicators of positive development (e.g., multi-dimensional appraisals of well-being, Karaš, Cieciuch, Negru, & Crocetti, 2014).

Furthermore, we investigated if gender, type of school, and age moderate the relations between career adaptability and identity development. Existing longitudinal research unraveling associations of career adaptability (Guan et al., 2015; Stringer, Kerpelman, & Skorikov, 2012; Stringer et al., 2011) or adolescent identity formation (Luyckx, Teppers, Klimstra, & Rassart, 2014) with other variables (e.g., personality traits, adjustment, career-relevant parental behaviors) highlighted that several socio-demographic characteristics of youth (e.g., gender, age) do not moderate these relations. Hence, we did not expect gender, type of school, and age to moderate the relationships between career adaptability and identity.

Hypothesis 3. There are positive longitudinal relations between career adaptability and vocational exploration and commitment dimensions (Hypothesis 3a) and negative longitudinal relations between career adaptability and the reconsideration of vocational commitment dimension (Hypothesis 3b). These relations are not moderated by adolescents' gender, type of school, and age (Hypothesis 3c).

2. Methods

2.1. Participants and procedure

Our study uses data from the ongoing longitudinal study Transylvania Adolescent Identity Development Study (TRAIDES). We collected data from seven schools located in four towns in the North-Western part of Romania. Students from the 8th to the 12th grade completed paper-and-pencil questionnaires at three measurement waves 3 to 4 months apart during one academic year.

Students completed all questionnaires in classrooms during school hours. Participation in the study was voluntary and anonymous. At all waves, students could choose not to fill in the questionnaires and become involved in other classroom activities. 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.

A total of 1151 adolescents (58.7% females) participated in the study, of which 40.1% were early-to-middle adolescents (age range 13–15 years) and 59.9% were middle-to-late adolescents (age range 16–19 years). Mean age was 16.45 years ($SD_{\text{age}} = 1.40$; range = 13–19 years). In terms of type of school attended, 48.5% were students in theoretical schools and 51.5% were students in vocational schools. The parents of 79.5% of youth were married, while 13.4% came from one-parent households. As for living arrangements, 97.2% of adolescents lived with one or both parents, while 2.8% lived with other students or relatives. The large majority of adolescents were fully financially supported by their parents (97.6%), while few reported having some personal income (i.e., state-provided student allocation) that supplemented the financial support provided by their parents (2.4%). In terms of socio-demographic differences, more vocational school students reported having a source of personal income compared to theoretical school students, $\chi^2(1, N = 1112) = 10.66, p < .001$. We found no differences between the two groups for the other demographic variables.

Overall, 24.82% of data were missing at T1–T3. The range of missing items varied from 16.2% to 36.6% across the three waves. Little's (1988) Missing Completely at Random (MCAR) test on the variables of interest yielded a normed χ^2 (χ^2/df) of 1.10. According to guidelines by Bollen (1989), this indicates a good fit between sample scores with and without imputations. Missing item values were estimated in SPSS using the Expectation Maximization procedure.

2.2. Measures

Measures were translated from English to Romanian through the back-translation method. A team of four academics independently translated the measures from English to Romanian. All discrepancies among the four versions were discussed until a consensus was met for a final Romanian form of each measure. Then, two bilingual translators back translated the Romanian versions to English. This final back translation procedure provided English versions identical to the original forms of each scale.

2.2.1. Career adaptability

Career adaptability was measured with the Career Adapt-Abilities Scale (CAAS)—International Form 2.0, an instrument which showed excellent psychometric properties cross-culturally (Savickas & Porfeli, 2012a). The CAAS—International Form 2.0 consists of 24 items, divided equally on four subscales which appraise specific adapt-ability resources, namely: concern (e.g., “Planning how to achieve my goals”), control (e.g., “Taking responsibility for my actions”), curiosity (e.g., “Observing different ways of doing things”), and confidence (e.g., “Taking care to do things well”). Participants responded to each item on a scale from 1 (not strong) to 5 (strongest). Cronbach's Alphas for the subscales ranged between .74 and .80 at T1; between .78 and .84 at T2; and between .81 and .86 at T3. We performed confirmatory factor analysis (CFA) with maximum likelihood estimation in Mplus 7.2 to check the factor structure of the Romanian version of the CAAS—International Form 2.0. In line with the cross-cultural validation study (Savickas & Porfeli, 2012a), findings indicated that the four-factor structure fit the data very well, $\chi^2 = 205.645, df = 48; CFI = .970, RMSEA = .053; SRMR = .032$.

2.2.2. Vocational identity

Vocational identity was measured with the 30-item Vocational Identity Status Assessment (VISA, Porfeli et al., 2011), comprising three dimensions, each one operationalized by two subscales. Each subscale is composed of five items. The career commitment dimension comprises the commitment making (e.g., “I have invested a lot of energy into preparing for my chosen career”) and identification with commitment (e.g., “Becoming a worker in my chosen career will allow me to become the person I dream to be”) subscales. The career exploration dimension is composed of the in-depth exploration (e.g., “Trying to find people that share my career interests”) and in-breadth exploration (e.g., “Trying to have many different experiences so that I can find several jobs that might suit me”) subscales. The career reconsideration dimension integrates the commitment flexibility (e.g., “I need to learn a lot more before I can make a career choice”) and commitment self-doubt (e.g., “I may not be able to get the job I really want”) subscales. Participants responded to each item on a scale from 1 (strongly disagree) to 5 (strongly agree). Cronbach's Alphas for the subscales ranged between .67 and .79 at T1; between .72 and .82 at T2; and between .76 and .83 at T3. For the Romanian version of the VISA we performed confirmatory factor analysis (CFA) with maximum likelihood estimation in Mplus 7.2 to check the factor structure. We found that the original 6-factor structure (Porfeli et al., 2011) fit the current data very well, $\chi^2 = 156.103, df = 39; CFI = .972, RMSEA = .051; SRMR = .026$.

3. Results

3.1. Preliminary analyses

Mean scores and standard deviations for study variables and correlation coefficients between study variables appear in Tables 1 and 2. At all time-points the 4Cs of career adaptability related positively to vocational commitment and exploration processes.

Table 1
Descriptive statistics and within-time correlations at Time 1.

Variable	Descriptive statistics			Within-time correlations at Time 1										
	Time 1	Time 2	Time 3	Career adaptability				Vocational identity						
	M (SD)	M (SD)	M (SD)	Conc	Cont	Curi	Conf	InbE	IndE	Com	IdCom	Flex	Sedo	
Conc	3.91 (0.68)	3.88 (0.69)	3.83 (0.68)	–										
Cont	3.98 (0.61)	3.93 (0.62)	3.90 (0.63)	.44***	–									
Curi	3.73 (0.65)	3.69 (0.65)	3.72 (0.65)	.59***	.48***	–								
Conf	3.82 (0.62)	3.80 (0.61)	3.77 (0.63)	.53***	.61***	.61***	–							
InbE	3.24 (0.64)	3.22 (0.61)	3.20 (0.61)	.28***	.13***	.32***	.23***	–						
IndE	3.66 (0.63)	3.55 (0.61)	3.46 (0.61)	.44***	.25***	.40***	.37***	.43***	–					
Com	3.42 (0.82)	3.37 (0.79)	3.39(0.72)	.35***	.30***	.19***	.30***	.08**	.43***	–				
IdCom	4.02 (0.61)	3.86 (0.66)	3.74 (0.63)	.44***	.37***	.33***	.41***	.25***	.48***	.49***	–			
Flex	2.90 (0.76)	2.87 (0.73)	3.00 (0.71)	–.08**	.14***	.04	–.11***	.20***	–.00	–.38***	–.25***	–		
Sedo	2.27 (0.74)	2.33 (0.72)	2.58 (0.77)	–.11***	–.18***	–.03	–.14***	.08**	–.00	–.20***	–.25***	.57***	–	

Note. Conc = concern; Cont = control; Curi = curiosity; Conf = confidence; InbE = in-breadth exploration; IndE = in-depth exploration; Com = commitment making; IdCom = identification with commitment; Flexi = flexibility; Sedo = self-doubt; M = Mean; SD = Standard Deviation.

- * $p < .05$.
- ** $p < .01$.
- *** $p < .001$.

3.2. Latent growth curve analyses

The first purpose of this study was to examine the development of career adaptability and vocational identity in adolescents. In order to address this aim, we analyzed mean-level changes in the four dimensions of career adaptability and in the six identity processes. We conducted latent growth curve (LGC) analyses in Mplus 7.2 (Muthén & Muthén, 1998–2012) with the maximum likelihood (ML) estimator. LGC analyses provide mean levels (i.e., intercepts) and mean change rates (i.e., slopes) that are based on individual growth trajectories of all participants. We evaluated fit of linear models through multiple indices (Byrne, 2012): the Comparative Fit Index (CFI), with values higher than .90 indicative of an acceptable fit and values higher than .95 suggesting an excellent fit; the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR), with values below .08 indicative of an acceptable fit and values less than .05 representing a good fit.

Results appear in Table 3 and in Figs. 1 and 2. Model fit indices showed adequate to excellent data fit for all linear growth models, with the exception of career flexibility and self-doubt. Thus, on the one side, it appears that the individual linear growth trajectories were adequately estimated for career adaptability dimensions, and vocational exploration and commitment dimensions. On the other side, the model fit for reconsideration of vocational commitment processes was very good in terms of CFI and SRMR indices, but the RMSEA values exceeded the cut-off of an acceptable model. Recent recommendations (Kenny, Kaniskan, & McCoach, 2014) brought forward the problematic and possibly misleading use of RMSEA in models with small *df*, as was the case for our models. Hence, based on the values of the CFI and SRMR indices, the individual linear growth trajectories were adequately estimated also for this dimension.

An analysis of growth factors indicated that all 4Cs of career adaptability were characterized by high initial levels that significantly decreased over time (see Table 3 and Fig. 1). As an exception, the slope of career curiosity was not significant, as curiosity remained stable from T1 to T3. Intercept-slope correlations indicated that the higher the initial level of confidence and curiosity adolescents

Table 2
Within-time correlations at Time 2 and Time 3.

Variable	Within-time correlations at Time 2 and Time 3									
	Career adaptability				Vocational identity					
	Conc	Cont	Curi	Conf	InbE	IndE	Com	IdCom	Flex	Sedo
Conc	–	.52***	.61***	.56***	.31***	.45***	.32***	.43***	.00	–.13***
Cont	.62***	–	.51***	.59***	.14***	.31***	.31***	.35***	–.07*	–.22***
Curi	.69***	.61***	–	.66***	.36***	.44***	.24***	.39***	.11***	–.06*
Conf	.67***	.70***	.70***	–	.30***	.43***	.41***	.48***	–.09**	–.22***
InbE	.33***	.25***	.34***	.31***	–	.51***	.16***	.31***	.19***	.10**
IndE	.51***	.41***	.46***	.43***	.57***	–	.47***	.55***	–.02	–.12***
Com	.44***	.41***	.35***	.43***	.29***	.57***	–	.58***	–.40***	–.31***
IdCom	.52***	.49***	.43***	.50***	.38***	.63***	.62***	–	–.23***	–.31***
Flex	.00	–.01	.11***	–.01	.29***	.05	–.20***	–.10***	–	.59***
Sedo	–.09**	–.17***	.00	–.11***	.19***	–.02	–.13***	–.26***	.62***	–

Time 2 within-time correlations are shown above the diagonal, Time 3 within-time correlations appear below the diagonal.

Note. Conc = concern; Cont = control; Curi = curiosity; Conf = confidence; InbE = in-breadth exploration; IndE = in-depth exploration; Com = commitment making; IdCom = identification with commitment; Flexi = flexibility; Sedo = self-doubt; M = Mean; SD = Standard Deviation.

- * $p < .05$.
- ** $p < .01$.
- *** $p < .001$.

Table 3
Latent growth curve (LGC) analyses: growth factors and model fit for the linear models.

	Growth factors			Model fit indices				
	Intercept (I)	Slope (S)	<i>r</i> (I, S)	χ^2	<i>df</i>	CFI	RMSEA	SRMR
	<i>M</i> (σ^2)	<i>M</i> (σ^2)						
Concern	3.92*** (0.24***)	−0.04*** (0.00)	.78***	0.711	1	1.000	.000	.006
Control	3.98*** (0.18***)	−0.04*** (0.00)	.93***	0.021	1	1.000	.000	.001
Curiosity	3.72*** (0.26***)	−0.00 (0.03**)	−.07**	3.668	1	.997	.048	.011
Confidence	3.83*** (0.25***)	−0.03** (0.03**)	−.16***	0.011	1	1.000	.000	.001
In-breadth exploration	3.24*** (0.19***)	−0.02* (0.01)	.07**	2.087	1	.999	.031	.010
In-depth exploration	3.66*** (0.26***)	−0.10*** (0.05***)	−.28***	0.022	1	1.000	.000	.001
Commitment making	3.41*** (0.54***)	−0.01 (0.09***)	−.45***	5.307*	1	.997	.061	.012
IdentifCommit	4.02*** (0.28***)	−0.14*** (0.06***)	−.35***	2.434	1	.998	.035	.009
Flexibility	2.88*** (0.41***)	0.05*** (0.06***)	−.61***	22.77***	1	.975	.138	.028
Self-doubt	2.25*** (0.43***)	0.14*** (0.08***)	−.68***	31.454***	1	.961	.163	.034

Note. *M* = Mean; σ^2 = Variance. χ^2 = Chi-Square; *df* = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; IdentifCommit = identification with commitment.

* *p* < .05.
** *p* < .01.
*** *p* < .001.

displayed, the steeper was their decline in time (negative correlations), while high initial levels of concern and control related to a more reduced decline in time (positive correlations). Also, all the variances of the intercepts and most of the slope variances for career adapt-abilities were statistically significant, suggesting inter-individual differences in the initial levels and in the rates of change.

For vocational identity, an analysis of growth factors indicated that vocational commitment and exploration processes had high initial levels that significantly decreased over time, while reconsideration of commitment processes had lower initial levels that significantly increased in time (see Table 3 and Fig. 2). As an exception, the slope of vocational commitment making was not significant, as this process remained stable across the three measurement points. Intercept–slope correlations for vocational in-depth exploration and both commitment processes indicated that adolescents who were initially high in these identity processes reported a steeper decrease as time passed. Students who had lower reconsideration of commitment (i.e., flexibility, self-doubt) at onset displayed a sharper increase in these processes. Also, all the variances of the intercepts and most of the slope variances were statistically significant, indicating inter-individual differences in the initial levels and in the rates of change displayed by adolescents.

Thus, we examined whether gender, school-type, and age were significant moderators of these developmental patterns. We tested if intercept and slope parameters varied significantly across these variables by means of the Wald test. Findings reported in Table 4 show that for career adaptability girls had significantly higher initial levels of career concern and curiosity. Also, adolescents attending theoretical schools initially reported more concern, curiosity, and confidence about their careers. As time passed, career control decreased more sharply in boys and in vocational school students. For vocational identity, at T1 girls reported higher in-depth exploration and stronger identification with their vocational commitment, while boys experienced significantly more self-doubt about vocational choices. Also, at onset adolescents attending theoretical schools reported more in-depth exploration, were more committed, and identified more with their career choices. In contrast, vocational school students initially reported higher levels of career flexibility and self-doubt. Furthermore, in-depth and in-breadth exploration and identification with career commitments decreased more sharply in vocational school students. In terms of age-group differences, all four career adapt-abilities were significantly higher in middle-to-late adolescents compared to early-to-middle adolescents. Career curiosity showed a sharper decrease in middle-to-late adolescents. For vocational identity, age was a significant moderator only for career self-doubt, which was higher

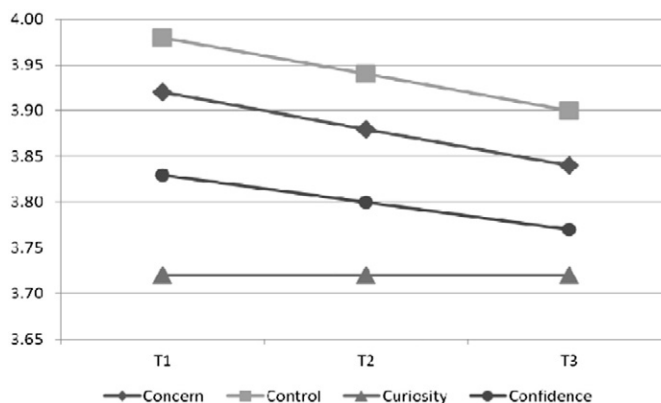


Fig. 1. Estimated growth of career adaptability dimensions.

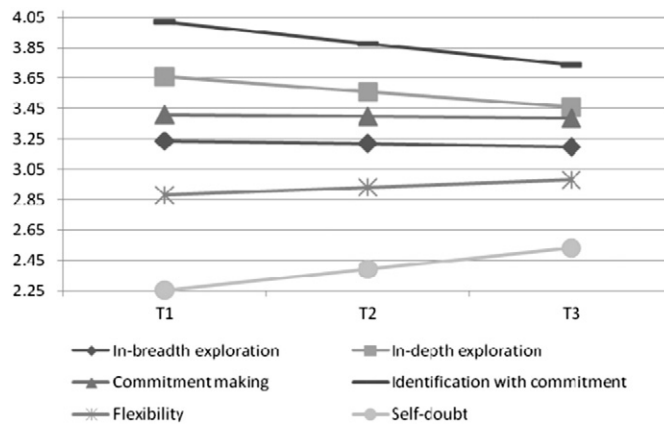


Fig. 2. Estimated growth of vocational identity processes.

in younger adolescents. For the same identity process the older students (middle-to-late adolescents) tended to display a higher increase in career self-doubt compared to the younger ones.

3.3. Cross-lagged analyses

The second purpose of this study was to examine reciprocal associations between adolescent career adaptability and vocational identity. To address this aim we conducted cross-lagged panel analyses in Mplus and we used multi-group tests to examine the potential moderating effects of gender, type of school, and age-group. Specifically, we tested for cross-lagged associations between career adaptability and vocational identity (e.g., career adaptability dimensions measured at T1 predicting vocational identity processes at T2 and vocational identity at T1 predicting career adaptability at T2), controlling for: (a) one-year stability paths (e.g., career adaptability dimensions at T1 predicting career adaptability dimensions at T2); (b) two-year stability paths (e.g., career adaptability dimensions at T1 predicting career adaptability dimensions at T3); and (c) within-time correlations among all the variables.

To model the reciprocal associations between career adaptability and vocational identity as parsimoniously as possible, we tested whether cross-lagged effects were time invariant (i.e., assumption of stationarity). Thus, we compared the model in which cross-lagged paths were free to vary with the model in which they were fixed across time. 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 cross-lagged effects were time invariant was not substantially different ($\Delta\chi^2(90) = 207.98, p < .001, \Delta CFI = -.007, \Delta RMSEA = -.001$) from the model in which these effects were allowed to vary across time. Thus, we could retain the more parsimonious time-invariant model as the final one.

This model fit the data very well, $\chi^2 = 432.699, df = 180; CFI = .985, RMSEA = .035, SRMR = .025$. Significant standardized cross-lagged paths are reported in Fig. 3. Though they depict small effects, these effects are meaningful when predicting change (Adachi & Willoughby, 2015) in longitudinal autoregressive models, because: (a) we had high bivariate correlations between variables from T1 to T3 and (b) we controlled for stability effects (i.e., previous scores on the outcome), hence removing a significant

Table 4
Intercepts and slopes across gender, type of school, and age-groups.

	Intercepts						Slopes					
	Gender		Type of school		Age		Gender		Type of school		Age	
	Boys	Girls	Theor	Voc	Early-to-middle	Middle-to-late	Boys	Girls	Theor	Voc	Early-to-middle	Middle-to-late
Conc	3.81	3.99	4.04	3.80	3.86	3.98	-0.05	-0.03	-0.02	-0.05	-0.03	-0.05
Cont	3.95	3.99	4.00	3.95	3.89	4.05	-0.06	-0.02	-0.00	-0.07	-0.01	-0.05
Curi	3.64	3.76	3.77	3.67	3.63	3.78	-0.01	0.00	0.01	-0.01	0.02	-0.02
Conf	3.81	3.83	3.87	3.78	3.78	3.87	-0.05	-0.01	-0.01	-0.04	-0.03	-0.03
InbE	3.22	3.25	3.26	3.22	3.22	3.25	-0.01	-0.03	0.00	-0.04	-0.04	-0.01
IndE	3.60	3.70	3.70	3.61	3.64	3.68	-0.11	-0.09	-0.07	-0.13	-0.12	-0.08
Com	3.44	3.39	3.48	3.35	3.39	3.43	-0.03	0.00	-0.00	-0.02	-0.04	0.01
IdCom	3.93	4.08	4.10	3.93	4.01	4.04	-0.15	-0.13	-0.12	-0.16	-0.15	-0.13
Flexi	2.85	2.89	2.79	2.96	2.91	2.84	0.07	0.04	0.07	0.03	0.07	0.05
Sedo	2.34	2.20	2.11	2.39	2.33	2.18	0.15	0.13	0.14	0.14	0.11	0.17

Note. Intercepts and slopes significantly different across gender, type of school, and age-groups at the Wald test ($p < .05$) are noted in bold; Conc = concern; Cont = control; Curi = curiosity; Conf = confidence; InbE = in-breadth exploration; IndE = in-depth exploration; Com = commitment making; IdCom = identification with commitment; Flexi = flexibility; Sedo = self-doubt; Teor = Theoretical schools; Voc = Vocational schools.

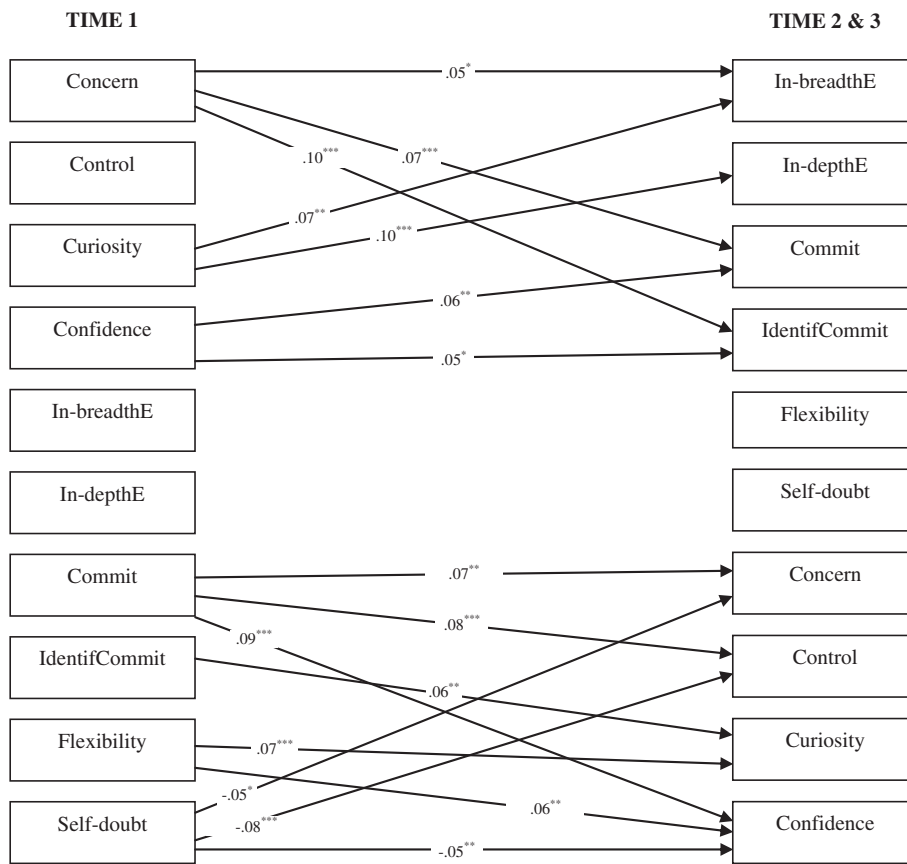


Fig. 3. Significant cross-lagged paths. For the sake of clarity, within-time correlations, stability paths, and regression paths between identity processes and between career adaptability dimensions are not reported. Furthermore, since the assumption of stationarity (i.e., cross-lagged paths are time-invariant) was confirmed we reported cross-lagged paths only once. In-breadthE = in-breadth exploration; In-depthE = in-depth exploration; Commit = commitment making; IdentifCommit = identification with commitment. * $p < .05$, ** $p < .01$, and *** $p < .001$.

amount of the variance in the outcome variables. Additionally, existing literature on cross-lagged analyses for identity processes (e.g., Klimstra, Luyckx, Germeijs, Meeus, & Goossens, 2012; Luyckx et al., 2014) depicted similar values in standardized cross-lagged path coefficients. In the four wave longitudinal study of Klimstra et al. (2012) the values of the standardized path coefficients ranged from $-.09$ to $.13$ (see Table 5, p. 355). In the four wave longitudinal study of Luyckx et al. (2014) the values of the standardized path coefficients ranged from $-.11$ to $.13$ (see Figure 1, p. 2148).

Findings indicated that career concern positively predicted vocational in-breadth exploration and both commitment processes. Curiosity was a positive predictor of both in-breadth and in-depth exploration; while confidence positively predicted vocational commitment-making and identification with commitment. Vocational commitment making was a positive predictor of career concern, control, and confidence; while identification with commitment positively predicted career curiosity. Career flexibility was a positive predictor of career curiosity and confidence; while vocational self-doubt was a negative predictor of career concern, control, and confidence. Thus, results pointed out reciprocal over time associations between career adaptability and vocational identity.

We conducted multi-group analyses to test whether cross-lagged paths from career adaptability to vocational identity and from vocational identity to career adaptability were significantly moderated by gender, type of school, and age-group. Results indicated, for gender ($\Delta\chi^2(45) = 44.024, p = .513, \Delta CFI = .000, \Delta RMSEA = -.002$), school type ($\Delta\chi^2(45) = 50.494, p = .265, \Delta CFI = -.001, \Delta RMSEA = -.002$), and age-group ($\Delta\chi^2(45) = 43.655, p = .528, \Delta CFI = .000, \Delta RMSEA = -.002$), that 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. Therefore, the pattern of results displayed in Fig. 3 applied equally to boys and girls, to adolescents attending theoretical and vocational schools, and to early-to-middle and middle-to-late adolescents.

4. Discussion

The vocational domain represents a key component of adolescent development, with career adaptability and vocational identity standing as pillars in the facilitation of vocational decision-making (Savickas, 2005; Skorikov & Vondracek, 2011). More longitudinal research is needed for an in-depth understanding of how these dimensions evolve in adolescence and how they are related to each

other across time. Existing literature brought forward the need to analyze career adaptability and vocational identity in more detail, as both are multi-dimensional constructs (Hartung, Porfeli, & Vondracek, 2005; Savickas, 1997, 2005). Therefore, we conducted a three-wave longitudinal study that investigated intra- and inter-individual changes in and reciprocal associations between adolescent career adaptability and vocational identity, during the course of one academic year. We tapped into career adaptability through the four career adapt-abilities (Savickas & Porfeli, 2012a). Vocational identity was unpacked into six dimensions referring to specific commitment, exploration, and reconsideration of commitment facets (Porfeli et al., 2011). Hence, for this construct we analyzed for the first time from a longitudinal standpoint the dynamics of reconsideration of vocational commitments. Findings showed significant longitudinal changes in career adaptability dimensions and identity processes, partly moderated by adolescents' gender, the type of school they attended, and their age. We depicted multiple longitudinal associations between career adaptability dimensions and vocational identity processes, which were independent of adolescents' gender, type of school, and age-group. Our study brought numerous additions to a growing literature on adolescent vocational development.

4.1. Longitudinal development of adolescent career adaptability

The results of our study suggest that career adaptability is a dynamic process in adolescence. Adolescents begin the academic year with high levels in their career adapt-abilities and for all career adapt-abilities the linear growth trajectories provided an excellent fit to the data. As the school year progressed, at sample level adolescents became slightly less concerned about, less in control of, and also less confident regarding their career prospects. Intercept-slope correlations brought forward valuable information about the dynamics of these dimensions in time. Adolescents that were initially very confident and curious about their career seemed to be slightly more vulnerable to longitudinal decreases in these dimensions, while increased concern and control at onset appeared to shield them from longitudinal declines in these abilities. As an exception, career curiosity remained stable throughout the duration of one academic year. These findings point out that the four career adapt-abilities play different roles in adolescent career development, hence further refining the career construction theory advanced by Savickas (1997, 2013). The context and culture dependence of vocational development can explain the fact that career curiosity seemed to be more stable across the academic year. As Romanian students have limited active occupational exploration opportunities and are engaged in very specific academic tracks (i.e., theoretical versus vocational), they actually have little to be curious about and few chances to analyze diverse career paths.

We highlighted relevant gender, type of school, and age differences in career adapt-abilities. In line with our hypothesis (Hypothesis 1a), at T1 girls had a significant advantage over boys in several career adapt-abilities (i.e., concern, curiosity). Also, the level of career control decreased more sharply in boys during one academic year. This clear advantage of girls can be interpreted in terms of the additional effort they invest in their vocational advancement even in adolescence, in order to prepare for a male-dominated labor market (Skorikov & Vondracek, 2011). As expected (Hypothesis 1b), theoretical school students initially had a clear advantage over vocational school students, as they were more concerned, curious, and confident about their careers. This can be linked to differential cross-cultural dynamics in the facilitation of school-to-work transitions, with some cultures offering better and quicker employment prospects for vocational school graduates (e.g., Switzerland; Hirschi, 2009, 2012), while other cultures, like the Romanian one, value and offer increased social protection for theoretical school students (e.g., Australia; Creed et al., 2010). As hypothesized (Hypothesis 1c), in terms of age differences, all four career adapt-abilities had higher levels in middle-to-late adolescents at onset, indicating a developmental progression in these abilities (Skorikov, 2007), with older students acquiring higher career adaptability than younger ones.

4.2. Longitudinal development of adolescent vocational identity

Adolescents started the academic year with high levels in the vocational commitment evaluation cycle (i.e., in-depth exploration and identification with career commitments, Luyckx, Goossens, & Soenens, 2006) and medium-high levels in the commitment formation cycle (i.e., in-breadth exploration and commitment making, Luyckx et al., 2006). Also, at onset, in the global sample levels of reconsideration of vocational commitment processes were low. In the span of the academic year adolescents generally experienced a slight, although statistically significant, decrease in the identity evaluation cycle. This could indicate students' detachment from active reflection upon current vocational commitments. This global trend was doubled by a small increase in reconsideration of vocational commitments. Intercept-slope correlations brought forward that adolescents with high initial levels in the identity evaluation cycle reported a steeper decrease as time passed, while those with lower initial reconsideration of commitment (i.e., flexibility, self-doubt) displayed a sharper increase. This stresses the cultural dimension of vocational development (Bosma & Kunnen, 2008; Savickas, 2005; Zimmer-Gembeck & Mortimer, 2006) and underscores the fact that in some cultures adolescence can be a time of reconsideration of vocational commitments. Namely, in cultures like Romania, fluctuating economic conditions and an unstable labor market offer adolescents reduced access to occupational exploration and limited prospects for occupational integration in the future (Karaš et al., 2014). Nevertheless, it is worth mentioning that reconsideration of vocational commitments is not necessarily a bad thing. As Klimstra et al. (2010) also pointed out, temporary increases in reconsideration of identity commitments can be related to the proximity of normative transitions (i.e., from middle-school to high-school or from high-school to university). In these times adolescents may reflect more on the validity of their previous identity choices.

We depicted interesting gender, school-type, and to a lesser extent age-group differences in vocational identity processes. At onset girls displayed higher levels in the vocational commitment evaluation cycle (i.e., high levels of in-depth exploration and identification with current commitments). We did not detect gender differences in the commitment formation cycle though (i.e., in-breadth exploration and commitment making). Hence, our hypothesis (Hypothesis 2a) regarding gender differences in the vocational

exploration and commitment dimensions was partially confirmed. In line with existing studies on identity cycles for other life domains (Klimstra et al., 2010; Luyckx et al., 2005, 2006) these results indicate that also for the vocational domain girls tend to allot more resources to actively reflecting upon their present commitments. As expected, at the beginning of the school year, theoretical school students had a clear advantage over vocational school students, displaying higher levels in all vocational exploration and commitment processes (Hypothesis 2b). Additionally, as time passed, in-breadth and in-depth exploration and identification with current vocational commitments decreased more sharply for vocational school students. This indicates that these students were more vulnerable to identity confusion, due to the low levels in the commitment formation and evaluation cycles. This trend can be linked to the reduced prospects for vocational development available for this category of students and also to the negative social evaluation of vocational high-school studies in the Romanian context (Ghinararu et al., 2012).

Vocational identity processes were more similar across age-groups. For most processes we did not find age-group differences; an exception was the career self-doubt dimension. Hence, Hypothesis 2c was partially confirmed. The lack of age-group differences for most vocational identity processes (see Table 4) can be linked to the fact that vocational identity development spans over longer time periods in adolescence (Skorikov & Vondracek, 2011) and most Romanian youth have very limited work experiences and continue with university studies after graduation (Karaš et al., 2014). Career self-doubt was an exception though, with younger students having more doubts about their vocational choices than older ones. The latter displayed a sharper increase in this process across time. This can be linked to that fact that choice of a high-school in the Romanian school system is done by means of a computerized distribution to a very large range of schools, depending on the students' previous grades. Hence, on the one hand, younger students were more dissatisfied with their "choice" at the beginning of the school year. On the other hand, as the school year unfolded, the older students, who approached the end of their studies, may have gradually started to doubt more what their future holds for them.

To our knowledge, this is the first longitudinal study that analyzed the dynamics of vocational reconsideration of commitments. In line with our hypothesis (Hypothesis 2d), the level of vocational self-doubt was significantly higher in boys, vocational school students, and early-to-middle adolescents. Also, vocational school students reported more career commitment flexibility. Our results can be linked to the more limited opportunities for career development available to vocational school students in the Romanian educational system (Ghinararu et al., 2012). Additionally, the developmental trend with boys and younger adolescents showing less stability in identity work in adolescence mirrored to a certain extent the results of Klimstra et al. (2010) longitudinal study on educational and interpersonal identity in adolescence. The authors highlighted a curvilinear trend depending on age-group and gender, with early and middle adolescent boys displaying higher levels of reconsideration of commitment than girls. Future studies could analyze the dynamics of vocational reconsideration of commitments with more than three data waves and during a longer time-span, in order to allow for analyses of quadratic and cubic change patterns.

4.3. Longitudinal reciprocal associations between career adaptability and vocational identity

In line with our hypotheses, we highlighted a pattern of reciprocal associations between career adapt-abilities and vocational identity that was consistent over time (Hypothesis 3a and b). This pattern applied equally to boys and girls, to students from theoretical and vocational schools, and to early-to-middle and middle-to-late adolescents (Hypothesis 3c).

As expected (Hypothesis 3a) career adaptability positively predicted adolescents' ways of dealing with vocational exploration and commitment. Adolescents that were more concerned about their careers tended to conduct more in-breadth vocational exploration, to make stronger career commitments, and to identify more with their current vocational commitments. Career curiosity was positively linked to both exploration processes; while confidence positively predicted both commitment processes. Hence, the vocational commitment formation and evaluation cycles (Luyckx et al., 2006) were differentially fueled by specific career adapt-abilities. Both the commitment formation cycle (i.e., the formation of active commitments) and the commitment evaluation cycle (i.e., the active evaluation of present commitments) were activated and reinforced by specific career adapt-abilities. This indicates that for vocational identity both cycles are closely linked to the development of career adaptability in adolescence, hence contributing a growing literature on the development of career adaptability (e.g., Hirschi, 2009; Savickas & Porfeli, 2012b; Skorikov, 2007) and identity (e.g., Klimstra et al., 2010; Luyckx et al., 2014) in adolescence.

Commitment and reconsideration of commitment processes predicted career adapt-abilities in time. Vocational commitment-making positively predicted career concern, control, and confidence; while identification with current commitments positively predicted career curiosity. It appears that vocational commitment-making had the strongest link to career adaptability. Adolescents who were certain about a career decision (e.g., entering a specific occupational path) became more involved in preparing for the future and had greater trust in their abilities, which in turn augmented the level of conviction about this choice. Hypothesis 3b was partially confirmed: vocational flexibility positively predicted curiosity about and confidence in one's career; while self-doubt about current commitments was a strong negative predictor for career concern, control, and confidence. This pattern from reconsideration of commitment processes to career adapt-abilities (but not vice-versa) suggested that career adaptability was also driven by the manner in which adolescents reviewed and changed their vocational commitments. Higher career commitment flexibility and reduced self-doubt about vocational choices seemed to greatly benefit career adaptability in the long-run. On the one side, it can be that increased career flexibility in adolescents is a developmental prerequisite for the boundaryless careers (Sullivan & Arthur, 2006) they will construct in the future, preparing them for lifelong occupational adjustment. Namely, the work force of the future must gradually prepare for multiple changes in types of occupations, geographic locations, or employment patterns (Sullivan & Arthur, 2006). Therefore, an adequate level of flexibility in vocational commitments, developmentally acquired, could be a necessary ingredient for the "adapted" employed adult of the future. On the other side, the strong negative relation between commitment self-

doubt and career adaptability should be further detailed by tapping into protective (e.g., social support, motivation) and risk (e.g., anxiety) factors (Creed, Fallon, & Hood, 2009; Hirschi, 2009; Pouyaud, Vignoli, Dosnon, & Lallemand, 2012) that could mediate their link over time. Specifically, it would be useful to investigate the personal characteristics and environment factors that make adolescents more prone to and also those that shield them from experiencing prolonged vocational self-doubt. Such factors can refer to variables that have already been linked to reconsideration of commitments in other life domains, like personality traits (Luyckx et al., 2014) or parental support (Beyers & Goossens, 2008).

As hypothesized (Hypothesis 3c), the relations between career adaptability and vocational identity were not moderated by adolescents' gender, type of school, and age. This finding indicates that at least in the time-frame of our study (i.e., one academic year) their longitudinal associations transcend these socio-demographic factors. Hence, from an applied standpoint, integration of vocational identity in the intervention framework proposed by Savickas (2005) for adaptability dimensions could further help adolescents in developing their career competences (i.e., planning, decision-making, exploring, problem solving).

4.4. Strengths, limitations, and suggestions for future research

In line with existing evidence (Hartung et al., 2005), our study pointed out that the vocational domain is an important life domain for adolescents, as in one academic year students were involved in significant adaptability and identity work. Hence, from a theoretical perspective, we brought additional information on how these two core vocational development dimensions fluctuate in a time-frame that is quite normative for adolescents: a school year. It seems that the “high hopes” (high levels in career adaptabilities, high levels in the vocational commitment evaluation cycle) that students had at the beginning of the school year became more moderate as time passed. Also, they pondered more on their current vocational commitments (i.e., increases in reconsideration of vocational commitments). From an applied perspective, our findings can aid educational interventions aimed at fostering vocational and academic achievement. Namely, we highlighted the dimensions that were more “vulnerable” to slight decreases or increases across the school year. These dimensions can be included in classroom-based interventions aimed at strengthening career adaptability and/or vocational identity.

This study should be considered both in light of its strengths and limitations that might suggest directions for further research. First, a major strength of the current study was its longitudinal design. In fact, as strongly recommended (e.g., Schwartz, 2005), we employed a longitudinal design with shorter time intervals (three to four months), which allowed us to analyze career adaptability and vocational identity in greater detail. However, we analyzed only one academic year. The patterns of linear growth depicted in the study variables can be linked to students' motivational dynamics across this time frame: students started the new school year with “high hopes” and gradually, as the year unfolded, became more moderate about their vocational development. Additionally, the repeated assessments might have also contributed to students' tendency to respond more moderately over time (Little, 2013). Hence, future studies need to continue monitoring the interplay between career adaptability and vocational identity over a longer time-frame, covering relevant school-to-university and school-to-work transitions. Second, we investigated career adaptability dimensions (Savickas & Porfeli, 2012a) and vocational identity processes (Porfeli et al., 2011) directly, hence allowing a fine-grained longitudinal investigation. Nevertheless, we only employed self-report measures. To address this limitation, future studies should integrate objective indicators of career outcomes that are relevant for adolescents (e.g., entrance to university) and assessments provided by third parties (e.g., parents, teachers). Third, we explained some variability in developmental patterns of career adaptability and vocational identity by highlighting gender, school-type, and age differences. However, we did not include ethnic minorities, which could present distinctive patterns due to differential access to educational and occupational resources. Therefore, future studies could take into account ethnicity as an additional moderator of adolescent career development.

5. Conclusions

In spite of these limitations, the present study has significant implications for mapping adolescent career development. We shed more light on the longitudinal trajectories and relations between two core components of adolescent vocational development: career adaptability and vocational identity. In the course of one academic year these dimensions changed significantly and were interwoven in complex prediction patterns. Hence, we brought forward the importance of analyzing together the two meta-competencies of adaptability and identity in research and practice.

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