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## Deciding on a College Major: Commitment Trajectories, Career Exploration, and Academic Well-Being

*Julia Dietrich, Anna Lichtwarck-Aschoff, Bärbel Kracke*

### **Abstract**

In this weekly diary study we followed thirty-three adolescents through the transition from school to college and focused on the micro-level processes of commitment and exploration while adolescents decided on their college major. Between their final exams at school and their enrolment in college they completed standardized diaries once a week. Nine months later at the end of their first semester in college, adolescents reported on their academic well-being (satisfaction with college major, perceived fit regarding interests and expectations, and drop-out intentions). We assigned the participants to one of three theoretically derived commitment trajectories: decided (adolescents who had committed themselves to one option early in the process and implemented their choice), narrowing (adolescents who narrowed down to one favorite option), and searching (adolescents with low and changing commitments), and found meaningful differences in exploration processes and subsequent academic well-being. Searching adolescents explored particularly little in-depth information about their future studies and showed worse academic well-being than decided and narrowing adolescents.

*Keywords:* Commitment, Career exploration, Transition to college, Diary study, Academic well-being

*Entschiedene vs. Suchende: Entwicklungsverläufe von Commitment und Exploration während des Übergangs Schule-Hochschule und akademisches Wohlbefinden im Studium*

### **Zusammenfassung**

Ziel der vorliegenden Tagebuchstudie war die Erfassung der Mikro-Entwicklungsprozesse von Commitment und Exploration im Übergang von der Schule in die Hochschule. Im Mittelpunkt stand die Untersuchung der Entwicklungsverläufe von 33 Abiturient/-innen im Zeitraum der Studienentscheidung nach dem Ende der Schulzeit. Den Jugendlichen wurde zwischen Abiturprüfung und Einschreibung an einer Hochschule wöchentlich ein standardisierter Fragebogen vorgelegt. Zusätzlich wurde am Ende des ersten Semesters an der Hochschule das akademische Wohlbefinden (Studienzufriedenheit, Passungserleben und Studienabbruchintentionen) mittels eines Follow-Up-Fragebogens erfasst. Die Datenauswertung der Tagebuchstudie zum Commitment ergab eine Zuordnung der Jugendlichen zu einem von drei theoretisch abgeleiteten Entwicklungsverläufen: Entschieden (Jugendliche, die sich bereits früh im Entscheidungsprozess auf nur eine Studienoption festgelegt hatten), Verengend (Jugendliche, die über die Zeit ihre Festlegung auf eine Option verengten) und Suchend (Jugendliche mit geringen und wechselnden Festlegungen). Es zeigten sich zudem Unterschiede zwischen diesen Gruppen im Explorationsverhalten während des Entscheidungsprozesses und hinsichtlich des akademischen Wohl-



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befindens. Suchende Jugendliche explorierten wenig in die Tiefe und berichteten geringeres akademisches Wohlbefinden als entschiedene und verengende Jugendliche.

*Schlagworte:* Commitment, Berufsbezogene Exploration, Entwicklungsverläufe, Übergang ins Studium, Tagebuchstudie, Akademisches Wohlbefinden

## 1 Introduction and theoretical framework

The transition to college imposes a major challenge for adolescents. Given the vast array of possible options, adolescents need to undertake the difficult task of making a choice and forming commitments for their future career when approaching high school graduation. The issue of making occupational commitments hence becomes an urgent matter right before going through the transition from high-school to college (cf. *Dietrich/Parker/Salmela-Aro* 2012). Although it is known that adolescents vary in how they generally approach career choices and transitions, little is known about the actual processes in adolescents' career decision-making, i.e., processes of commitment and exploration, as they unfold under conditions of urgency (cf. *Dietrich et al.* 2012), and their developmental patterns. That is, while some adolescents might make their choices and commitments very early, others might be in the midst of the decision process when approaching the deadlines for college admission. This study follows German students from the application process to college until the end of the first semester. Our aims were, first, to describe patterns of commitment trajectories during the application process to college, and second, to examine the extent to which these commitment trajectories relate to academic well-being in college.

According to theories of developmental regulation and career development, career transitions, such as the transition from school to college, are age-graded normative tasks that trigger young people's engagement towards task accomplishment (for a review see *Dietrich et al.* 2012). In turn, young people's phase-adequate career engagement—defined in terms of intentional activities that influence important career outcomes—is considered adaptive behavior (cf. *Dietrich et al.* 2012). Such activities include setting career goals, undertaking career exploration activities, and making career commitments. In translating *Eriksons's* theory, *Marcia* (1966) was the first to systematically distinguish commitment and exploration as the core elements involved in forming an identity during adolescence. Whereas commitment refers to making relatively firm choices, e.g., about a future career, and engaging in implementation of these choices, exploration encompasses the process of seeking and processing information which informs such commitments.

In the career domain, researchers have proposed that how adolescents cope with the decisional tasks of commitment and exploration has implications for the implementation and quality of their career-related choices (see *Dietrich et al.* 2012, for an overview). *Hirschi/Läge's* (2007) six-phase model of career decision-making, which integrates previous models of career decision-making, provides a fruitful basis for conceptualizing the choice process during the transition to college. They propose that the choice process occurs in a series of six phases: (1) becoming concerned about career choice, (2) generating possible alternatives, (3) reducing the alternatives, (4) deciding among few options, (5) establishing a commitment to the chosen option, and (6) being decided and firmly committed to one's choice. According to the model, different kinds of career exploration ac-

tivities—in-breadth and in-depth—are undertaken in different phases of the decision-making process. Whereas in-breadth exploration pertains to researching rather superficial information, for instance, possible income or qualification needs in several different occupations, in-depth exploration refers to exploring in greater detail the characteristics of one particular occupation and thinking about whether oneself is suited for this kind of work (see e.g. *Gati/Asher* 2001; *Germeijs/Verschueren* 2006). In the six-phase model of career decision-making, in-breadth exploration is predominant in the first phases of the process, and in-depth exploration is predominant in the later phases (cf. *Hirschi/Läge* 2007). Similar to *Hirschi/Läge* (2007), *Luyckx* and colleagues (2006) distinguished between processes of making commitments and evaluating them. According to their dual-cycle model of identity formation, in-breadth exploration is important in order to explore possible alternatives before a commitment to one alternative is made. After a commitment is made, in-depth exploration is important as it serves the strengthening or re-evaluation of the present alternative (cf. *Luyckx et al.* 2006).

A number of previous studies has shown that young people differ in their ability to make and implement firm commitments (see e.g. *Berzonsky/Kuk* 2000) and in their developmental trajectories of commitment and exploration. Recently, *Kunnen* (see 2009) proposed three distinct trajectories of commitment and exploration: an information-oriented trajectory (adolescents actively explore information before they commit to an option), a normative trajectory (adolescents form commitments based on the normative expectations of significant others instead of exploration), and a diffuse trajectory (adolescents avoid identity decisions as long as possible) in the process of identity formation (see also the identity style model, *Berzonsky/Kuk* 2000). In *Kunnen's* model, the information-oriented trajectory is further divided into subtypes: According to the frequency of changes in their commitments, individuals belong either to a gradual subtype with few commitment changes, to a fluctuating subtype that shows a moratorium-achieved-moratorium-achieved trajectory, or to a searchers subtype that is characterized by an enduring moratorium (cf. *Kunnen* 2009).

Thus, in the wake of the growing interest in process models (see e.g. *Lichtwarck-Aschoff et al.* 2008), the field of identity research has begun to study the micro-level processes (i.e., day to day or week to week) that are involved in changes and the development of identity (see e.g., *Klimstra et al.* 2010). Very little is known, however, with regard to the role that vocational identity development plays when young people go through the post-school transition phase (cf. *Dietrich et al.* 2012). According to *Dietrich* and colleagues' phase-adequate engagement framework, approaching high school graduation and the deadlines for college admission should trigger commitment and exploration (transition-as-cue hypothesis). Moreover, phase-adequate engagement should benefit adolescents' successful dealing with the demands of the transition while inadequate engagement has costs for them (costs-and-benefits hypothesis). Benefits and costs are potential transition outcomes such as accomplishing one's career goals or being satisfied with and engaged in the new activity. Although longitudinal studies are scarce, there is some evidence suggesting that exploration and commitment significantly increase as adolescents approach the post-school transition (cf. *Germeijs/Verschueren* 2006), and that engaging in such behaviors has positive consequences for choice implementation (cf. *Germeijs/Verschueren* 2007; *Kracke/Schmitt-Rodermund* 2001). Furthermore *Dietrich/Kracke/Nurmi* (2011) showed that adolescents who engaged in thorough exploration of the available options during the transition to college were more satisfied with how the transition

progressed. However, these studies did not take into account developmental patterns of commitment and related changes in exploration.

In the current study, we therefore focus on differences in typical trajectories of how adolescents come to their decision on a college major when only little time is left until a decision has to be made. Although generally admission deadlines function as a trigger for commitment and exploration (cf. *Dietrich et al. 2012*), adolescents are expected to differ in the extent to which their decision-making for a college major has progressed. Applied to the transition process to college, the six-phase model of career decision-making (cf. *Hirschi/Läge 2007*) implies that some adolescents have already made their choices and commitments, while others are in the midst of the decision process when approaching the deadlines for college admission. The yet undecided adolescents can be further divided into those who have a favorite option in mind, and those who have not. Thus, in line with *Hirschi/Läge (2007)*, we assume three possible groups of adolescents with different commitment trajectories in the application process to college: a decided trajectory, a narrowing trajectory, and a searching trajectory. As will be detailed below, adolescents in different trajectory groups were expected to differ, first, in their overall mean levels of studying-related career exploration (in-breadth and in-depth) during the admission process to college, second, in the week to week mean changes of their exploration (increase vs. decrease), and third, in the week to week stability vs. variability of exploration (research question 1). Moreover, based on the costs-and-benefits hypothesis (cf. *Dietrich et al. 2012*) we expected to find differences between adolescents in different commitment trajectories in terms of academic well-being after having entered college (research question 2). Specific hypotheses for each trajectory group will be outlined below.

(1) The *decided trajectory* is characterized by strong commitments. Adolescents in this group have decided on a preferred alternative and eventually implement this choice (cf. *Hirschi/Läge 2007*). As decided adolescents have already made firm commitments, they were expected to show low and stable levels of in-breadth exploration (cf. *Luyckx et al. 2006*), while in-depth exploration could still be present to enhance the current commitment. In line with the costs-and-benefits hypothesis (cf. *Dietrich et al. 2011*), previous research has shown that having made firm commitments and identifying with them goes along with active coping and higher well-being, regardless of whether commitments are based on previous explorations or not (see e.g., *Kunnen et al. 2008; Luyckx et al. 2005; Vleioras/Bosma 2005*). Accordingly, decided adolescents were expected to experience high academic well-being in college, as assessed by satisfaction with studies, perceived fit, and low drop-out intentions.

(2) The *narrowing trajectory* is characterized by a crystallizing process as described by *Hirschi/Läge (2007)*, in which one preferred alternative is selected from a pool of several alternatives and is eventually implemented. However, adolescents on the narrowing trajectory are somewhat delayed in their decision-making as they form a strong commitment to one option just shortly before facing application deadlines. Due to the hypothesized narrowing process, in-breadth exploration should decrease, while in-depth exploration should be more frequent and even increase over time (cf. *Gati/Asher 2001*). In-depth exploration activities were assumed to be highest in this group which is still involved in active decision-making (cf. *Hirschi/Läge 2007*). Being similar to a fluctuating information-oriented trajectory (cf. *Kunnen 2009*), we expected high week to week variability in exploration in the narrowing trajectory. Moreover, as the crystallizing process ends with a

firm commitment, adolescents in this group were hypothesized to show better academic well-being in college than searching adolescents (cf. *Berzonsky/Kuk* 2000; *Kunnen* et al. 2008; *Nurmi* et al. 1997).

(3) The *searching trajectory* is characterized by generally weak and changing commitments (cf. *Kunnen* et al. 2008). That is, the favorite option changes despite the urgency of making a firm commitment. In-breadth exploration activities were expected to be more frequent than in the other groups and fluctuating. Due to the lack of a strong commitment, in-depth exploration should be low (cf. *Luyckx* et al. 2006), but also highly variable. Regarding mean changes in exploration, two possibilities exist. As the pressure to make a decision is inevitable at this point, on the one hand an increase in both in-breadth and in-depth exploration can be expected (cf. *Dietrich* et al. 2012). On the other hand, since searching adolescents' exploration likely is subject to more or less random contextual cues which trigger the search for study-related information (cf. *Flum/Blustein* 2000), it is also possible to find no systematic mean change in exploration over time. Finally, previous research has shown that both continuous exploration and weak commitments make adolescents particularly prone to maladjustment (cf. *Berzonsky/Kuk* 2000; *Kunnen* 2009; *Kunnen* et al. 2008; *Nurmi* et al. 1997). Therefore, in terms of academic well-being we anticipated searching adolescents to be worst off after the first semester at college.

## 2 Method

### 2.1 Sample and Procedure

The sample consisted of German adolescents attending upper track schools (Gymnasium) who were facing the transition to university. Generally after finishing high school, about 60 percent of the students from cohorts having left school before 2011 directly continued their education (mainly females because boys had to do military service), of which 40 percent directly entered college studies, and about 20 percent entered vocational education (cf. *Federal Ministry of Education and Research* 2007). German high school graduates apply for a particular subject instead of a particular college. This requires having made commitments to one's college major before entering college. In this study, the focus was on those adolescents who plan to move directly from high school to college. Typically, applications are sent during summer, and studies begin in fall. College admission in Germany is highly dependent on the grade point average adolescents attain in their General Qualification for University Entrance (Abitur). As adolescents receive their Abitur results in late spring, there is a relatively short time frame for making final decisions about one's college applications. The present study aimed to capture identity development during exactly this time frame.

A total of 46 students participated in a weekly diary study that would follow them from shortly after obtaining their Abitur results until enrolment into one major. The sample was recruited from an ongoing longitudinal panel study, in which students had participated in an assessment during their final school year. The main data collection took place over 21 weeks from June to September 2009. Data of four participants was collected in a pilot data collection in 2008. During the application process to college participants filled in standardized weekly diaries in an online assessment procedure and received 25€ as a

reward. The diary period ended when a person had enrolled at a college, or when he or she had eventually decided not to enter college for the next winter term but instead decided to do something else (e.g. jobbing or traveling). Participants completed between 2 and 21 assessments (Mod = 9,  $M = 8.13$ ,  $SD = 3.74$ ). For the current analyses, only those participants were included who had not dropped out during the diary assessment period and who had completed at least four weeks of data collection in order to arrive at time lines of reasonable length. For that reason, 13 cases had to be removed from the sample. The final sample consisted of 33 adolescents (27 female, 6 male) aged 17-18 years. Compared to the other potential diary participants in the panel study (youths who had indicated planning an immediate transition to college,  $n = 142$  out of  $N = 232$ ), the actual 33 diary participants did not differ in terms of gender, career exploration nor decisional status (i.e., being decided vs. being undecided about one's future career path).

The length of time lines used for our analyses ranged from 4 to 14 weeks<sup>1</sup> in the diary period ( $M = 10.07$ ,  $SD = 2.43$ ) and was unrelated to commitment trajectory group and exploration. At the end of the diary period 32 adolescents had eventually enrolled at a college, and one participant had ended up working. Approximately nine months later at the end of their first semester at college, participants were contacted again for the follow-up assessment on academic well-being. Thirty participants completed the follow-up. No academic well-being data was available for the participant who ended up working.

## 2.2 Measures

### 2.2.1 Weekly Diary Measures

*Description of the application process.* In each week, students named up to three majors they were currently considering entering. For each major they indicated how certain they were that they would enter this major (range 0-100). Moreover, students reported on the applications they sent, on the admissions they received, and on the subject and the college in which they eventually had enrolled. This information was used to classify adolescents into commitment trajectory groups.

*Career exploration.* In each week, participants reported on their in-breadth and in-depth career exploration activities (two items per dimension). They indicated on a 6-point Likert scale (1 = *not at all*, 6 = *very intensively*) how intensively they had engaged in each activity. Sample items are "During the last week I collected some general information and/or I talked with someone about occupations, majors or universities in general" (in-breadth exploration), and "During the last week I thoroughly thought about whether the occupations/majors I consider entering really suit me" (in-depth exploration). Using the aggregate score across time points for each person, the in-breadth exploration items correlated  $r = .47$ ,  $p = .005$  (Cronbach's alpha = .63), the in-depth exploration items correlated  $r = .59$ ,  $p < .001$  (Cronbach's alpha = .74). The mean of the two items at each time point was computed for each exploration dimension.

*Academic Well-Being.* At the end of the first semester in college, participants indicated on a 6-point Likert scale (1 = *does not apply*, 6 = *fully applies*) to what extent the following statements were true of them. To assess participants' *satisfaction with studies* participants rated how satisfied they were with their current studies (cf. Westermann et al. 1996;

3 items, e.g., “All in all I am satisfied with my current studies”). Cronbach’s alpha for this scale was .78. To assess *perceived fit* participants rated how congruent their current studies were to their interests and expectations (cf. *Bergmann 1998*; 2 items, e.g., “My current studies fully fit my interests”). Cronbach’s alpha was .89. Finally, on the *drop-out intention* scale developed by *Ditton (1998)*, participants indicated how strong was their intention to quit their current studies (3 items, e.g., “I have thought about quitting my studies”). Cronbach’s alpha was .83.

### 2.2.2 Analysis Strategy

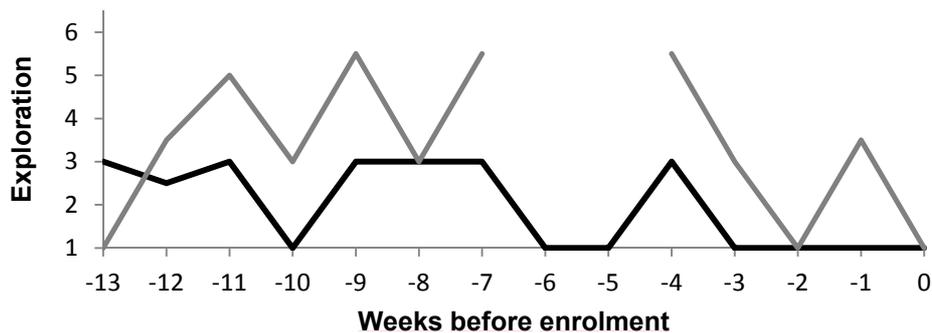
On the basis of their application process data, adolescents were grouped in one of the three trajectory groups according to the following criteria. All adolescents could clearly be assigned to one of the groups. Adolescents were assigned to the decided trajectory, if they named only one option as their preferred college major during the whole diary period of which they were completely certain they would enter it, and if they eventually enrolled into this major. Adolescents were assigned to the narrowing trajectory, if they named, among several other options, one preferred college major and eventually enrolled into this major. The eventually chosen major was the favorite option throughout the entire diary period, and adolescents had continuously reported the highest certainty levels for it. Last, adolescents were assigned to the searching trajectory, if their preferred major changed during the diary period, i.e., if the option with the highest certainty levels was a different major at different points in time, and if adolescents eventually chose a major which was not the initially preferred one.

In the following, we describe a few issues concerning our small sample and the interdependence in our data. Simulations and resampling techniques, such as Monte Carlo analyses, are appropriate for small samples. They are parameter free and allow for the testing of any specific null hypotheses (cf. *Todman/Dugard 2001*). We applied a non-parametric permutation test (cf. *Todman/Dugard 2001*) for testing differences in means, mean changes (linear slopes) and standard deviations (week to week variability) between the trajectory groups as well as for testing the mean changes (linear slopes) themselves against zero (for a similar procedure, see *Steenbeek/van Geert 2007*). We tested against the null hypothesis that no statistical difference exists between adolescents from different trajectory groups and between different time points within one adolescent. Accordingly, this null hypothesis assumed that instead of distinct distributions for each of the trajectory groups only one underlying distribution existed. In other words, according to the null hypothesis, the assignment of a particular adolescent to one of the trajectory groups as well as the order of time points within each adolescent is arbitrary. We tested the null hypothesis by randomly rearranging the adolescents over the three trajectory groups and the time points within each adolescent. For each random rearrangement (permutation), we calculated the desired parameter (e.g., mean difference between the groups). Next, we counted the number of times that the random permutation produced a parameter which was at least as large as the observed parameter. Finally, dividing this number by the number of times the permutation had been carried out (1000 times) yielded an exact p-value.

As a first step, we assigned each adolescent’s last time point (the final decision) as the zero point. This was done because the final decision is the common temporal marker for all individuals. If there were weeks with missing data, the respective cell was left empty. Examples for the resulting time lines are shown in Figure 1. Next, we computed the mean,

the intra-individual standard deviation and the linear slope (linear regression line reflecting the mean change) in exploration for each individual based on all available data. Finally, we computed the mean from the individual parameters over the adolescents in each trajectory group<sup>2</sup>. Using the same procedure, we examined the differences in academic well-being by comparing the means between the three trajectory groups.

Fig. 1: Two example trajectories of exploration over the course of the study



### 3 Results

The assignment of the adolescents to one of the three choice trajectories based on the application process data yielded the following distribution of groups. In the decided trajectory group were 17 adolescents, in the narrowing group were 9 adolescents, and in the searching group were 7 adolescents. In the follow up at the end of the first semester, one adolescent had dropped out from both the decided group and the narrowing group.

The results, as depicted in Table 1, showed that the trajectory groups did not differ from each other in their mean intensity and variability of in-breadth exploration. All three groups showed a significant decline in in-breadth exploration (all  $ps < .001$ ) which was stronger in the searching trajectory than in the decided trajectory ( $difference = .08, p = .034$ ). The means of in-depth exploration differed by group, such that narrowing adolescents explored significantly more in-depth than decided ( $p = .001$ ) or searching adolescents ( $p = .026$ ), while the latter two did not differ significantly from each other. Moreover, narrowing adolescents explored more in-depth than in-breadth ( $p < .001$ ), whereas no such difference was found in the decided or the searching trajectory. In-depth exploration decreased significantly in all trajectory groups (decided and narrowing:  $p < .001$ , searching:  $p = .002$ ). Adolescents on the narrowing trajectory showed the strongest decrease of in-depth exploration, whilst the slopes of the other two groups did not differ (decided vs. narrowing:  $difference = .10, p = .040$ ; searching vs. narrowing:  $difference = .12, p = .044$ ). With respect to intra-individual variability the results showed higher variability of in-depth exploration for narrowing ( $p = .001$ ) and searching ( $p = .019$ ) as compared to decided adolescents.

*Tab. 1:* Descriptive statistics for in-breadth and in-depth exploration (means, intra-individual standard deviations, and linear slopes)

	<i>M</i>	<i>SD</i>	Slope
<i>Decided trajectory (n = 17)</i>			
In-breadth exploration	1.67	.90	-.11***
In-depth exploration	1.79	.92	-.17***
<i>Narrowing trajectory (n = 9)</i>			
In-breadth exploration	1.70	.94	-.15***
In-depth exploration	2.51	1.39	-.27***
<i>Searching trajectory (n = 7)</i>			
In-breadth exploration	1.80	1.10	-.19***
In-depth exploration	2.00	1.26	-.15**

\*\*\*  $p < .001$ . \*\*  $p < .01$ .

*Note.* Asterisks indicate whether a slope (linear mean change) was significantly different from zero.

*Tab. 2:* Means for academic well-being by trajectory group

Trajectory group	Satisfaction with studies	Perceived fit	Drop-out intentions
Decided trajectory ( $n = 15$ )	5.05 <sup>a</sup>	5.07 <sup>c</sup>	1.48 <sup>e</sup>
Narrowing trajectory ( $n = 8$ )	5.25 <sup>a</sup>	4.81 <sup>c</sup>	1.88 <sup>e</sup>
Searching trajectory ( $n = 7$ )	4.29 <sup>b</sup>	3.21 <sup>d</sup>	3.29 <sup>f</sup>

*Note.* Means in one column sharing a common subscript are not statistically different.

The follow up results showed that both decided and narrowing adolescents exhibited high levels of academic well-being, such that they were highly satisfied with their studies and perceived a high fit between their studies and their interests and expectations (see Table 2). Furthermore, both decided and narrowing adolescents had weak intentions to quit studies. Decided and narrowing adolescents did not differ significantly from each other in terms of satisfaction with their studies, perceived fit and drop-out intentions. In contrast to the first two trajectory groups, the searching group showed significantly worse well-being to college. Searching adolescents were less satisfied with their studies ( $p = .015$  vs. decided,  $p = .022$  vs. narrowing), perceived less fit ( $p = .003$  vs. decided,  $p = .001$  vs. narrowing), and had higher drop-out intentions than decided ( $p = .023$ ) and narrowing adolescents ( $p = .006$ ).

## 4 Discussion

This weekly diary study employed a micro-level perspective on adolescents' commitment and exploration during the application process to college. The study had two aims: First, to describe trajectories of career commitment and exploration under conditions of urgency (research question 1), and second, to examine differences in academic well-being at the end of the first semester in college (research question 2).

To begin with, our results showed that while the majority of adolescents had already committed themselves to one major in the last phase of the decision process (decided trajectory), there was a considerable amount of adolescents who showed a late crystallization process towards one option (narrowing trajectory), and who had weak and changing commitments (searching trajectory). As a next step in describing these trajectories, we examined how adolescents differed in their overall mean levels, mean level changes, and week to week variability of studying-related career exploration.

Concerning the decided trajectory group, we found the expected low and even decreasing levels of in-breadth exploration. Also in-depth exploration was low and decreased over time. Moreover, academic well-being was high for adolescents on a decided commitment trajectory, lending further support to the hypothesis that making firm commitments is associated with elevated general and domain specific well-being levels (cf. *Luyckx et al. 2005; Vleioras/Bosma 2005*). Similarly, from a phase-adequate engagement perspective (cf. *Dietrich et al. 2012*) it can be considered appropriate in relation to post-school outcomes to have a strong commitment towards a college major. Since this has rarely been studied across the post-school transition, our study is one of the few to examine potential outcomes of phase-adequate identity work (see also *Germeijs/Verschueren 2007*).

With regard to the narrowing trajectory group, our findings also largely confirmed our expectations. As hypothesized, adolescents on the narrowing trajectory explored most in-depth information compared to the other groups and further showed a high week to week variability of in-depth exploration. High variability corresponding with high levels of exploration and with a crystallization of a commitment to one favorite option confirms the conceptual closeness of this trajectory to an information-oriented trajectory (cf. *Kunnen 2009*). Moreover, exploration in-depth was higher than exploration in-breadth. This suggests that those adolescents indeed have made a firm commitment and thus explore in-depth information, for example about specific universities, before entering the major they have committed to (cf. *Luyckx et al. 2006*). Even though we found a decline instead of an increase in in-depth exploration for the narrowing trajectory, the mean changes of exploration still indicate a crystallization process (cf. *Hirschi/Läge 2007*). It might well be possible that in-depth exploration had its peak before our study started, or during the beginning of data collection. During the course of the study, in-depth exploration then showed the same decline as within decided adolescents, but on a higher mean level. Finally, in line with prior research (cf. *Luyckx et al. 2005*), our findings on academic well-being suggest that arriving at firm commitments and identifying with them can be considered phase-adequate towards the transition (cf. *Dietrich et al. 2012*). This even holds for individuals who are somewhat delayed in their decision-making, as was the case for narrowing adolescents, thus suggesting that making commitments very late is not necessarily related to transition costs.

Finally, the searching trajectory was characterized by low and decreasing levels of both types of exploration which was unexpected for this group of adolescents. Thus, even though searching adolescents did not have strong commitments at the start of the application process, and despite the urgency of making a college major decision (cf. *Dietrich et al. 2012*), they did not seem to explore a range of alternative choices but decreased their in-breadth exploration before matriculation even stronger than decided adolescents. Furthermore, in line with our expectation we found higher week to week variability for searching adolescents. To summarize, high variability of in-depth exploration corre-

sponded with low levels of it and unstable commitments. In contrast to the narrowing trajectory, the high variability in the searching trajectory group may resemble more non-systematic (low) exploration activities, potentially triggered by more or less random contextual cues (cf. *Flum/Blustein* 2000). Moreover, as predicted, searching adolescents showed significantly worse academic well-being than decided and narrowing adolescents. That is, searching adolescents were less satisfied with their studies, perceived a lower fit between their major and their interests and expectations, and showed higher drop-out intentions. Our results suggest that adolescents' dealing with the task of choosing a college major in a way characterized by low and changing commitments and exploration represents a type of inadequate engagement (cf. *Dietrich et al.* 2012).

When interpreting the findings of this study, a number of considerations should be taken into account. Small sample sizes like ours are common with diary studies, particularly over longer periods of time (see *Lichtwarck-Aschoff/Kunnen/van Geert* 2010; *Schindler/Tomasik* 2010) and are one of the drawbacks of the diary approach. Highly committed participants are needed who stay motivated for keeping diaries. This does not only makes such studies expensive, but also keeps a certain kind of people involved in data collection by the risk of a selective dropout. Although we did not find differences between diary participants and non-participants in the variables of interest, it is still likely to have a selective sample. Moreover, the small sample size of this study limits the possibility to statistically generalize our results to the population of adolescents at the transition to college. However, our study focused on the development of individual trajectories over time, and resampling techniques allowed for appropriate statistical analyses of this data (see *Todman/Dugard* 2001). In addition, as was typical for the year when our participants graduated from high school, more females than males made an immediate transition from school to college due to males being in military or civil service. Our findings were thus obtained with a sample dominated by girls, which could have influenced our results. Since mandatory military service in Germany has ended in 2011, adolescents who nowadays take gap years have typically made a decision to do so. Comparing individuals who take a gap year with those who move directly from school to college is a next step towards testing the generalizability of our results. Finally, although longitudinal, the design of our study was still correlational; therefore caution is warranted with respect to causal interpretations. For example, we do not know whether taking a certain commitment trajectory causes lower academic well-being. It could be that well-being is also a psychological resource for phase-adequate engagement (see, e.g., *Haase/Heckhausen/Silbereisen* 2012) and further research is needed to explore this possibility.

As such, this study is a first step in the examination of the processes involved in the transition from school to college and different developmental patterns therein. A next important step would be to study the mechanisms which drive development during these transition periods. For example, in the searching trajectory group, what are the environmental conditions or cues that trigger exploration (cf. *Flum/Blustein* 2000)? Second, in-breadth exploration did not differ between groups and might be more relevant in earlier phases of the decision-making process (cf. *Hirschi/Läge* 2007), thus exploration and commitment could be studied over a longer period of time.

Moreover, further theoretical elaborations on mechanisms of phase-adequate engagement and related identity processes at the transition from high school are needed (cf. *Dietrich et al.* 2012). They could fruitfully be based within a dynamic systems framework (e.g., *Lichtwarck-Aschoff et al.* 2008). Dynamic systems theory contends that the two lev-

els of development, micro-development (day to day, week to week) and macro-development (months, years) influence one another. On the one hand, developmental goals defined by adolescents' internal reflections of current developmental tasks (cf. *Heckhausen et al. 2010*) can be described as higher order goals on the macro-level of development (cf. *Carver/Scheier 1990*). Developmental goals affect the (micro-level) goals adolescents set and the actions they undertake in their everyday lives, such as exploring a certain post-school option. Macro-level entities thus function as a constraint for everyday behaviors (e.g., *Granic/Patterson 2006*). On the other hand, identity processes on the micro-level of development can be assumed to have consequences for the attainment of the macro-level developmental goals. Long-term progress with developmental goals thus emerges out of successive short-term interactions. Applied to adolescents during the transition to college, identity processes on the micro-level might contribute to long-term progress with the macro-level transition-related goal of becoming clear about one's preferences for a college major.

Combining both levels of time in one theoretical model has at least two advantages. First, such a model acknowledges that different processes might be at work on the well-researched developmental macro-level and on the rather under-researched micro-level (cf. *Lichtwarck-Aschoff et al. 2008*). Second, such a model is able to shed light on the processes and mechanisms which drive long-term development (see, e.g., *Kerpelman/Pittman/Lamke 1997*). We thus encourage researchers to intensify their efforts in the study of micro-level development at the transition from high school.

In conclusion, the gains of this study are twofold. On the one hand, this study is the first to describe micro-level developmental processes of commitment and exploration while adolescents pass the post-school transition. While such processes can be captured with diary studies, they remain unexplored in large panel studies. On the other hand, applying commitment and exploration as indicators of phase-adequate engagement (cf. *Dietrich et al. 2012*), the results showed that differences in such engagement processes (not only engagement levels) were associated with post-transition outcomes. The present study further gives hints for the design of future research for the investigation of micro-level processes and mechanisms involved in vocational identity development during the transition from school to college.

## Footnotes

- 1 Due to varying deadlines at the different colleges and different dates of receiving letters of admission, the length of the individual time lines until final enrolment at a university differed between participants. One participant completed 21 weekly assessments. Of this time line, only the last 14 time points (length of the next longest time line) were included in the current analyses to be able to include this outlier in analyses in the same way as the other participants.
- 2 To rule out the possibility that our analysis method biased the results we also employed a group mean based method. The analyses on the group level were based on aggregated data for each time point. We computed the means of exploration for each time point over all adolescents in each trajectory group. From the aggregated data, we computed an overall group mean as well as a least-squares linear slope. The results obtained with this method resembled those reported in the results section.

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