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The development of gendered occupational aspirations across adolescence: Examining the role of different types of upper-secondary education

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Additional Information:	
Question	**Response**
Key Messages Please enter 2-4 bullet points summarising the key messages of the paper. The contribution made by the paper to the field should be clear from these key messages. Each bullet point must be less than 100 characters. These points may be used to promote your	- The development of occupational aspirations differs by upper-secondary track and by gender - Gender-typical occupational aspirations are most prevalent at the age of 15 - Identity formation, perceived opportunities and status considerations may provide an explanation

The development of gendered occupational aspirations across adolescence: Examining the role of different types of upper-secondary education

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Abstract
Gender-typical educational and occupational goals are an important precursor of educational gender segregation and unequal opportunities of men and women in the labour market. However, little is known about how gender-typical aspirations develop during childhood and adolescence. Drawing on identity and opportunity arguments from a developmental perspective, this paper attempts to fill this gap by examining whether and to what extent gender-typical aspirations change during adolescence and how track allocation in secondary school is related to the development of gendered occupational aspirations between the ages of 15 and 21. The analyses are based on the Swiss Longitudinal Survey of Children and Youth. They include an observation span of six years, during which respondents were surveyed at the ages of 15, 16, 18 and 21.
The findings show that gender-typical occupational aspirations were most prevalent at the age of 15. Their level and development differed by upper-secondary school track and gender. Young men's aspirations were considerably more gender-typical than those of young women. Aspirations became less gender-typical for women in baccalaureate school and in initial vocational education and training programmes with high academic requirements and, in particular, for young men who entered vocational education and training with low requirements. Overall, our results support the assumption that changes in gender-typical aspirations during adolescence are the result of an interplay between opportunity structures offered by the upper-secondary school track, identity and status considerations.

Keywords
occupational aspirations, gender segregation, adolescence, educational system, tracking

Introduction

A persistent characteristic of labour markets in all Western countries is their high level of gender segregation (Charles & Grusky, 2005). Men and women often train for different occupations and work in different jobs. This unequal distribution of men and women is accompanied by occupational gender-typing. Occupations dominated by women are associated with female-typed personality traits and competencies and perceived as particularly suitable for women. Vice versa, the same holds for occupations dominated by men (Adachi, 2013; He, Kang, Tse, & Toh, 2019). Children perceive the gender type of occupations from an early age (Watson & McMahon, 2005; Wilbourn & Kee, 2010). They frequently develop gender-typical educational and occupational goals, which in turn promote training and working in gender-typical jobs (Authors own, 2012; Polavieja & Platt, 2014). The development of gender-typical occupational aspirations contributes to occupational gender segregation in the labour market and thus to unequal opportunities for men and women. This is because female-dominated occupations often pay lower wages and offer less career opportunities than male-dominated or gender-integrated occupations employing more balanced proportions of men and women (e.g. Gundert & Mayer, 2012; Reimer, Noelke, & Kucel, 2008; Reskin & Bielby, 2005).

A wealth of research has examined determinants of gender-typical educational and occupational aspirations, including school performance, interests, and values, at various stages in the life course (Authors own, 2019). However, surprisingly little is known about how gender-typical aspirations change during adolescence and which factors might be responsible for such changes. A study by Lawson, Lee, Crouter, and McHale (2018) examined the development of gendered vocational aspirations and attainment between childhood and young adulthood in the U.S. They found that the gender typicality of both men and women's occupational aspirations remained fairly stable between childhood and adolescence. However, men's aspirations were considerably more gender-typical than women's. Other research on the development of occupational aspirations has focused on the status dimension. The results, which pertain to Germany and Switzerland, are mostly based on short observation spans during lower-secondary education. They showed that the majority of young people aged 14 to 16 had already adapted their status aspirations to the opportunities they perceived in their school environment (Heckhausen & Tomasik, 2002; Hirschi, 2010; Hirschi & Vondracek, 2009; Tomasik, Hardy, Haase, & Heckhausen, 2009). Furthermore, Authors own (2019) found that in tracked

educational systems in Switzerland the development of occupational status aspirations depends on the upper-secondary school track, which determines young people's further educational and occupational opportunities.

It is likely that upper-secondary track allocation also affects the development of gendered occupational aspirations. However, to our knowledge, no study has yet systematically investigated the influence of upper-secondary education on the gender typicality of the occupational aspirations of young men and women across adolescence. We aim to close this gap by investigating how the upper-secondary track attended is related to the development of gender-typical aspirations between the end of compulsory school at the age of 15 and early adulthood. If we know how gendered aspirations develop over time and which factors explain why young people may either abandon early gender-typical aspirations or strengthen them, we can better understand the persistence of occupational gender inequality. Switzerland lends itself ideally to the analysis of this question. It features a strongly tracked upper-secondary school system with a large initial vocational education and training (IVET) sector closely linked to the labour market (Authors own, 2014).

The formation of gendered occupational aspirations

The development of occupational goals is an important task in adolescence (Havighurst, 1952; Nurmi, 2004). These goals guide young people's educational and job-related choices and thus support the successful completion of formal education and the school-to-work transition (Nurmi, 1993; Nurmi, Salmela-Aro, & Koivisto, 2002). The development of aspirations is a dynamic process of circumscription and compromise that begins in childhood and continues into adulthood. Children and adolescents narrow their occupational options by discarding occupational goals they consider as unattractive, inappropriate, or inaccessible. This process reflects young people's self-concept, which is strongly shaped by gender and social class. Consequently, young people judge the desirability of occupations by their gender type and social status. Occupations that are not in line with adolescents' gender identity and gendered self-perception or are below the family's social status are excluded from the pool of options (England, 2010; Gottfredson & Lapan, 1997). Gender and status thus serve as important markers for narrowing down potential occupational options.

The perceived gender type of an occupation is of paramount importance in this narrowing of occupational options. Girls eliminate male-typed occupations, and boys female-typed

occupations. Only occupations perceived as suitable either for one's own gender or for both genders remain within the range of options considered (Gottfredson & Lapan, 1997). This tendency has remained fairly stable in recent years despite increasing gender equality in most spheres of life. An important reason is that in Western societies the formation of gender-typical aspirations and the subsequent choice of a gender-typical occupation serves as a means of expressing gender identity (Charles & Bradley, 2009).

Gender identity includes contentment with one's gender, self-appraised gender typicality, perceived pressure to adhere to gender roles, and the importance of gender relative to other identities (Tobin et al., 2010). During adolescence, young people consolidate components of their gender identity and gender stereotypes, and they adopt identity-defining values and gender roles (Steensma, Kreukels, Vries, & Cohen-Kettenis, 2013; Tobin et al., 2010). Perceived pressure for gender conformity from parents and peers is fairly strong in early adolescence (Kornienko, Santos, Martin, & Granger, 2016; Kroger, 2008; Steensma et al., 2013). It weakens in adulthood, when gender identity has stabilised and gender role attitudes become more flexible (see Hill & Lynch, 1983; Marcell, Eftim, Sonenstein, & Pleck, 2011; Priess-Groben & Lindberg, 2018). Gendered occupational aspirations and choices are thus likely to be most prevalent in early adolescence and attenuate thereafter. We thus hypothesise that *occupational aspirations of young women and men become less gender-typical between the ages of 15 and 21 (Hypothesis 1).*

Within the range of occupational options adolescents consider suitable for their gender and social background, they also consider the opportunities and constraints provided by their social environment when developing their aspirations (Gottfredson, 2005; Nurmi, 1993, 2004). During adolescence, young people's social environment is strongly shaped by their educational environment and thus by their lower- and upper-secondary school tracks. Adopting a social systems perspective (e.g. Dannefer, 1992), we assume that the opportunity structure resulting from track allocation in secondary school is transparent for adolescents and impacts the development of their gendered occupational aspirations. Adolescents perceive and assess their own performance and the ensuing accessibility of educational and occupational options. Equally, they are aware of educational and occupational options allowing status maintenance or even upward mobility. Findings from Malin and Jacob (2019) confirm the relevance of opportunity structures for the formation of occupational aspirations. They showed that the willingness of adolescents in Germany bound for initial vocational education and training (IVET)

to deviate from gender-typical occupational aspirations depended on the structure of the labour market and the local apprenticeship offers.

In her seminal work on the persistence of gender inequality, England (2010, p. 150) argues that the majority of individuals ignore or challenge occupational gender boundaries only when gender-typical options do not allow upward mobility. Many female-dominated occupations are accompanied by lower earnings (Authors own, 2020; Murphy & Oesch, 2016), lower status, less favourable class position (Gundert & Mayer, 2012; Reimer et al., 2008), and fewer opportunities for upward mobility (Reskin & Bielby, 2005); consequently, they are particularly unattractive for young people who highly value good career prospects. We thus hypothesize that *a strong career orientation leads to fewer gender-typical occupational aspirations in young women but fosters the development of gender-typical aspirations in young men (Hypothesis 2)*.

However, career opportunities depend not only on the gender type of an occupation but also on the labour market segment to which a worker's educational credentials provide access (Dekker, Grip, & Heijke, 2002; Authors own, 2016). Therefore, the next section describes the structure of Switzerland's educational system and its link with occupational opportunities and derive assumptions about the relationship between the development of gendered aspirations and track allocation.

Swiss institutional context in education and gendered occupational aspirations

At the age of 15 or 16 years, Swiss adolescents enter upper-secondary education, which is highly stratified, differentiated, and gender segregated. Upper-secondary education includes IVET, specialised middle schools, and baccalaureate schools Authors own, 2016; Authors own, 2016). The majority of courses last three or four years, and students earn their diplomas and degrees between 18 and 20 years.

About two thirds of all young people enter one of the approximately 230 occupation-specific training programmes, mostly offered by companies and differing in their academic requirements (Stalder, 2011; SERI, 2017)[i] Consequently, the majority of adolescents have to decide at the age of 14 or 15 for which occupational programmes they would like to apply.

An salient characteristic of IVET is its strong gender segregation, which is most pronounced within the academically less demanding training occupations (Abraham & Arpagaus, 2008; Authors own, 2015).[ii] Many training occupations are either strongly female- or male-dominated. Women often train in health, sales, and personal service occupations, whereas men

train in technical and, in the case of IVET with lower academic requirements, manufacturing and construction occupations (Abraham & Arpagaus, 2008; Becker & Glauser, 2015; Authors own, 2015; Leemann & Keck, 2005). The majority of the training occupations most frequently entered by women, such as surgical, dental, veterinary, pharmacy, healthcare, and social care assistants and hairdressers have proportions of female apprentices ranging between 85% and 99%. Similarly, the proportions of male apprentices in the most frequently male-dominated training occupations, including electricians, computer specialists, mechanics, carpenters, and car specialists, amounts to 90% and more. A minority of youth train in gender-integrated occupations with more equal numbers of men and women. Typical examples include the training occupations of retail specialist and commercial clerk, which are less gender-typed and not associated with one specific gender.[iii]

The completion of an IVET programme offers good employment prospects in the training occupation. However, opportunities for mobility are limited and are often contingent on further training at the tertiary level (Authors own, 2016). Regular IVET programmes of three or four years' duration offer the option of earning a federal vocational baccalaureate, which allows access to universities of applied sciences (UAS). Although this option is formally accessible to all IVET diploma holders, it is mainly those in the academically more demanding programmes who choose this path (Meyer & Sacchi, 2020; Authors own, 2020). Alternatively, young people with regular IVET diplomas may continue their education at the tertiary level by entering professional education (PE) and earning an (advanced) federal diploma of higher education in their field of occupational training. UAS and PE degrees lead to jobs in the middle of the income and status distribution (see Authors own, 2017; Schellenberg, Hättich, Schmaeh, & Häfeli, 2016).

UAS and PE programmes build on IVET. The majority of IVET diploma holders continuing their education at the tertiary level choose a field of study similar to the upper-secondary training occupation they have completed (Authors own, 2020). As a consequence, UAS and PE programmes are gender segregated along similar lines to IVET (Authors own, 2018).

About 20% of all young people attend an academic baccalaureate school. Children from high socio-economic backgrounds are strongly overrepresented in this school type. Most academic baccalaureate holders enter a university after earning their degree at the approximate age of 19 years (Authors own, 2016; Authors own, 2020). The study fields at academic universities are less gender-segregated compared to IVET, PE, and UAS. Although some fields are dominated by

one gender and strongly gender-typed, such as engineering, physics, and computer science (male-dominated) and psychology (female-dominated), gender-integrated fields with more equal numbers of male and female students are more common and lead to fairly high-status gender-integrated jobs in the service sector (Authors own, 2018).

A small minority of mostly female adolescents enter specialised schools after compulsory education and earn a specialised baccalaureate that grants access to higher education in specific female-dominated occupational fields, such as health, social work, and teaching. Holders of a specialised baccalaureate may enter a UAS or teacher education.

In the occupationally segmented Swiss labour market, where access to jobs is limited to those holding segment-specific credentials, the choice of training occupation or field of study has a strong impact on labour market allocation, further training, and career opportunities (Authors own, 2020; Authors own, 2016). The close link between the education system and the labour market also leads to a perpetuation of educational gender segregation in the labour market (Authors own, 2018). In short, gender-segregated education programmes lead to gender-segregated job opportunities. These institutional links are exacerbated by employers' reluctance to hire workers with the "wrong" sex for strongly male- or female-typed jobs (Authors own, 2020; Campero & Fernandez, 2019; Authors own, 2013; Leung & Koppman, 2018).[iv]

As argued above, adolescents perceive the educational and occupational opportunities offered by their upper-secondary educational track and take these into account when developing occupational aspirations (Dannefer, 1992; see also Malin & Jacob, 2019). In line with this assumption, a qualitative study by Authors own (2017) showed that young people who were about to enter IVET used the perceived gender type of the training occupations accessible to them as markers of the occupations suitability. Adolescents bound for baccalaureate school were aware of their numerous gender-typical and non-gender-typical occupational options, and their occupational aspirations were therefore broader and less fixed. Differences in perceived opportunities between educational tracks are thus likely to impact the gender typicality of occupational aspirations. We therefore assume that *the aspirations of those entering academic baccalaureate school are less gender-typical than the aspirations of adolescents entering specialised schools or IVET (Hypothesis 3a).*

Regarding heterogeneity within IVET, Eberhard, Matthes, and Ulrich (2015) showed for the tracked German educational system that the gender-typical vocational choices of young people

bound for IVET were less common among those who performed well academically. In the Swiss system, academically strong adolescents who do not enter baccalaureate school enter IVET programmes with high academic requirements, many of which are less gender-typed than programmes with lower requirements (Abraham & Arpagaus, 2008; Authors own, 2016). We thus assume that *adolescents who enrol in IVET with high academic requirements have less gender-typical occupational aspirations than those entering an IVET programme with low or medium academic requirements (Hypothesis 3b).*

Development of gendered occupational aspirations: differences between tracks

In order to formulate hypotheses how track allocation in secondary school may be related to the development of gendered occupational aspirations, we draw on Heckhausen's (2002) assumption that educational deadlines, such as the transition to upper-secondary education or into the labour market, affect the process of goal formation. Before educational transitions, individuals form goals and strive to reach them. After a successful transition, the concomitant changes in the social context trigger adaptation processes. New alternatives are assessed, and individuals set themselves new goals and form more ambitious aspirations (see Authors own, 2019). Bearing in mind that adolescents' self-perception and their awareness of opportunities and constraints provided by their changing social environment also become more accurate and realistic with increasing age (Beal & Crockett, 2010; Gottfredson & Lapan, 1997), we assume that the transition to upper-secondary school is likely to trigger an adaptation of occupational aspirations. Based on England's (2010) argument outlined above, we further assume that gender-typical aspirations are discarded more often if the gender-typical occupational options available for people in the chosen upper-secondary track offer poor career prospects. In this situation, young people more readily consider occupations that are not clearly associated with one gender or are even gender-atypical.

For the majority of adolescents bound for vocational education and training, the transition to upper-secondary education occurs concurrently with entry into the world of work. They gather work experience and gain knowledge about the advantages and disadvantages of their chosen occupation, further career opportunities, and options for further training. Young people in IVET programmes with high requirements have access to a wide range of further education opportunities offering attractive opportunities for upward mobility within the occupational field (see Leemann & Keck, 2005). These include numerous programmes of professional

education and access to UAS for those holding a vocational baccalaureate (Authors own, 2016). Given that many of these programmes are strongly gender-segregated, they are likely to stabilise gendered aspirations. We thus assume that entry into an IVET track with high requirements lowers the probability of abandoning gender-typical occupational aspirations over time.

However, adolescents in IVET with low or medium academic requirements face fewer opportunities for further training and mobility, partly due to their lack of access to vocational baccalaureate school (Meyer & Sacchi, 2020). They are likely to become aware of this during upper-secondary education. Opportunities are even more limited for men, who predominantly train in the shrinking manufacturing sector (e.g. Murphy & Oesch, 2018). Better career prospects are offered by the expanding service sector. For young men, this requires occupational reorientation towards service sector occupations, which often employ more or less equal numbers of men and women and are less gender-typed (see Swiss Federal Statics Office, 2019, September). We thus assume that the prevalence of gender-typical occupational aspirations declines over time for young people in IVET programmes with low academic requirements. We expect this decline to be stronger for men than for women.

Finally, young people in baccalaureate school face a less predefined and structured situation, with many gender-integrated fields of study to choose from after upper-secondary education, which are not clearly male- or female-typed. Furthermore, their first occupational decision takes place later, around age 18 or 19. In this life phase, the pressure felt from peers and parents to conform to gender norms has diminished, and the choice of a gender-typical occupations is less important for their self-concept (Blanchard & Lichtenberg, 2003; Authors own, 2019). We therefore assume that gender-typical occupational aspirations become less important for academic baccalaureate track students and the development of non-gender-typed or even gender-atypical aspirations becomes more frequent among these students between 15 and 21 years of age.

Summing up our assumptions for the different tracks of upper-secondary education, we hypothesise that *occupational aspirations of young people in IVET with low and medium academic requirements and in baccalaureate school should become less gender-typical between 15 and 21 years (Hypothesis 4a), whereas the importance of gender-typical aspirations to those in IVET with high requirements is likely to remain stable (Hypothesis 4b).*

Additional variables that may influence gender-typical aspirations

Empirical research has shown that gender roles are less pronounced in the academically educated middle-class than in working-class milieus. In particular, girls whose parents have a higher level of education choose less gender-typical occupations (Davis & Greenstein, 2009; Gottfredson, 1996; Helbig & Leuze, 2012; Kleinert & Schels, 2020; Authors own, 2014; Ratschinski, 2000). Previous research suggests that gender segregation in education is partly caused by a comparative advantage of male students in maths and female students in languages. Consequently, it is rational for boys to aspire to occupations that require maths skills. Girls correspondingly aspire to occupations with enhanced language requirements because they perceive themselves stronger in languages than in maths (Correll, 2001; Kleinert & Schels, 2020; Lörz, Schindler, & Walter, 2011; Skaalvik & Skaalvik, 2004). We therefore control for parental education and comparative advantage in our model.

Data

Our analyses are based on the adolescent cohort of the Swiss Longitudinal Survey of Children and Youth (COCON), which is representative for the German- and French-speaking parts of Switzerland.[v] They were born between 1 September 1990 and 30 April 1991 and interviewed in 2006 (T1, N = 1257), 2007 (T2; N = 1162), 2009 (T3; N = 952) and 2012 (T4; N 816) through computer-assisted personal interviews.[vi] The data includes information on respondents' educational and occupational pathways, the development of individual competencies and aspirations, socialisation contexts, and social background. Individuals who did not make the transition to upper-secondary education until the age of 18 (N = 54) were excluded from the analysis.[vii]

We assessed panel attrition by comparing participants and nonparticipants of the first and the fourth wave with respect to the variables included in the model. Based on Chi-square and t-tests, we found that attrition was higher among male participants from upper-secondary tracks with low requirements and baccalaureate schools, with lower cognitive abilities, higher career orientation and with parents without tertiary education. Among women, only women with lower cognitive abilities showed higher attrition (see Table 1). In order to rule out a sample bias, we applied multiple imputation (see Allison, 2001; Asendorpf, van de Schoot, Denissen, & Hutteman, 2014; Ferro, 2014; Graham, 2009) and compared the analyses with and without

imputed data. However, since the main effects of the two analyses did not differ, the final results are based on non-imputed data.[viii]

[About here: Table 1: Analysis of sample attrition]

Measures

The dependent variable for gender-typical aspirations captures the gender concentration in the occupation aspired to. In the model for women, it measures the proportion of female workers in the occupation aspired to, and in the models for men the proportion of male workers. Respondents were asked in each survey wave which occupation they would like to train for if they could freely choose. The information was coded according to the eight-digit code of the Swiss Standard Classification of Occupations 2000 (see Meier, 2003). We linked this code with Structural Survey data capturing the proportion of men and women per occupation. In order to take into account the on average rather minor changes in occupational gender segregation during the observation span,[ix] we use data from the Structural Survey of 2010 for the first three data waves (2006, 2007, 2009) and data from the Structural Survey of 2012 for the last survey wave (2012).[x]

Year has proportional values ranging from 0 to 6, whereby 0 captures the first survey wave, 1 the second, 3 the third, and 6 the fourth. Year is also used to capture the random slope.

The variable for upper-secondary track captures the first track of upper-secondary education that a respondent has enrolled in after compulsory school. We distinguish three categories: IVET with low or medium academic requirements (IVET-), IVET with high academic requirements (IVET+), and academic baccalaureate programmes. Adolescents completing a vocational baccalaureate and those in specialised schools are included in the IVET+ category. The distinction between the academic requirements of IVET programmes is based on Stalder's (2011) expert rating (level 1–4 for low and medium, level 5–6 for high academic requirements).

The career orientation variable is time dependent and captures the importance of career opportunities vis-à-vis intrinsic and altruistic job values at the time of the surveys. It uses a scale from 0 (no importance) to 10 (extremely important).

We control for parental education, comparative advantage, and basic cognitive abilities.[xi] Parents' highest educational level distinguishes families in which at least one of the parents has tertiary-level education (1) from those in which both parents have secondary-level education

or lower (0).[xii] The comparative advantage was calculated as the difference between grades in mathematics and the local language, German or French (range 1 to 6, with 6 being the highest grade: see Jonsson, 1999, p. 397). The basic cognitive abilities indicator (values 0 to 6) is based on the short version of a non-verbal basic intelligence test (CFT 1, Cattell, Weiss, & Osterland, 1977). We centred the variables for comparative advantage and basic cognitive abilities. All control variables were measured at the age of 15. Descriptive statistics for all variables are shown in Table 2.

[About here: Table 2: Descriptive statistics]

Analytical strategy

We estimated linear multilevel models (random coefficient models) with a repeated-measures study design[xiii] (e.g. Rabe-Hesketh & Skrondal, 2012) to estimate the impact of various determinants on the dependent variable. The sample was 'unbalanced', with different numbers of individuals per time points (Hoffman, 2015). Time-variant observations (i.e., aspirations and career orientation at each time point) were treated as nested within the individual. This acknowledges that the individual-specific model residuals are correlated (Hoffman, 2015). Development differences between individuals were estimated by adding a random slope for time to the models (see Macmillan & Furstenberg, 2016),[xiv] which were estimated separately for men and women. The models for women are based on 538 individuals and an average of 3.3 time points per person, thus including a total of 1801 observations. The models for men are based on 465 individuals and 3.2 time points per person, thus including 1490 observations.

To estimate the development of gender-typical occupational aspirations for each upper-secondary education track over time, we added interaction terms of upper-secondary education and year (e.g. Macmillan & Furstenberg, 2016; Rabe-Hesketh & Skrondal, 2012). We illustrate the results by plotting the predictive margins of gender concentration of occupational aspirations over time and educational type separately for women and men. In linear regression models, the predictive margins are equivalent to the predicted probabilities. They capture the change in the gender-typical aspirations of young people in IVET-, IVET+, and baccalaureate school across time, all else being equal.

The impact of young people's career orientation was estimated by decomposing the time-varying covariate into a within and a between component. Coefficients of the within component

are fixed-effects estimates and capture change within an individual. Coefficients of the between component refer to interindividual differences (see Hoffman, 2015; Hosoya et al., 2014; Schunck, 2013) . We centre time-varying predictors capturing interindividual differences by the group mean across waves and those capturing intraindividual differences by the person-specific mean across waves. The coefficients for interindividual differences thus refer to the expected deviation from the group mean, and those for the intraindividual differences to the expected deviation from the individual mean across time (Allison, 2009). All models are estimated in Stata 15 using the 'mixed' command and a two level-hierarchical structure. We use restricted maximum likelihood estimators (reml) and an unstructured covariance structure. The coefficients in Tables 3 and 4 show beta coefficients that are equivalent to average marginal effects and depict the change in the dependent variable if the independent variable increases or decreases by one unit.

Results

Results for men are presented in Table 3 and for women in Table 4. First, we calculated the random intercept random slope model (RIM; random intercept model including year) and then added the upper-secondary track. Second, we estimated the growth curve models (GCMs) that capture the trajectories of the upper-secondary tracks over time (GCM1, see also Figures 2 & 3) and then added the career values (GCM2). The last model includes the control variables (GCM3).

The RIM showed a negative and statistically significant fixed effect of year for men and women.[xv] Figure 1 visualises the development of gender-typical aspirations over time. For women, the y-axis shows the percentage of women in the occupation aspired to, for men it shows the percentage of men (gender concentration). The results illustrate, firstly, that young men aspired more often to strongly gender-dominated occupations than women. At the age of 15, for example, the average proportion of men in the occupations aspired to was about 72%. Although many young women aspired to female-dominated occupations, the average gender concentration was lower for women than for men. At the age of 15, the average proportion of women in the occupations aspired to amounted to only 62%. Secondly, gender-typical occupational aspirations were most prevalent at the age of 15. The gender concentration of occupational aspirations declined somewhat thereafter, by 2.7 percentage points for men and

3.2 percentage points for women. Although the decline was rather small, it is in line with Hypothesis 1.

[About here: Table 3 & 4: Multilevel models: Determinants of occupational aspirations]

The relationship between upper-secondary track allocation and the development of gendered aspirations is illustrated by the coefficients in Table 3 and 4 and the predictive margins in Figures 2 and 3. The former show that, compared to our reference group of adolescents who entered baccalaureate school, both those in IVET+ and those in IVET- had, on average, significantly more gender-typical aspirations. The positive effect was particularly pronounced for men entering IVET- (GCM1: $\beta = 17.01$, $p < 0.000$). In other words, young men in IVET- aspired to more gender-typical occupations than their counterparts in IVET+, and male adolescents attending the IVET+ track had more gender-typical aspirations than those in the academic baccalaureate track. The average differences between the tracks were much greater for men than for women. Men in IVET- aspired to occupations in which the proportion of men was on average more than 17% higher than in occupations aspired to by men attending baccalaureate school and 13% higher than in occupations aspired to by men in IVET+. The corresponding differences between women in IVET- and baccalaureate school and IVET+ amounted to 11% and 6% respectively. For both genders, the differences between baccalaureate and IVET students remained significant after including the control variables. These findings support Hypotheses 3a and 3b.

[About here: Figures 1 to 3: Development of occupational aspirations]

Young men entering IVET- after compulsory school abandon their strongly gender-typical aspirations significantly after the age of 15 years compared to the reference group in baccalaureate school (GCM3). The annual downwards trend in the proportion of males in the occupations aspired to was on average 1.40 percentage points (GCM3: IVET- β: -1.17 – 0.23= -1.40), amounting in sum to 8.4 percentage points across the observed time span of six years (see also Figure 2).[xvi] However, the interaction IVET+ * year and the effect of year, capturing the development for men in baccalaureate school, are not statistically significant. In line with Hypothesis 4, the gender typicality of young men entering IVET+ thus remained fairly stable between 15 and 21 years of age. The same holds for young men in baccalaureate school.

The results for young women differ from those of men. Figure 3 shows that women reduce their gender-typical aspirations between the ages of 15 and 21. The main effect of year in Table 4 represents the average annual downwards trend for women in baccalaureate school and reaches statistical significance (GCM3: β: -0.73, $p < 0.042$). Consequently, the gender-typical aspirations of women in academic baccalaureate school declined significantly over time. However, the decline is modest and amounts to approximately 4 percentage points over a time span of six years. The interaction effects of year and the two IVET tracks are not statistically significant. Women in IVET thus decreased the gender typicality of their aspirations similar to those in baccalaureate school. Based on the magnitude of the (statistically not significant) interaction coefficients, we conclude that the decline is slightly less pronounced for women in IVET- than for the other two groups. Further analyses with a different reference group (not shown) reveal that the decline is not statistically significant for women in IVET- and significant at the 10% level for women in IVET+.

Model GCM2 in Table 3 and Table 4 includes young people's career orientation. The between coefficient refers to differences between individuals and captures the impact of career orientation on interindividual differences in gender-typical aspirations. The within effect refers to the impact of intraindividual changes in career orientation on the gender concentration of the occupations aspired to with increasing age. The results show that career orientation matters for women but not for men and only partially support Hypothesis 2: young women who value career opportunities aspired on average to occupations with lower proportions of women than their counterparts with lower career orientation (GCM2: β: -4.18, $p < 0.000$). Furthermore, an increase in career orientation across adolescence led to a decrease in gender-typical aspirations (GCM2: β: -2.27, $p < 0.000$).

The results for our control variables showed that young women whose parents had completed a tertiary education had significant lower gender-typical occupational aspirations. The average difference between the two groups is about four percentage points (GCM3: β: -4.03, $p < 0.028$). For men, the effect of parental education did not reach statistical significance. The comparative advantage (difference between maths and language performance) was only significant for men (GCM3: β: 4.59, $p < 0.000$). Men who perform one grade better in maths than in the local language aspired to an occupation in which the gender concentration was on average 5 percentage points higher. Basic cognitive abilities are not related to the gender type of young people's occupational aspirations.

Discussion and conclusions

Our study investigated the relationship between upper-secondary track allocation and the development of the gender-typical occupational aspirations of young men and women between the ages of 15 to 21. The results show, firstly, that the prevalence of gender-typical aspirations differed by gender and upper-secondary track. Young men's aspirations were considerably more gender-typical than young women's, and adolescents bound for IVET, and particularly for programmes with low and medium requirements, had formed considerably more gender-typical aspirations than their counterparts in baccalaureate schools. Secondly, gender-typical occupational aspirations were most pronounced at the age of 15 and declined somewhat thereafter. However, the decline was modest and limited to young women in baccalaureate school and vocational education and training programmes with high requirements and young men who entered IVET with no more than medium academic requirements. The comparatively high stability of gender-typical aspirations is in line with recent research showing that curricular track choice in upper-secondary school strongly determines the choice of study field in higher education (Barone & Assirelli, 2020).

The striking difference at the age of 15 between young people bound for IVET and baccalaureate school supports a social systems perspective (Dannefer, 1992). It is in line with previous research, arguing that young people take the perceived opportunity structure into account when developing their aspirations (see, for example Authors own, 2019; Hirschi & Vondracek, 2009; Tomasik et al., 2009; Authors own, 2017 regarding status aspirations). The perceived options of some IVET learners are defined and curtailed by the strongly gender-segregated accessible IVET programmes. The perceived options of baccalaureate students include a larger proportion of occupations that are less gender-typed. We argue that these differences are reflected in the stronger gender typicality of IVET learners' aspirations, especially of those in the less demanding training occupations.

The slight general decline in the gender typicality of aspirations after the age of 15 is in line with the assumption that with increasing age, gender-typical aspirations become less important for young people's identity formation. However, the fact that the observed changes are most pronounced and significant for young men in IVET-, less pronounced but still significant for female baccalaureate students and women in IVET+ programmes, and not statistically significant for other groups indicates that more complex mechanisms are at work, at least in

tracked and gender-segregated educational systems. The pattern of results suggests that the transition to upper-secondary school triggers an adaptation and attenuation of gendered career goals only under certain conditions. These may include a lack of career opportunities provided by early aspirations (see England, 2010) or abundant opportunities for easy and free occupational reorientation. Although we are unable to test these two mechanisms directly with our data, our results lend support to both postulated mechanisms.

The decline of gender-typical occupational aspirations in female academic baccalaureate holders and women in IVET+ programmes is in line with the hypothesis that gender-typical aspirations decline with increasing age because young people's identity stabilises and they become less susceptible to pressure from their social environment to conform to gender-role expectations. However, this mechanism may only have an impact on aspirations if young women have ample leeway for change, as is the case for baccalaureate holders, who are able to put off occupational decisions until the age of 18 or 19 (Authors own, 2017). Female IVET diploma holders from academically demanding programmes also have some opportunities for change due to their extended options for tertiary-level training (Authors own, 2020). The decline of gender-typical aspirations in this group may be strengthened by a growing awareness that many female-dominated occupations offer lower pay and limited opportunities for advancement. This interpretation is in line with findings from Italy showing that female baccalaureate students who learned about occupational prospects changed their gender-typical aspirations towards less gender-typed fields of study (Barone, Schizzerotto, Assirelli, & Abbiati, 2019).

The significance of perceived career opportunities is supported by the finding that women with a high career orientation develop less gender-typical aspirations than those who value career opportunities less highly. Furthermore, an increase in career orientation between 15 and 21 years leads to a decrease in female-typical aspirations. Secondly, the differences observed between educational tracks are in line with England's (2010) argument that gendered aspirations are abandoned if they curtail occupational advancement. This holds particularly for the group of young men who entered initial education and training with low or medium academic requirements. Their gender-typical aspirations are most pronounced at the age of 15, when the majority aspires to occupations almost exclusively chosen by men. From this high level of gender typicality, they show the steepest decline thereafter. The majority of this group aspires to and trains in strongly male-dominated manufacturing and trade occupations that

offer limited access to higher education and employment only in the declining manufacturing sector (e.g. Authors own, 2016; Flückiger & Falter, 2004). Consequently, their opportunities for status improvement are limited in male-dominated occupations to which they have access. Moreover, an orientation towards service sector occupations, which are often not as strongly dominated by one gender and thus less gender-typed, may reduce the danger of becoming unemployed and offer better employment prospects, rewards, and possibilities for upward mobility. After the transition to IVET, young people gain work experience and learn about their options for further training and advancement in their training occupations (Beal & Crockett, 2010; Gottfredson & Lapan, 1997). This is likely to trigger aspirational adaptation processes, as Heckhausen (2002) also argued, and, in the case of young men training in low and medium requirement occupations, a shift towards less gender-typed occupational aspirations.

Men entering the baccalaureate track or IVET+ and women in general have fewer incentives to change their gender-typical occupational aspirations. For men, both tracks offer good opportunities in male-dominated occupations and access to fairly high-status service sector jobs. Men in IVET+ have easy access to universities of applied sciences and good opportunities for career advancement and further training in their chosen fields. They can therefore maintain or even increase their status within their chosen occupational fields. The same holds for women, who profited from the expansion of the service sector and the growth in female-dominated job opportunities (Charles, 2004). Irrespective of their school track, young women are not forced to change their gendered occupational aspirations to improve their occupational status. Given the high costs of changing the occupational field once chosen, it can be rational for young women in IVET to adhere to their aspirations.

Despite several strengths, this study has some limitations. First, and despite the longitudinal character of our data, we cannot determine causality with complete certainty. Aspirations might influence the choice of upper-secondary track rather than vice versa. However, bearing in mind that upper-secondary track allocation is strongly determined by lower-secondary track placement at the age of 12 and by school performance, it is unlikely that reverse causality plays a major role. Second, we are unable to directly test the adaptation mechanisms proposed. Further research is needed to corroborate the validity of our assumptions. Given the complex interplay proposed between the structure of the educational system, labour market opportunities, status improvement considerations, and individual values and interests, a qualitative research design may provide useful further insights.

From a theoretical perspective, the pattern of results implies that the formation and development of gendered aspirations is the result of an interplay between identity formation, the perceived opportunity structure, and status improvement considerations. In line with England's (2010) assumption that gender boundaries are crossed only if gender-typical occupational options do not allow status improvement, we observe a high stability of gender-typical aspirations between adolescence and early adulthood. In the differentiated and stratified Swiss upper-secondary system, which strongly determines future occupational options, the upper-secondary track plays a pivotal role in shaping the level and further development of young people's gender-typical aspirations. The strong vocational orientation of a large part of the upper-secondary system channels and curtails adolescents' aspirations from an early age and renders changes costly.

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[i] 90% of the students entering IVET complete a regular three- or four-year programme. A minority of 10% enter a short two-year programme (State Secretariat for Education, Research and Innovation [SERI], 2017). The latter neither allow access to vocational baccalaureate programmes nor to tertiary education.

[ii] Our own (unpublished) analyses based on Swiss Census data confirm that on average training occupations with high academic requirements are less segregated than those with low requirements and employ more equal numbers of men and women.

[iii] See https://www.bfs.admin.ch/bfs/de/home/statistiken/bildung-wissenschaft/bildungsabschluesse/sekundarstufe-II/berufliche-grundbildung.assetdetail.12307128.html (last access 13 August 2020).

[iv] The reluctance of employers to offer apprenticeship positions for male-dominated occupations to young women contributes to the strong gender-segregation of some IVET programmes (Authors own, 2013).

[v] 131 municipalities were selected in a two-stage process, divided by municipality type and size. The young people living in these municipalities were randomly sampled based on the official residence register.

[vi] In 2007, the data were collected using a computer assisted telephone interview.

[vii] Only few young people never enter upper-secondary education in Switzerland. Most of those who remain without an upper-secondary credential (about 10%) dropped out of vocational education and training or failed the final upper-secondary exams (Buchmann, 2013).

[viii] Models based on imputed data are available on request.

[ix] Data on the occupational gender composition during the observation span is available for the years 2000 (full census), 2010, 2011 and 2012 (representative population samples). A comparison of the data shows that the occupational gender composition has remained fairly stable across the observed years. Exceptions are a handful of service sector occupations requiring tertiary-level qualifications. These include medical and veterinary doctors, architects, psychologists or marketing specialists. In these occupations, the proportion of women has risen between 2000 and 2010 by more than 10%.

[x] See https://www.bfs.admin.ch/bfs/en/home/statistics/population/surveys/census.html for more information on the Structural Surveys (last access 21 August 2020). In order to test the robustness of our dependent variable and our models we estimated them separately based on the occupational gender composition of the years 2000, 2010 and 2012 as well as on data considering only the workforce up to 35 years of age. The pattern of results remained very similar irrespective of the data used.

[xi] We also tested whether the academic requirement level of the lower-secondary track matters. We omitted the variable from the final model due to its lacking statistical significance.

[xii] We tested a number of different options for parental education. However, the findings indicated that the distinction between parents with and without tertiary-level education is most relevant in order to explain adolescents' occupational aspirations.

[xiii] The intra-class correlation coefficient of our random intercept random slope model revealed variance between and within individuals (men 51% and women 54% of the explained variation is due to differences between individuals; about 49% respectively 46% is due to differences within individuals). This indicated that a that a multilevel model is appropriate (Hoffman, 2015; Hosoya, Koch, & Eid, 2014).

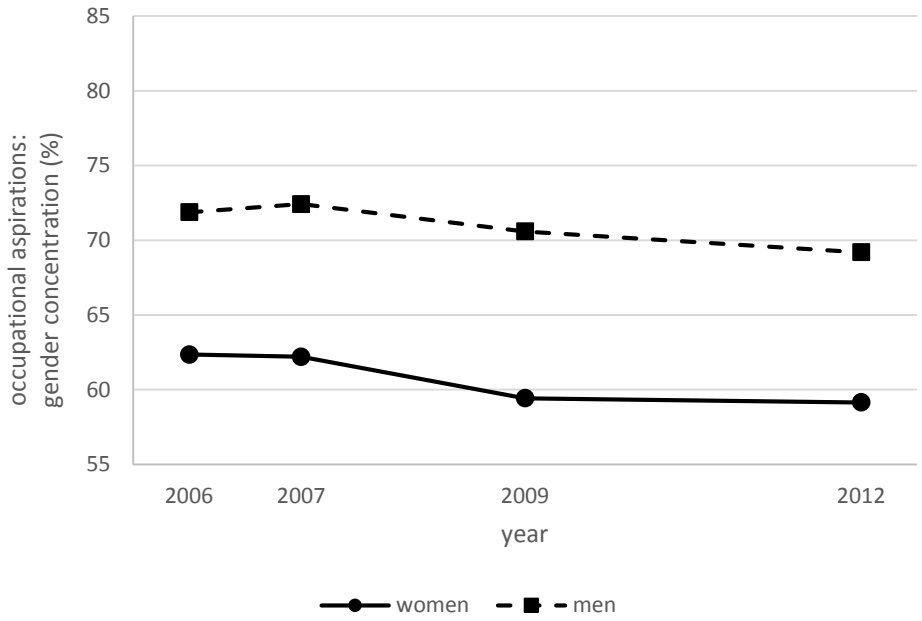
[xiv] We conducted a likelihood ratio test to examine whether there is a statistically significant improvement by including a random slope for time. The test result was significant (LR women $\chi 2 = 18.56$, $p = .000$; LR men $\chi 2$

=25.70, p = .000), indicating that a random slope model represents our data more accurately (e.g. Hoffman, 2015; Rabe-Hesketh & Skrondal, 2012).

[xv] The error variance of the random slope and the random intercept were significant at the 5% level. Thus, the effects between time points and between individuals differed significantly.

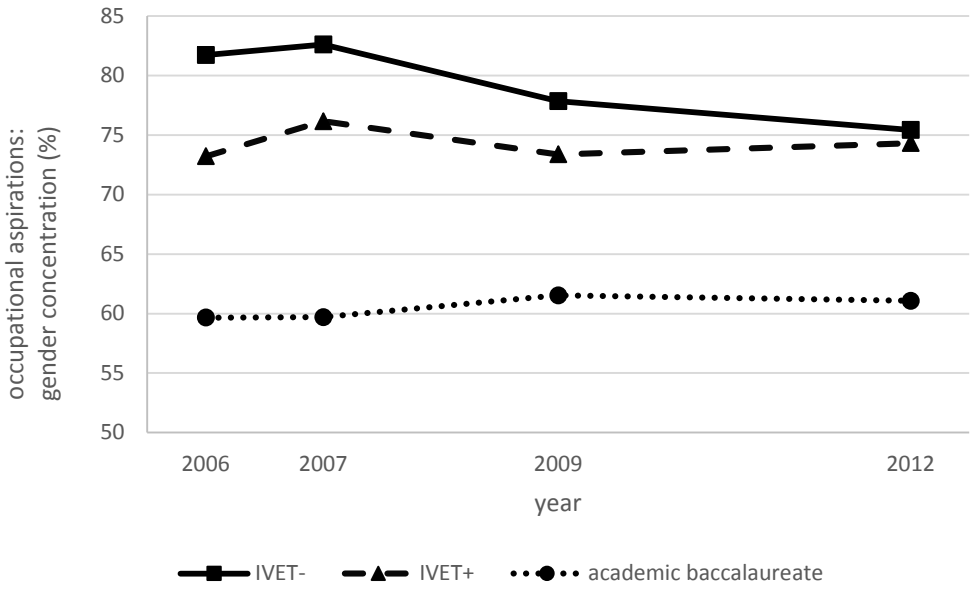
[xvi] For the interpretation of the interaction effect, one has to sum up the main effect plus the respective interaction effect.

Figure 1: Development of gender-typical occupational aspirations over time



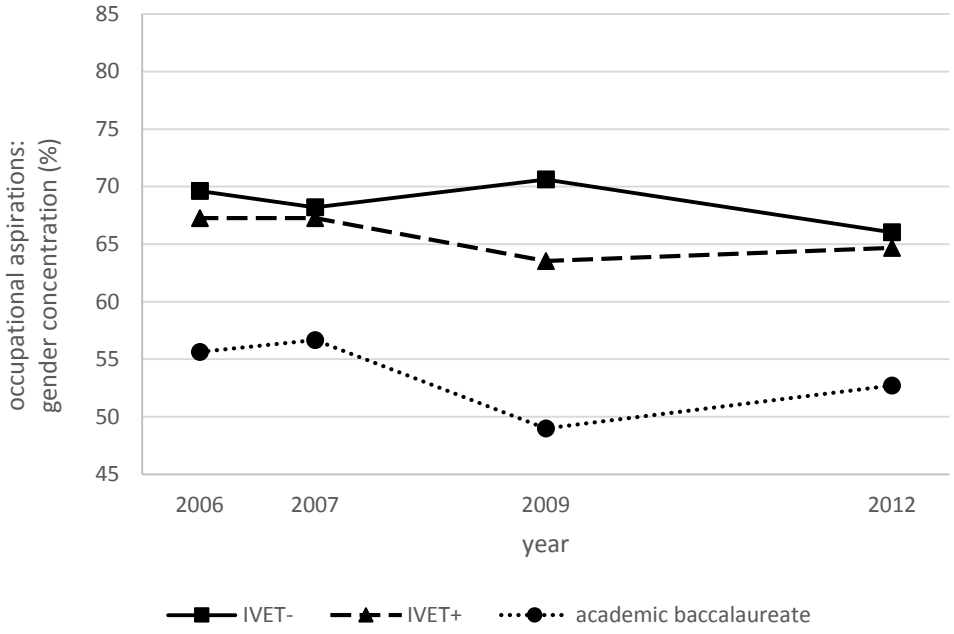
Source: Cocon data, predictive margins based on model GCM3

Figure 2: Development of men's gender-typical occupational aspirations by upper-secondary track



Source: Cocon data, predictive margins based on model GCM3

Figure 3: Development of women's gender-typical occupational aspirations by upper-secondary track



Source: Cocon data, predictive margins based on model GCM3

Tables and Figures

Table 1: Analysis of sample attrition: Comparison of participants and non-participants of the 4th wave

Variables - men	n	df	Chi-Square	p-value
Upper-secondary track				
IVET with low or medium academic requirements	486	1	5.557	0.018
IVET with high academic requirements/specialised schools	486	1	0.128	0.721
Academic baccalaureate	486	1	4.919	0.027
Parents with tertiary education (ref. sec. education or lower)	551	1	7.211	0.007

	n	df	t-test	p-value
Occupational aspirations: gender concentration (%)	525	523	-0.184	0.854
Career orientation	555	553	-1.995	0.047
Comparative advantage	535	533	1.355	0.176
Basic cognitive abilities	555	553	2.143	0.033

Variables - women	n	df	Chi-Square	p-value
Upper-secondary track				
IVET with low or medium academic requirements	552	1	2.298	0.130
IVET with high academic requirements/specialised schools	552	1	0.843	0.359
Academic baccalaureate	552	1	0.338	0.561
Parents with tertiary education (ref. sec. education or lower)	639	1	0.716	0.397

	n	df	t-test	p-value
Occupational aspirations: gender concentration (%)	608	606	-0.438	0.661
Career orientation	645	643	-1.352	0.177
Comparative advantage	637	635	-0.479	0.632
Basic cognitive abilities	648	646	3.026	0.003

Table 2: Descriptive statistics

men

	N	Missings	Mean	Std. Dev.	Min	Max
Time-variant variables						
Occupational aspirations: gender concentration (%)						
Occupational aspirations - wave1	525	30	71.96	24.09	11.12	100.00
Occupational aspirations - wave2	475	80	73.07	23.07	9.11	100.00
Occupational aspirations - wave3	359	196	70.82	22.04	12.15	100.00
Occupational aspirations - wave4	293	262	68.44	24.41	2.05	100.00
Career orientation						
Career orientation - wave 1	555	0	3.58	1.28	0	8
Career orientation - wave 2	555	0	3.58	1.28	0	8
Career orientation - wave 3	405	150	3.30	1.33	0	10
Career orientation - wave 4	351	204	3.04	1.27	0	10
Time-invariant variables						
Upper-secondary track						
IVET with low or medium academic requirements	486	69	0.44	0.50	0	1
IVET with high academic requirements/specialised schools	486	69	0.26	0.44	0	1
Academic baccalaureate track	486	69	0.30	0.46	0	1
Time-invariant control variables						
Parents with tertiary education (ref. sec. edu. or lower)	551	4	0.31	0.46	0	1
Comparative advantage	535	20	0.09	0.72	-2.5	2.5
Basic cognitive abilities	555	0	3.29	1.49	0	6

women

	N	Missings	Mean	Std. Dev.	Min	Max
Time-variant variables						
Occupational aspirations: gender concentration (%)						
Occupational aspirations - wave1	608	40	62.34	25.43	0.00	100.00
Occupational aspirations - wave2	541	107	62.78	25.50	0.45	100.00
Occupational aspirations - wave3	458	190	59.40	24.62	0.68	99.94
Occupational aspirations - wave4	361	287	59.46	23.47	1.22	100.00
Career orientation						
Career orientation - wave 1	645	3	2.72	1.20	0	8
Career orientation - wave 2	645	3	2.72	1.20	0	8
Career orientation - wave 3	496	152	2.62	1.15	0	7
Career orientation - wave 4	418	230	2.43	1.08	0	6
Time-invariant variables						
Upper-secondary track						
IVET with low or medium academic requirements	552	96	0.32	0.47	0	1
IVET with high academic requirements/specialised schools	552	96	0.30	0.46	0	1
Academic baccalaureate	552	96	0.38	0.49	0	1
Time-invariant control variables						
Parents with tertiary education (ref. sec. edu. or lower)	639	9	0.28	0.45	0	1
Comparative advantage	637	11	-0.29	0.72	-3	2
Basic cognitive abilities	648	0	3.35	1.44	0	6

Table 3: Multilevel models predicting the level and the development of gender-typical occupational aspirations of men

	RIM			GCM 1			GCM 2			GCM3		
	B		SE	B		SE	B		SE	B		SE
Fixed part												
Year	-0.62	*	0.25	-0.26		0.44	-0.21		0.44	-0.23		0.44
Upper-secondary track (academic baccalaureate)												
IVET with low or medium academic requirements				17.01	***	2.17	16.96	***	2.19	17.80	***	2.33
IVET with high academic requirements/specialised schools				3.26		2.43	3.08		2.46	2.82		2.49
Interaction upper-sec. track and year												
IVET with low or medium academic requirements				-1.17	*	0.59	-1.18	*	0.59	-1.17	*	0.59
IVET with high academic requirements/specialised schools				0.69		0.64	0.71		0.64	0.73		0.64
Career orientation												
Between-effect (interindividual)							0.26		0.80	0.09		0.79
Within-effect (intraindividual)							0.66		0.58	0.65		0.58
Parental education (ref. secondary education or lower)										1.36		1.79
Comparative Advantage										4.59	***	1.08
Basic cognitive abilities										0.07		0.53
Intercept	72.54	***	0.98	64.20	***	1.68	63.28	***	3.01	1.36	***	3.23
Random part												
sd (year)	2.80		0.33	2.71		0.34	2.69		0.34	2.70		0.34
sd (_cons)	16.62		0.90	14.75		0.89	14.76		0.89	14.61		0.90
corr (year, _cons)	-0.42		0.09	-0.36		0.10	-0.36		0.10	-0.41		0.10
sd (Residual)	16.23		0.43	16.23		0.43	16.24		0.43	16.25		0.43

Number of groups: 465 Number of observations: 1490 *Source: Own calculations based on COCON data.*

*Notes: ***p<0.001. **p<0.01. *p<0.05. +p<0.10. RIM = Random Intercept Random Slope Model; GCM = Growth Curve Model.*

Table 4: Multilevel models predicting the level and the development of gender-typical occupational aspirations of women

	RIM			GCM 1			GCM 2			GCM3		
	B		SE	B		SE	B		SE	B		SE
Fixed part												
Year	-0.54	*	0.22	-0.62	+	0.36	-0.72	*	0.36	-0.73	*	0.36
Upper-sec. track (academic baccalaureate)												
IVET with low or medium academic requirements				10.74	***	2.37	12.52	***	2.37	10.81	***	2.48
IVET with high academic requirements/specialised schools				6.08	*	2.40	7.83	**	2.39	6.91	**	2.41
Interaction upper-sec. track and year												
IVET with low or medium academic requirements				0.24		0.54	0.31		0.54	0.32		0.54
IVET with high academic requirements/specialised schools				0.11		0.54	0.02		0.54	0.03		0.54
Career orientation												
Between-effect (interindividual)							-4.18	***	0.88	-4.15	***	0.88
Within-effect (intraindividual)							-2.27	***	0.62	-2.27	***	0.62
Parental education (ref. secondary education or lower)										-4.03	*	1.84
Comparative Advantage										0.14		1.11
Basic cognitive abilities										-0.57		0.60
Intercept	62.06	***	1.00	56.72	***	1.62	66.80	***	2.62	68.83	***	2.77
Random part												
sd (year)	2.34		0.35	2.40		0.34	2.40		0.34	2.39		0.34
sd (_cons)	18.70		0.89	18.25		0.89	17.83		0.88	17.72		0.88
corr (year, _cons)	-0.49		0.08	-0.51		0.08	-0.51		0.08	-0.51		0.08
sd (Residual)	17.28		0.41	17.27		0.41	17.17		0.41	17.18		0.41

Number of groups: 538 Number of observations: 1801 *Source: Own calculations based on COCON data.*

*Notes: ***p<0.001. **p<0.01. *p<0.05. +p<0.10. RIM = Random Intercept Random Slope Model; GCM = Growth Curve Model.*