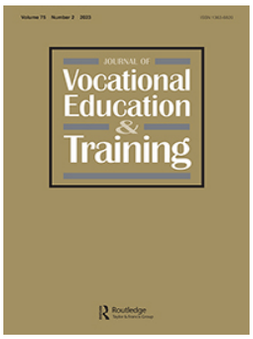

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# Why do they leave? Examining dropout behaviour in gender-atypical vocational education and training in Germany

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**ABSTRACT**

Germany's VET system is highly gender-segregated and marked by high dropout rates. This article investigates the dropout behaviour of apprentices in gender-atypical training occupations. First, we investigate whether gender-atypical apprentices drop out at a higher rate than their majority peers. Second, we examine differences in the self-reported reasons for dropping out among gender-typical and gender-atypical apprentices. Results show that gender-atypical apprentices, and particularly males in female-dominated occupations, are more likely to prematurely leave their apprenticeship. The self-reported reasons for dropping out differed by gender minority status: female minorities were more likely to drop out due to a lack of social integration, while male minorities were more likely to drop out due to unfulfilled aspirations in comparison to the gender majority. These results show that gender-specific perceptions and experiences are related to the higher dropout rates of gender-atypical apprentices.

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Gender segregation; vocational education and training; dropout; gender-atypical occupations; career aspiration

## Introduction

Horizontal occupational gender segregation is a persistent feature of many labour markets (Heiniger and Imdorf 2018; Levanon and Grusky 2016; Smyth 2005). Women are over-represented in service, health and care occupations, while men more frequently choose technical and manual occupations, and Germany is no exception (Hillmert 2015). International research has shown that horizontal occupational segregation is one of the main causes of both the gender wage gap (e.g. Grønning, Kriesi, and Sacchi 2020; Leuze and Strauß 2016) and women's lower career advancement (e.g. Granato 2017; Malin and

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Wise 2018). Therefore, from a social inequality perspective, it is crucial to uncover the processes that lead to gender-segregated labour markets.

Horizontal gender segregation can be conceptualised as the result of both gendered career choices and gendered dropout behaviour. First, gendered career choices have been explained by gender-stereotypical socialisation processes leading to gendered vocational interests, work values, and ability perceptions (e.g. Busch-Heizmann 2015; Correll 2004). Second, apprentices in gender-atypical training occupations dropping out at a higher rate than those in gender-typical occupations further reproduces gender segregation in the labour market. Previous empirical research has shown that those who enter gender-atypical fields have higher rates of job mobility (e.g. Torre 2017, 2014; Jacobs 1989) and more frequently drop out of VET (e.g. Haverkamp and Runst 2015; Rohrbach-Schmidt and Uhly 2015) and higher education (e.g. Mastekaasa and Smeby 2008; Meyer and Strauß 2019). This study focuses on the minority of young people who enter gender-atypical apprenticeships, thus providing additional evidence of how gender segregation is reproduced in the early career.[1]

Thus far, it remains largely unknown *why* gender-atypical apprentices leave their apprenticeship and what gender-specific experiences they have that lead them to drop out. Theories of gendered work experiences suggest that apprentices in gender-atypical occupations have more harmful social and professional experiences than those in gender-typical occupations (England 2010; Kanter 1977). Furthermore, gender-atypical career choices may result from structural barriers in the local labour market, leading to an imperfect match between apprentice and occupation (Sousa-Poza and Henneberger 2004; Torre 2018). Apprentices entering gender-atypical occupations may therefore be more likely to leave their apprenticeship due to their gender-specific perceptions and experiences.[2]

This article examines four theoretical mechanisms of gendered decisions to drop out: First, women in male-dominated occupations are expected to drop out more often than their male counterparts due to lower levels of social integration, a mechanism rooted in theories of gendered workplace experiences (Acker 2006). Second, based on the theory of gender stereotype threat (Steele 1997), women in male-dominated may experience greater professional difficulties than their male peers. Third, theories of gendered career preferences suggest that men in female-dominated occupations drop out primarily because they are dissatisfied with the monetary returns (Jonsson 1999). Fourth, both male and female gender minorities may drop out due to unfulfilled career

[1] The number of recognized apprenticeships (training occupations) is regulated by the Vocational Training Act (BBiG). In 2010, the dual system comprised 348 training occupations. This number reduced to 324 occupations in 2019 (Federal Institute for Vocational Education and Training, 2020).

[2] The reverse argument can be applied to women in male-dominated occupations. Accordingly, they may be more likely to drop out because their occupation is not compatible with their gender-normative preferences for work-family reconciliation. However, since this reason for dropping out is not covered by the data at hand, this hypothesis cannot be empirically tested and was therefore not included.

aspirations, an expectation based on the conceptualisation of career choice as a matching process under a lack of information and labour market constraints (Heckhausen and Tomasik 2002; Tomasik et al. 2009).

Understanding why members of the under-represented gender leave their training occupation prematurely will provide a more comprehensive understanding of gendered attrition processes and thus guidance for developing effective policies to retain both men and women in gender-atypical occupations. To address this research gap, this article examines i) whether gender-atypical apprentices leave their training occupation more frequently than their gender-typical peers, and ii) whether gender majorities and gender minorities differ in their self-reported reasons for dropping out.

Using longitudinal representative survey data on 7,028 apprentices from the German National Educational Panel Study (NEPS), which provides information on the reasons apprentices cite for dropping out, this article focuses on the persistence of gender minorities in their first-chosen apprenticeship. Given that i) the German labour market is characterised by a high and persistent degree of gender segregation in international comparison (Protsch and Solga 2016), and that ii) half of the population in Germany enters the VET system at some point in their lives (Federal Institute of Vocational Education and Training 2020), we use the German VET system as a case study to analyse dropout patterns of gender-atypical apprentices.

## The German Vocational Education and Training (VET) system

In Germany, students can enter a vocational training programme after graduating from secondary school (Protsch and Solga 2016). The VET system is divided into a dual (or company-based) track and a school-based track. In the dual system, apprentices enter into an employment contract with a company and become part of the labour force. Apprenticeship training takes place both in the host company and in vocational schools. The dual system provides training in over 320 recognised occupations.[1] In the school-based system, apprentices attend full-time school-based vocational training in sectors such as health, social work and education. In contrast to the dual system, apprentices in the school-based system are not employed by a company and therefore do not receive a salary. In 2019, around 43% of apprentices attended the school-based track (Federal Institute of Vocational Education and Training 2020)

Apprenticeship programmes last between 2 and 3.5 years, after which students can take up a qualified occupation. Through apprenticeship, students attain highly delineated, occupation-specific and nationally recognised VET certificates that are closely linked to the labour market. Changes in occupation are therefore most easily realised during VET rather than at later stages of one's occupational career. High attrition rates in the VET system of around 25% underline the fact that attrition processes are a common strategy to correct

undesirable choices early in the occupational career (Beicht and Walden 2013). The majority of these dissolutions represent stopouts, i.e. dropouts entered another VET programme but did not leave the VET system completely (e.g. Holtmann and Solga 2023).

Moreover, the German apprenticeship market is strongly segregated by gender. Using administrative data covering the dual track of the German VET system, Rohrbach-Schmidt and Uhly (2015) have shown that apprentices in gender-atypical training have a higher risk of dropping out than those in gender-typical occupations. Based on the same data, Kroll (2021) finds that this difference is only visible for men in female-dominated occupations.

## Theoretical framework

### *Dropping out of gender-atypical apprenticeships*

Although men and women who enter gender-atypical apprenticeships have already overcome barriers to these non-normative choices – and may therefore differ from their opposite-sex peers in terms of skills, interests or motivation – apprentices' gendered workplace experiences may still pose a threat to their persistence. Following tokenism theory (Kanter 1977), the proportional gender composition of an occupation shapes employees' workplace experiences: the numerical minority ('token') experiences greater visibility than the numerical majority ('dominants'), so that gender becomes a salient social category. As a result, the minority often experiences performance pressure and social exclusion in their workplace interactions. Empirical studies have documented such gendered attrition processes for professional careers (Torre 2014, 2017, 2018) and within higher education (Mastekaasa and Smeby 2008; Meyer and Strauß 2019).

### *Empirical evidence on women in male-dominated occupations*

Acker's (2006) theory of gendered organisations argues that male-dominated occupations are marked by a specific organisational culture, which disadvantages women via social interactions, hostile working climates and male-typed occupational identities. Empirical research indicates that women in the United States show higher attrition rates from male-dominated occupations over their life course (Torre 2017, 2014; Jacobs 1989). Based on semi-structured interviews, Makarova, Aeschlimann, and Herzog (2016) further found that female apprentices in Switzerland often feel they are the 'wrong sex' in male-dominated occupations. Another theoretical mechanism of why women leave male-dominated occupations at a higher rate has been attributed to reconciling work and motherhood (Cha 2013; Madsen, Brekke, and Fekjær 2021). However, since apprentices enter VET at an average age of 19.7 (Federal Institute of Vocational Education and Training 2020), difficulties in reconciling work and family might be less salient at this early career stage.

### *Empirical evidence on men in female-dominated occupations*

Regarding the pathways of men who enter female-dominated occupations, the 'glass escalator' metaphor has been evoked to describe the phenomenon that males are usually treated favourably and more often proceed along the promotional ladder in these occupations (Williams 1992). According to this view, men anticipate the promotional advantages associated with a career in female-dominated occupations, making them less likely to change occupations (for supportive evidence see Hultin 2003; Malin and Wise 2018). Contrary to this view, recent evidence suggests that this male advantage cannot be generalised, but is limited to certain occupations and individuals (Snyder and Green 2008; Williams 2015). For example, Torre (2018) found that men in the U.S exit female-dominated occupations more frequently than women and that this was more pronounced in low-status jobs, which she explains by the fact that low-status occupations are more stigmatising to men's identity. Since the present study is based on the VET system, which overwhelmingly provides access to lower-status occupations (which do not require a higher education degree), one can assume that the 'glass escalator' phenomenon is less relevant here. Rather, a higher attrition from female-dominated occupations due to men's minority status can be assumed. Qualitative research supports this argument, showing that men in care professions struggle with traditional masculine identities and gender stereotyping (Ajith 2020; Clow, Ricciardelli, and Bartfay 2015).

Based on the theoretical arguments of gendered work experiences and the existing empirical evidence generally lending support to this view, it is expected that men and women in gender-atypical apprenticeships are more likely to drop out than the gender majority:

**H1a (female minority dropout behaviour):** Female apprentices in male-dominated occupations drop out more frequently than their male peers.

**H1b (male minority dropout behaviour):** Male apprentices in female-dominated occupations drop out more frequently than their female peers.

### *Gender-specific reasons for dropping out of gender-atypical apprenticeships*

The self-reported reasons why apprentices drop out are manifold, ranging from social conflicts, the difficulty and quality of training, to a choice of occupation that does not match apprentices' aspirations (Beicht and Walden 2013; Böhn and Deutscher 2022). These reasons may be structured by apprentices' gender minority status, such that apprentices of the minority gender more likely drop out due to specific reasons invoked by their gender-specific workplace perceptions and experiences. Furthermore,

some of these processes may be specifically relevant to females in male-dominated occupations or males in female-dominated occupations.

### *Social integration*

Tinto's framework of student retention (Tinto 1975) describes students' integration with peer and faculty as a central aspect of the dropout process. Empirical research confirms that social integration is an important predictor of continuing in or dropping out of an educational or occupational field (Elffers, Oort, and Karsten 2012; Piepenburg and Beckmann 2022). A lack of social integration may be particularly relevant for apprentices in gender-atypical occupations. Given the preference for gender homophily in friendship formation (Miller, Smith-Lovin, and Cook 2001), women and men who work in occupations which are dominated by the opposite gender generally have fewer opportunities to establish emotional bonds. Consequently, the minority gender may experience feelings of alienation and social isolation (e.g. Makarova, Aeschlimann, and Herzog 2016).

Although both genders may therefore have a higher risk of dropping out due to a lack of social integration, there are reasons to expect that this is primarily the case for women in male-dominated occupations. First, men are less sensitive to a lack of social integration because they generally place a lower value on being socially integrated (Budig 2002). Second, devaluation theory suggests that as soon as females enter male occupations, the social status of these occupations sinks (England 2010; Levanon, England, and Allison 2009). Consequently, men seek to protect their dominant position, which results in hostile and exclusionary practices towards women (Acker 2006). This theoretical expectation also relates to the 'chilly climate' metaphor that has been evoked to describe exclusionary and discriminatory workplace experiences of women in male-dominated fields (Hall and Sandler 1982; Lee and Mccabe 2021). Empirical evidence indicates that women in male-dominated occupations are confronted with a less supportive work environment (Busch 2013; Taylor 2010) and experience more harassment (Dresden et al. 2017).

**Hypothesis 2 (social integration):** Female apprentices in male-dominated occupations have a higher probability of dropping out due to a lack of social integration in comparison to their male peers.

### *Professional difficulties*

According to Tinto (1975), academic integration is another key aspect of decisions to drop out of educational programmes. In the context of apprenticeships,

experiencing such 'professional difficulties' in acquiring occupation-specific skills and competencies might be connected to apprentices' gender minority status. This expectation is based on stereotype threat theory (Steele 1997), which predicts that the salience of gender stereotypes leads to lower confidence and achievement on tasks that are not congruent with one's own gender. As such, men and women in gender-atypical work environments experience unconscious treatment or messages priming stereotypes of men's and women's natural abilities and competencies (Hadjar and Aeschlimann 2015; He et al. 2019). The findings from Hofmann, Ramseier, and Neuenschwander (2022) that gender-atypical apprentices display lower levels of occupational self-efficacy support this view.

Previous research has shown that females underestimate their performance in male-typed tasks while men are generally more confident (Correll 2001). As such, professional difficulties are likely more conducive to females' attrition from male-dominated occupations (than to that of male apprentices from female-dominated occupations). Moreover, employers tend to devalue the performance of females compared to male workers, especially on male-typed tasks (Cohen and Huffman 2003; Leuze and Strauß 2016). Employers give women less credit for their performance and apply higher standards when evaluating them (Heilman 2001; Quadlin 2018). Consequently, women may perceive themselves as less capable of completing the tasks required of them during their apprenticeship. According to this line of argument, an increased risk of dropping out due to professional difficulties will be especially marked for female apprentices in male-dominated occupations.

**Hypothesis 3 (professional difficulties):** Female apprentices in male-dominated occupations have a higher probability of dropping out due to perceived professional difficulties in comparison to their male peers.

### *Monetary returns*

Rational choice theory predicts that people make educational and career choices based on cost-benefit evaluations (Breen and Goldthorpe 1997). Because of their gender-stereotypical socialisation, it can be assumed that men and women employ different benefit criteria (Jonsson 1999), with men anticipating their role as a breadwinner and thus placing greater emphasis on monetary returns. Women, on the other hand, prefer occupations that ensure a high degree of work-family reconciliation (Busch-Heizmann 2015; Quadlin 2020). Male-dominated occupations generally offer higher social status than jobs in female-dominated fields (England 2010). This devaluation of female work, in turn, is reflected in markedly lower wages in female-dominated occupations (Blau and Kahn 2000;

Levanon, England, and Allison 2009). During their apprenticeship, men in female-dominated occupations may realise that their (future) occupation is incompatible with their gender-normative career preferences tied to income.[2] Supportive evidence suggests that men in female-dominated occupations feel more strongly than their female colleagues that their wages are not adequate (Valet 2018). Hence, the fourth hypothesis:

**Hypothesis 4 (monetary returns):** Male apprentices in female-dominated occupations have a higher probability of dropping out due to their anticipation of low monetary returns in comparison to their female peers.

### *Unfulfilled aspirations*

The match between young people's career aspirations and their attained occupation is an important precursor of the decision to drop out (Ahrens et al. 2021; Beckmann Wicht, and Siembab 2023; Holtmann and Solga 2023). Due to local labour market constraints and employer sorting, young people do not always attain an apprenticeship in their desired occupation (Schels et al. 2022). As they accommodate their aspirations with local labour market demands, career decisions are often made with incomplete information. Such information deficiencies at the hiring stage have been connected to gendered attrition processes (Sousa-Poza and Henneberger 2004; Torre 2018). Accordingly, individuals who enter gender-atypical occupations may lack occupation-specific knowledge transmitted through their social environment or previous work experiences. Dropping out is a strategy to correct for such occupational mismatches. For example, research indicates that young people feel less well informed about gender-atypical occupations (Beckmann, Estela Esteve, and Granato 2023) and lack practical information about the job requirements (Beck, Fuller, and Unwin 2006). Hence, due to these information deficiencies, both men and women in gender-atypical occupations may realise that their apprenticeship is not in line with their aspirations and expectations.

**Hypothesis 5 (unfulfilled aspirations):** Male (female) apprentices in female-dominated (male-dominated) occupations have a higher probability of dropping out because of unfulfilled career aspirations in comparison to their female (male) peers.

## Data and methods

### Data

This study uses survey data of the National Educational Panel Study (NEPS), Starting Cohort 4 (doi:10.5157/NEPS:SC4:10.0.0), covering a representative panel of students who attended year 9 of a general school in 2010 in Germany (Blossfeld, von Maurice, and Schneider 2019). Survey data were collected on an annual or bi-annual basis from 2010 to 2017, thus covering students' graduation from the general school system, their entry into VET and persistence therein (for details on selectivity and attrition see Zinn et al. 2020). Students attending the general education system were interviewed in the classroom via PAPI. After graduation, young people were interviewed using computer-assisted telephone interviewing (CAPI) twice a year (Wave 3-6) or annually (Wave 7 onwards). The present study uses data from Wave 1 to Wave 10.

The sample includes apprentices who entered a first fully qualifying VET after lower secondary education (which involves graduation with a lower or intermediate secondary school certificate after year 9 or 10) or upper secondary education (which involves graduation with the university entrance qualification (*Abitur*) after year 12 or 13). Apprentices with incomplete data concerning their chosen occupation and apprentices who pursued their apprenticeship abroad or part-time were excluded. Since apprenticeships in Germany last a maximum of 3.5 years, the observation period was restricted to 42 months. The analytical sample includes 7,028 individuals with 149,064 person-months who were observed for on average of 21.21 months (S.D. 12.88). Missing information on the covariates was imputed using multiple chained equations (MICE) with 20 imputation sets (van Buuren and Groothuis-Oudshoorn 2011). Table 1 provides a descriptive overview of the pre-imputation sample, including the number of valid cases of the covariates.

### Measures

#### Dropping out of VET

The dependent variable captures dropout behaviour (1) versus persistence or completion (0) for each month of the observation period. This information was based on apprentices' self-reported information about whether they were still in their first apprenticeship at the time of the interview. Only apprentices who indicated that they decided themselves or in agreement with their employer or school to leave their apprenticeship are considered to have dropped out ($n$ = 772). These 'self-initiated' cases of dropping out are used as the focus of analysis since the apprentices gave a reason for their decision. In total, about 11% of apprentices are 'self-initiated' dropouts. Looking only atthe non-censored apprenticeship episodes, about 22.5% of apprentices dropped out. Given the overall low number of self-initiated dropouts in our sample, the probability of

**Table 1.** Descriptives of study variables (pre-imputation sample), by gender type of apprenticeship.

| | Male-dominated ($n = 2{,}772$) | | | | Balanced ($n = 1{,}252$) | | | | Female-dominated ($n = 3{,}004$) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | percent | mean | SD | $n_i$(valid) | percent | mean | SD | $n_i$(valid) | percent | mean | SD | $n_i$(valid) |
| *Dropout behaviour* | | | | 2,772 | | | | 1,252 | | | | 3,004 |
| persistence/right-censored | 88.89 | | | | 88.26 | | | | 83.09 | | | |
| self-initiated dropping out | 8.73 | | | | 9.66 | | | | 13.62 | | | |
| dropping out due to dismissal | 2.38 | | | | 2.08 | | | | 3.30 | | | |
| *Reasons for self-initiated dropping out* | | | | 242 | | | | 121 | | | | 409 |
| social integration | 50.00 | | | | 47.11 | | | | 43.52 | | | |
| professional difficulties | 17.36 | | | | 14.88 | | | | 17.11 | | | |
| unfulfilled aspirations | 57.02 | | | | 61.16 | | | | 62.59 | | | |
| monetary returns | 22.73 | | | | 24.79 | | | | 24.45 | | | |
| *Covariates* | | | | | | | | | | | | |
| Gender: female (ref. male) | 9.42 | | | 2,772 | 50.00 | | | 1,252 | 80.23 | | | 3,004 |
| Highest school-leaving certificate: | | | | 2,424 | | | | 1,162 | | | | 2,727 |
| low (ref.) | 35.40 | | | | 14.20 | | | | 25.89 | | | |
| medium | 51.53 | | | | 43.46 | | | | 50.79 | | | |
| high | 13.08 | | | | 42.34 | | | | 23.32 | | | |
| School-leaving certificate: final grade (1: very good – 6: insufficient) | | 2.73 | 0.53 | 2,305 | | 2.62 | 0.55 | 1,115 | | 2.68 | 0.54 | 2,580 |
| Parents: Abitur | 57.47 | | | 2,382 | 63.59 | | | 1,115 | 55.54 | | | 2,564 |
| Parents: highest occupational SES | | 46.47 | 19.12 | 2,404 | | 51.67 | 19.50 | 1,114 | | 46.68 | 19.26 | 2,631 |
| Migration background: | | | | 2,649 | | | | 1,194 | | | | 2,841 |
| Native | 79.01 | | | | 78.22 | | | | 72.33 | | | |
| 1st generation | 6.19 | | | | 4.35 | | | | 6.65 | | | |
| 2nd generation | 14.80 | | | | 17.42 | | | | 21.01 | | | |
| Age at entry into VET (in years) | | 17.50 | 1.28 | 2,772 | | 18.29 | 1.39 | 1,252 | | 17.97 | 1.43 | 3,004 |
| Company-based (ref. school-based) training | 91.26 | | | 2,770 | 86.62 | | | 1,248 | 62.30 | | | 3,000 |

dropping out is relatively low at all observed time points (see hazard function, Figure A1). For purposes of comparison, apprentices who dropped out because they were dismissed by their employer or school ($n = 191$) are considered as a dependent variable in separate analyses.

### *Gender composition of the apprenticeship*

It refers to the share of male employees in the occupation, ranging from 0 to 100 (Federal Employment Agency 2014). Occupations with up to 30% of female (male) employees are classified as male-dominated (female-dominated) and occupations with a share between 30%-70% of males and females are defined as gender-balanced.

### *Reasons for dropping out*

This variable indicates the reasons for self-initiated dropout behaviour ('An apprenticeship can be terminated for various reasons. Please tell me for each of the following reasons whether it applies to you.'). We distinguish between four types of self-reported dropout events: (1) the *social integration*-hypothesis attributes dropout behaviour to students 'having difficulties with other people in training, e.g. trainers, teachers, colleagues or other apprentices'; (2) the *professional difficulties*-hypothesis attributes dropping out to 'the training being too difficult'; (3) the theoretical argument that entering a gender-atypical occupation constitutes a compromise in relation to the desired training occupation relates to the third group of dropout behaviours. Students dropping out for the following reasons were compiled in this group: 'because it wasn't my desired profession or because the profession was different than I had imagined'; (4) the *monetary-returns*-argument describes students who stated that they dropped out because they were 'unhappy with the money (they) received in training or would have earned later.' As can be seen from Table 1, the most common reason given for dropping out was unfulfilled aspirations, followed by social integration, monetary returns and professional difficulties. Since students could select multiple reasons, the percentages do not add up to 100%. Correlations of the reasons for dropping out are shown in Table A2.

### *Gender*

It distinguishes between male students (coded as 0, the reference group) and female students (coded as 1).

### *Time intervals*

The observation period is divided into time intervals of six months. The first interval corresponds to the probation period of company-based training, during which contracts are most easily terminated.

Covariates were included based on theoretical expectations about which variables are associated with dropping out as well as selection into gender-

atypical apprenticeships, thus taking into account potential sources of confounding.

#### *Highest school certificate*

It refers to the highest school-leaving certificate obtained prior to entering VET, distinguishing between lower (*Hauptschulabschluss*), medium (*Realschulabschluss*) and higher (*Abitur*) education levels.

#### *Parental socio-economic status (SES)*

It was included based on parents' highest International Socio-Economic Index of Occupational Status (ISEI-08). The information on parental occupations was derived from parents and – in the case of missing data – their children.

#### *Grade point average (GPA)*

This variable indicates the grade point average on students' highest school-leaving certificate obtained prior to entering VET, on a scale from 1 (very good) to 6 (insufficient).

#### *Migration background*

This variable distinguishes between natives, first-generation immigrants and second-generation immigrants (for details see Olcyk, Will, and Kristen 2014).

#### *Age at entry into VET*

Age at entry into VET captures irregular and lengthy transitions into VET.

#### *Company-based training*

This variable distinguishes between the company-based (dual) and the school-based VET track.

### *Analytical strategy*

To model the probability that apprentices will drop out in relation to the gender type of their apprenticeship, we used discrete-time logistic models (Allison 1982). In these models, the time-dependency of dropping out is modelled by dividing the observation period into time intervals. For this purpose, the model is performed on a person-period dataset and time-dummies are introduced. This approach accounts for right-censoring, i.e. the incomplete observation of apprenticeship spells due to panel attrition. In the present data, right-censoring amounts to 52,18%. Importantly, right-censoring was only weakly associated with students' gender and the continuous gender type of their apprenticeship, the main variables of interest. It was strongly correlated with students' school-leaving certificate and entry age. These associations are due to the fact that

students with an *Abitur* enter VET at a later age and therefore have a shorter observation period in the apprenticeship system (see Figure A2).

We used two types of models. *Model A* was used to answer the research question of whether gender-atypical apprentices have a higher probability of dropping out (distinguishing between self-initiated dropout behaviour and dismissal). This is a discrete-time logistic model and includes apprentices' gender, the gender type of the occupation and an interaction term between both variables. Results indicate whether apprentices who represent the minority gender display a higher likelihood of dropping out in comparison to the majority gender. In *Model B*, four separate discrete-time logistic models are estimated, using each reason for dropping out as a separate dependent variable while treating other reasons for dropping out as competing events (i.e. censored). These models reveal whether dropping out of gender-atypical apprenticeships is associated with specific reasons. In all models, confounding is accounted for through a series of individual and apprenticeship-specific control variables.

## Results

### *Do gender-atypical apprentices drop out more frequently?*

In a first step, the Kaplan-Meier estimator provides an estimate of the proportion of apprentices dropping out within a given number of months. Figure 1 plots the gender-specific cumulative incidence of dropping out over time, by gender type of apprenticeship. Within male-dominated apprenticeships, small gender differences emerge: 11.78% of female in comparison to 7.96% of male apprentices drop out within the first 18 months. In female-dominated apprenticeships, male apprentices experience a larger disadvantage in comparison to their female peers. For example, within the first 18 months, 13.3% of female apprentices in comparison to 20.06% of male apprentices quit their apprenticeship prematurely. Such gender-specific dropout patterns are not visible in gender-

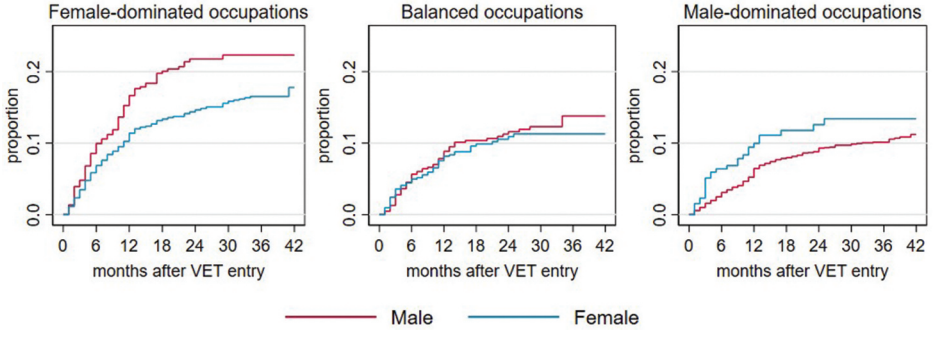


**Figure 1.** Kaplan-Meier cumulative failure probabilities (self-initiated dropout behaviour) by occupational gender-type.

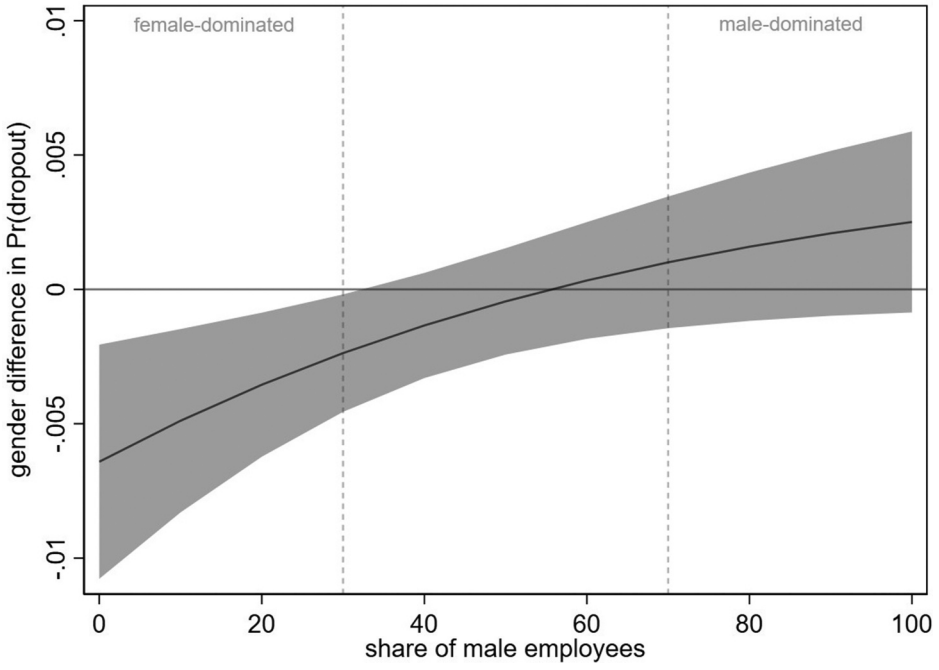


**Figure 2.** Gender differences in the predicted probability of (self-initiated) dropout behaviour by continuous gender type of occupation, first time interval.

*Note*: Displayed is the marginal effect of gender, i.e. the expected differences between male (0) and female (1) apprentices in the probability of (self-initiated) dropout behaviour in the first time interval. Positive values refer to a higher dropout probability of female apprentices. 95% confidence intervals. Covariates at their mean. Results from Table A3, Model 2. Dashed lines indicate the 30% and 70% thresholds for the classification of female-dominated and male-dominated occupations.

balanced apprenticeships. Results from the log rank test for the equality of the failure curves support this interpretation (Wellek 1993) and show that the gender gap of dropping out is statistically significant ($p < 0.05$) in both female-dominated and male-dominated occupations (see Table A1).

Second, multivariate results from discrete logit models are presented (Table A3). The interaction term between (continuous) occupational gender-type and gender reveals statistically significant differences between male and female apprentices in the occurrence of self-initiated dropout behaviour as a function of occupational gender type. Comparing Model 1 and Model 2 further reveals that the inclusion of covariates does not substantially change this interpretation, i.e. even when selection processes are accounted for, gender minorities display a higher probability of dropping out than gender majorities.

Figure 2 displays the gender difference in the predicted probabilities of self-initiated dropout behaviour by (continuous) gender type of occupation (i.e. the share of male employees) for the first six months. Overall, the difference between male and female apprentices in the predicted dropout

probability increases as the share of opposite-gender employees in their occupation increases. For example, male apprentices show a statistically significant higher dropout probability than their female peers in female-typed occupations (with a share of up to 35% male employees). Female apprentices also display an increased dropout probability in comparison to their male peers in more male-dominated occupations, albeit this gender difference does not reach statistical significance. These results show that the the occupational gender composition is proportionally related to the decision to drop out, i.e. more gender-skewed occupations lead to a higher dropout probability for gender minorities. Overall, the presented results confirm hypothesis 1b (male apprentices in female-dominated occupations drop out more frequently than their female peers). Hypothesis 1a (female apprentices in male-dominated occupations drop out more frequently than their male peers) is confirmed from a substantial perspective but does not reach statistical significance. When interpreting these effect sizes, it should be kept in mind that the overall probability of dropping out is rather low.

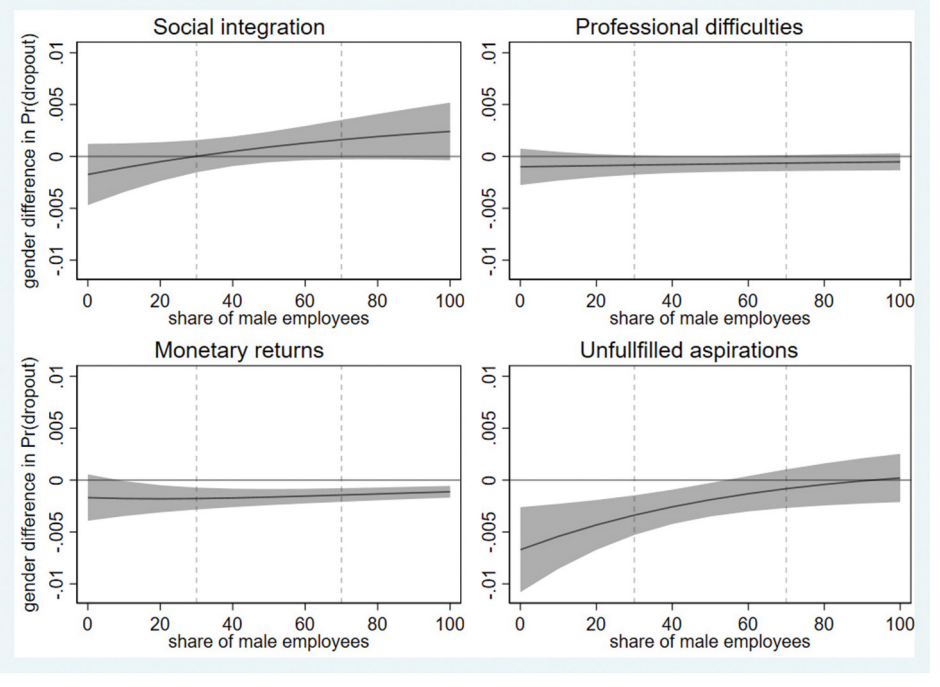


**Figure 3.** Gender differences in the predicted probability of different reasons for the decision to drop out (self-initiated) by continuous gender type of occupation, first time interval (Model B).

*Note*: Displayed is the marginal effect of gender, i.e. the expected differences between male (0) and female (1) apprentices in the probability of (self-initiated) dropout behaviour in the first time interval. Positive values refer to a higher dropout probability of female apprentices. 95% confidence intervals. Covariates at their mean. Results from Table A4.Dashed lines indicate the 30% and 70% thresholds for the classification of female-dominated and male-dominated occupations.

The results also show that gender minorities are not more likely to be dismissed by their employer or school than their majority counterparts (Table A3, Model 3–4).

### *Do gender-atypical apprentices drop out for different reasons?*

To test the expectation that minority and majority apprentices differ in the reasons they give for quitting their apprenticeship, we estimated separate logistic regressions for each type of dropout behaviour. We specify four sets of models, treating each type of dropout behaviour as the dependent variable (and other reasons for dropping out as right-censored, respectively). Figure 3 displays the expected difference in marginal effects between males and females of the probability of dropping out for each dropout reason (full results are displayed in Table A4, appendix).

Results show that male and female apprentices differ in their probability to drop out due to specific reasons as a function of the occupational gender composition. Minority apprentices hence drop out for different reasons than do gender majorities. Gender minority status is significantly related to dropping out due to a lack of social integration and unfulfilled aspirations, while the occurrence of dropping out due to professional difficulties and monetary returns does not vary by occupational gender composition and apprentices' gender (see Figure 3).

Looking at female apprentices in male-dominated occupations, differences are most visible for the social integration mechanism. As the share of male employees in an occupation increases, female apprentices show a higher likelihood of dropping out due to a lack of social integration. For example, in male-dominated occupations (with a share of more than 70% male employees), female apprentices display an about 0.2% point higher probability of dropping out due to a lack of social integration in comparison to their male peers. These results support the social integration mechanism (hypothesis 2) from a substantial perspective, however this gender difference is not statistically significant.

For male apprentices in female-dominated occupations, the greatest differences emerge with respect to unfulfilled aspirations. Male apprentices more often justify their decision to drop out with reference to unfulfilled aspirations compared to female apprentices as the share of female employees in the occupation increases. For example, in occupations with 90% female employees, the gender difference in the dropout probability amounts to 0.5 percentage points. These results confirm *hypothesis 5* (unfullfilled aspirations) for male apprentices. To a smaller extent, male apprentices in female-dominated occupations also drop out at a higher rate than female apprentices due to a lack of social integration. However, these differences are visible only for highly female-typed occupations (with no more than 20% male employees).

Overall, no substantial gender differences emerge with respect to the professional difficulties and monetary returns mechanisms. Interestingly, male apprentices overall drop out more often than female apprentices due to insatisfaction with the monetary returns and (to a lesser extent) due to professional difficulties, irrespective of the occupational gender composition.

## Conclusion and discussion

The present study addressed dropout behaviour in gender-atypical apprenticeships in Germany, with the aim of answering the understudied question of *why* apprentices drop out from gender-atypical occupations and of providing a comprehensive understanding of the decision to drop out in relation to gendered workplace experiences. For this purpose, we analysed the self-reported reasons apprentices gave for dropping out, distinguishing between (i) social integration, (ii) professional difficulties, (iii) monetary returns and (iv) unfulfilled aspirations.

Results revealed that gender minorities drop out more often than gender majorities, a finding that confirms previous research on gendered dropout patterns in the German apprenticeship system (Kroll 2021; Rohrbach-Schmidt and Uhly 2015). With this study, we contribute to previous international literature on gendered attrition processes, which is largely dominated by research on women in male-dominated occupations (e.g. Madsen, Brekke, and Fekjær 2021; Torre 2017, 2014; Jacobs 1989; for exceptions of studies on men in female-dominated occupations, see, e.g. Torre 2018). The finding that men display a higher probability of dropping out of female-dominated occupations contradicts the common argument of a 'glass escalator,' which might not be appropriate for the VET system (Budig 2002; Williams 1992).

These findings also show that the degree of gender minority status is proportionally related to an increased likelihood of dropping out, especially in female-dominated occupations. This pattern supports Kanter's (1977) theory that numerical proportions shape the workplace experiences of gender-atypical employees. Furthermore, distinguishing dismissals from self-initiated decisions to drop out allowed us to describe the dropout patterns of gender-atypical individuals in more detail: the probability of being dismissed is not related to gender minority status, suggesting that gender-minority apprentices show a high degree of agency and proactiveness when leaving their apprenticeship.

A central finding of this study is that the reasons leading to dropping out are related to gender minority status: female apprentices in male-dominated occupations relate their decision to drop out more often to social conflicts with supervisors or colleagues than do their male peers. This finding supports previous qualitative evidence on females' experiences with hostile male working and learning climates (Hall and Sandler 1982; Makarova, Aeschlimann, and Herzog 2016). Thus, female apprentices not only drop out of male-dominated

occupations at a higher rate, their decision to drop out is also more often rooted in a lack of social integration.

Male apprentices in female-dominated occupations drop out more often due to unfulfilled aspirations than their opposite-sex peers. Hence, female-dominated apprenticeships may represent a second=best alternative which male apprentices are willing to give up as soon as they have the opportunity to enter (potentially better paying) apprenticeships that are more in line with their aspirations. This interpretation is also in line with previous findings that gendered career compromises are associated with the decision to drop out (Ahrens et al. 2021; Beckmann, Wicht, and Siembab 2023).

## Policy implications

The findings of this study give rise to the following three policy implications. First, our study shows that gender segregation in the labour market is reproduced through dynamic attrition processes and occupational revisions across the early career (Margarita and Jacobs 2021; Guinea-Martin, Mora, and Ruiz-Castillo 2018). Hence, measures to reduce horizontal gender segregation should not only target young people's career choices but also their persistence within gender-atypical careers. Second, since (female) gender-atypical apprentices dropped out more frequently due to low levels of social integration, policy measures addressing apprentices' social integration are warranted. Potential measures include peer-to-peer mentoring and creating awareness for gender-atypical apprentices among VET trainers and teachers, who occupy a central role in the training of apprentices in Germany (Krötz and Deutscher 2021). Third, the finding that unfullfilled aspirations are central for gender-atypical men to leave their apprenticeship points to the need of fostering an informed career choice that is in line with young people's vocational self-concepts. Career counselling which includes both self-exploration and exploration of occupations could be a fruitful avenue. For example, Erdmann et al. (2023) show that intensive guidance counselling can not only foster gender-atypical choices, but can also reduce the dropout behaviour of gender-atypical students in higher education. Career exploration via occupational role models (e.g. Beckmann, Estela Esteve, and Granato 2023; Drury, Siy, and Cheryan 2011) and internships (e.g. Neuenschwander et al. 2018) could be another fruitful avenue to foster an informed and stable career choice.

## Future research

This study provides several avenues for future research. First, although we were able to distinguish dismissals from self-initiated decisions to drop out, the measurement of reasons for dropping out in the present study was restricted to the individual's perspective. Although self-reported reasons provide a good

indication of the processes leading to the decision to drop out according to the individual's own perception, including the perspective of employers could provide an even deeper understanding of dropout behaviour. For example, apprentices might cite extrinsic reasons to avoid feelings of failure. Future research is needed to further integrate the perspectives of apprentices and employers in the dropout process (see also Krötz and Deutscher, 2021).

Second, while this study did consider important reasons for dropping out tied to apprentices' experiences *within* their occupation, future research should acknowledge the *external* barriers associated with persistence in gender-atypical careers. For example, previous research highlights the 'need for social approval' as an important precursor of career decisions (Eberhard, Matthes, and Ulrich 2015) and the 'social costs' associated with gender-atypical occupations (e.g. McClintock 2020; Yu and Kuo 2021). A perspective that combines internal and external barriers, and comparing these with each other, is warranted.

Third, this study did not investigate which occupations apprentices enter after dropping out. Since the majority of dropouts in Germany take up apprenticeship in another training occupation, it is an open question whether these occupational revisions constitute more gender-typical choices. Relatedly, future research could investigate the occupations apprentices enter after having completed their apprenticeship. For example, Leitner and Kreimer (2021) find for the Austrian context that at the 'second threshold' gender segregation is further reproduced, with females who have completed an apprenticeship in STEM taking up a non-STEM occupation at a higher rate than men.

Fourth, the finding that reasons for dropping out are structured by gender minority status highlights the need to differentiate between different types of dropout behaviour when analysing attrition processes in VET. Future research could benefit from relating self-reported reasons for dropping out to other dimensions of social inequality, such as migration background and family socio-economic status. For example, our results showed that youth with a migration background show a higher dropout probability in general, and more often drop out due to unfulfilled aspirations and monetary returns (see Table A3 and A4). The intersection of gender with migration background or socio-economic family status could be another promising area of future research. Future research is warranted to analyse dropout behaviour in gender-atypical VET in other countries. Germany, with its highly delineated occupations and low occupational mobility after completing VET, is a special case; thus different patterns may emerge in other countries and VET systems.

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## Disclosure statement

No potential conflict of interest was reported by the author.

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## Research ethics statement

All human subjects gave their consent to participate in the study.
The analyses are based on data from the National Educational Panel Study (NEPS): starting cohort 4, DOI: 10.5157/NEPS:SC4:10.0.0. Data are available at the Data Center of the Leibniz Institute for Educational Trajectories (LIfBi). Requirement for data access is the conclusion of a Data Use Agreement with the Leibniz Institute for Educational Trajectories.

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