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ALLGEMEINER TEIL

Does context matter? The gendered impact of study conditions on dropout intentions from higher education

Anna Marczuk · Susanne Strauss

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Abstract This paper aims to understand how study conditions impact men and women's dropout intentions differently. As a first step, we analyse the gendered impact of three aspects of study conditions that were at the centre of the Bologna Process: achievement norms, the structure of the curriculum and practical components in the study programme. As a second step, we aim to understand how individual-level differences between men and women (performance, academic self-efficacy and perceived psychological burdens) mediate this gendered impact of study conditions on dropout intentions. We use the German Student Survey data (2000–2016), which allows for valid measurement of study conditions at the subject group level. Our results show that women's dropout intentions tend to increase in study contexts with high achievement norms, while men benefit more than women from highly structured study contexts. The practical component, in turn, lowers the dropout intentions of both groups equally.

Keywords Higher education · Dropout · Gender · Study conditions · German Student Survey

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Dr. Anna Marczuk
Research Group on Higher Education, University of Konstanz, Box 37, 78457 Konstanz, Germany
E-Mail: anna.marczuk@uni-konstanz.de

✉ Prof. Dr. Susanne Strauss
Department of Sociology, University of Konstanz, Box 26, 78457 Konstanz, Germany
E-Mail: susanne.strauss@uni-konstanz.de

Welche Rolle spielt der Kontext? Der geschlechtsspezifische Einfluss von Studienbedingungen auf Studienabbruchintentionen

Zusammenfassung In diesem Beitrag untersuchen wir, wie sich Studienbedingungen unterschiedlich auf die Abbruchintentionen von Studentinnen und Studenten auswirken. In einem ersten Schritt analysieren wir die geschlechtsspezifischen Auswirkungen von drei Aspekten von Studienbedingungen, die im Mittelpunkt des Bologna-Prozesses standen: Leistungsnormen, die Struktur des Lehrplans und praktische Komponenten des Studienplans. In einem zweiten Schritt wollen wir verstehen, wie individuelle Unterschiede zwischen Studentinnen und Studenten (Leistung, akademische Selbstwirksamkeit und wahrgenommene psychische Belastungen) diesen geschlechtsspezifischen Einfluss der Studienbedingungen auf die Abbruchintentionen vermitteln. Wir nutzen die Daten des Studierendensurveys (2000–2016), die eine valide Messung von Studienbedingungen auf der Fachgruppenebene erlauben. Unsere Ergebnisse zeigen, dass Frauen in Studienkontexten mit hohen Leistungsnormen eine höhere Abbruchintention haben, während Männer eher als Frauen von stark strukturierten Studienkontexten profitieren. Der praktische Bezug verringert wiederum die Abbruchintentionen beider Gruppen ähnlich stark.

Schlüsselwörter Hochschulbildung · Studienabbruch · Geschlecht · Studienbedingungen · Studierendensurvey

1 Introduction: The importance of study contexts for understanding gendered dropout intentions

While continuous gender inequalities in the area of employment (England 2010; Kasearu et al. 2017) and resulting access to economic resources (Haupt and Strauß 2022), as well as the unequal division of housework (Mandel et al. 2020; Nitsche and Grunow 2016) and childcare (Craig and Mullan 2011; Nitsche and Grunow 2018), have been widely discussed, women have made substantial gains in many Western countries, where they now largely surpass men in one crucial area: education. Girls have been shown to achieve better grades at school; they are more likely to be in high-achieving schools; and women have surpassed men in the transition to higher education (DiPrete and Buchmann 2013).

After entering higher education, men have considerably higher dropout rates than women (Heublein and Schmelzer 2018). This is true for almost all broad study areas: law/economics/social sciences (men 29%, women 20%), mathematics/natural sciences (men 43%, women 39%) and engineering (men 36%, women 29%) (Heublein and Schmelzer 2018). However, as Klein and Müller (2021) show, when controlling for background characteristics, gender differences are not that significant and can be mainly explained by performance indicators.

However, men's higher dropout rates are not merely the result of individual-level factors, which is why research on gendered dropout concentrates on the study context. Research in this area has predominantly focused on gender composition, showing that men and women in gender-atypical fields of study (so-called 'tokens')

tend to have higher dropout rates than their counterparts in gender-typical subjects (Kronberger and Horwarth 2013; Murray et al. 1999). By focusing on the gender composition of a field of study, however, it remains unclear which study conditions drive these effects. Earlier research has already indicated that study conditions influence men's and women's dropout rates differently (Kronberger and Horwarth 2013; Meyer and Strauß 2019; Miliszewska et al. 2006). These studies are, however, limited to a specific selection of subjects and focus predominantly on women. We aim to fill this research gap by analysing the gendered impact of the study context on dropout intentions more systematically. We consider three aspects of study conditions that have been promoted throughout Europe after the implementation of the Bologna Process (Bartolo et al. 2010). The Bologna Process explicitly intended to improve study conditions in higher education (European Education and Culture Executive Agency 2018): for example, by ensuring that study programmes are more standardised, better structured, and have high learning standards, with a strong practical component ('employability'). Based on these central reform goals, we focus on the impact of the following aspects of study conditions on gendered dropout intentions: the prevalence of *achievement norms* (that is, the expectation that students can be high achievers); the *structure of the curriculum*, which should be divided into modules and should have clear examination requirements; and *practical components* of the study programme, which impart relevant skills for the labour market (for an overview of all accreditation criteria, see Schneijderberg and Steinhardt 2019).

Our study focuses on Germany as one of the countries that had to reform its degree structure profoundly as part of the Bologna Process, as prior to that process the country had a typical Humboldtian higher education system (Kehm et al. 2010). The need for reform was much less far-reaching in some English-speaking or Eastern European countries, where a consecutive degree structure of bachelor followed by master programmes was already implemented (Kogan et al. 2011; Witte et al. 2008). However, since the same goals for study conditions were promoted throughout Europe (Bartolo et al. 2010; Witte 2004), we assume that similar results are to be expected in other European countries.

The goal of our study is thus twofold. First, we aim to understand how study conditions impact gendered dropout intentions. Second, we aim to analyse what individual-level factors explain the gendered impact of the study context on dropout intentions. We focus on students' performance and academic self-efficacy, career orientation and perceived psychological burdens, which have been shown to be prevalent dropout factors in general (Brandstätter et al. 2006; Fellenberg and Hannover 2006; Stinebrickner and Stinebrickner 2012) and can be expected to explain gender differences in dropout intentions in particular.

In the following section, we review previous research on dropout and discuss gender differences relating to dropout.

2 What do we know? Existing research on dropout (intentions)

2.1 Individual-level factors

International dropout research predominantly focuses on individual-level factors, with the aim of understanding why some students are more likely to drop out of higher education than others (for literature reviews, see Larsen et al. 2013; Neugebauer et al. 2019). Apart from financial problems or family and health issues (Bennett 2003; Lassibille and Gómez 2009; Müller and Schneider 2013), most relevant factors impacting on dropout relate to students' psychological characteristics. In particular, students with lower cognitive skills and lower performance (Belloc et al. 2010; Stinebrickner and Stinebrickner 2012) or lower self-efficacy (Brandstätter et al. 2006; Fellenberg and Hannover 2006) show higher dropout rates (or dropout intentions). By contrast, high levels of motivation can prevent dropout: being career-oriented (Bargmann et al. 2022; Heublein et al. 2012) or interested in acquiring knowledge (Fellenberg and Hannover 2006) clearly lowers students' dropout rates.

Men and women differ in a number of individual-level characteristics that have been shown to be related to dropping out of higher education. First, men are more extrinsically motivated and career-oriented (Beutel and Marini 1995; Braun and Borg 2004), although the gender gap in career orientation (motivation to earn a high income) has been shown to be on the decline (Galos and Strauß 2022). Second, while females perform better in schools and higher education institutions (Heine et al. 2007), they are also more sceptical about their academic performance and self-efficacy (Buchmann et al. 2008; Huang 2013; Kessels and Hannover 2008). Third, due to their greater self-doubt, women perceive events as more stressful than men (Tamres et al. 2002). And finally, they are more conscientious than men, which is advantageous for their academic achievement in higher education (Verbree et al. 2021).

2.2 Institutional factors

While the influence of students' individual-level characteristics on dropout is thus widely acknowledged, some studies also emphasise the importance of the institutional context, as well as the interaction between individual characteristics and institutional surroundings. Bodin and Orange (2018) argue that student dropout should be conceptualised as reflecting a discrepancy between the student and the institutional context.

Several studies analyse the impact of specific institutional characteristics (such as size, mission, selectivity or faculty–student ratio, expenditures on student services), but mostly find only weak to moderate effects (for an overview, see Schaeper 2020).

Other studies show that a more structured curriculum, a high practical component, or a pleasant social climate (Aymans and Kauffeld 2015; Blüthmann et al. 2008; Kliegl and Müller 2012; Pohlenz and Tinsner 2004; Schiefele et al. 2007) can prevent student dropout, while high achievement norms increase student dropout (Kliegl and Müller 2012; Pohlenz and Tinsner 2004). Klein and Stocké (2016) argue that a lack of practical training is one of the most commonly cited reasons students give for

dropping out of higher education. However, according to Heublein et al. (2010), this is not likely to be a causal influence since the comparison group of students who do not drop out of higher education complain about the lack of practical training just as often.

These mixed findings are based mainly on single higher education institutions and most of the mentioned studies do not address the theoretical mechanisms underlying the effect of study conditions; additionally, they measure study conditions based on students' subjective perceptions. To our knowledge, only two studies based on national datasets and identifying theoretical mechanisms analyse the impact of study conditions at the levels of subject groups. One of them, by Georg (2009), identifies teaching quality as the most influential among the contextual factors analysed, with the institutional context having generally rather weak effects. Additionally, Marczuk (2022) analyses the effect of study conditions and links them theoretically to individual-level factors impacting on dropout, such as performance, self-efficacy and career orientation. Marczuk (2022) concludes that highly structured study programmes reduce dropout intentions by increasing students' self-efficacy. Moreover, the study shows that a strong practical component prevents highly career-oriented students from dropping out, while achievement norms increase dropout intentions by lowering performance and/or increasing psychological burdens.

A few studies analyse gendered dropout for the specific subgroup of students in gender-atypical fields of study. They report that there is a higher dropout rate for men studying female-dominated subjects characterised by a low occupational component because men tend to be more career-oriented (Severiens and ten Dam 2012). In male-dominated subjects, women have higher dropout rates due to their more critical perception of their own academic skills (Fellenberg and Hannover 2006; Meyer and Strauß 2019). However, other studies have found the opposite to be true: high achievement norms in male-dominated subjects increase men's dropout rates due to their lower performance (Kronberger and Horwarth 2013). These studies are not conclusive and are limited in scope since they focus on specific subgroups of students in gender-atypical fields of study. Moreover, they do not measure study conditions directly but rather draw their conclusions indirectly from the gender composition in a particular field of study.

In sum, most existing research focuses on individual-level factors when trying to explain student dropout in higher education. Few studies show how individual-level characteristics interact with study conditions to shape students' dropout. Some studies focus on the specific subgroup of students in gender-atypical subjects, discussing how this context impacts on gendered dropout. However, we still lack a systematic analysis using valid measurements of study conditions that shows how these conditions contribute to gendered dropout. Our study aims to fill this gap and proposes a theoretical framework for addressing how study conditions impact differently on men's and women's dropout intentions.

3 Theoretical framework: explaining the link between study conditions and gendered dropout intentions

We present our theoretical assumptions in two steps. First, we start at the individual level and describe how students' characteristics relate to dropout intentions. We focus on those characteristics (performance, self-efficacy, career orientation, etc.) that have been shown to be gender-specific (Fellenberg and Hannover 2006; Meyer and Strauß 2019; Severiens and ten Dam 2012) and that are explicitly related to study conditions (Marczuk 2022). In a second step, we add the aggregated level and describe how study conditions affect these students' characteristics and thus their dropout intention. Since men and women differ in these characteristics, we formulate our hypotheses by addressing how study conditions shape gendered dropout intentions.

3.1 Rational choice theory explaining the impact of individual-level characteristics on dropout

To understand how individual-level characteristics relate to dropout intentions, we describe these characteristics using a rational choice model (Breen and Goldthorpe 1997; Erikson and Jonsson 1996). This model consists of three main factors: the subjective probability of success, and expected benefits and costs. Whereas the first two parts increase the utility of a higher education degree and thus lower the dropout intention, the costs have the opposite effect.

The probability of success can be measured using objective indicators, such as performance (Erikson and Jonsson 1996), or subjective indicators (Boudon 1974), such as academic self-efficacy, defined as the belief in one's own ability to master prospective (study) situations (Bandura 1977). We assume that the better a student's performance or academic self-efficacy, the higher their probability of successfully graduating from higher education and the lower their dropout intentions.

Regarding the *expected benefits* of higher education degrees, students' strong labour market orientation forms a prominent indicator (Erikson and Jonsson 1996; Esser 2002). We assume that since a stronger career orientation promises higher prospective benefits of a tertiary education degree it should reduce students' dropout intentions.

Whereas the above indicators reduce dropout intentions, monetary and non-monetary *study costs* can increase them (Breen and Goldthorpe 1997). As Breen and Goldthorpe (1997, p. 296) argue, monetary costs are not crucial for understanding (declining) gender differences in education. We therefore focus on non-monetary costs, such as psychological burden, since these can be related to gender differences. We assume that when students suffer from greater psychological burdens, the costs of finishing their studies are higher, which might increase their dropout intentions.

In the following, we describe how these cost–benefit characteristics interact with study conditions, leading to different dropout intentions for men and women.

3.2 Theoretical framework for the effect of study conditions on gender-specific dropout factors

As previously pointed out, we focus on three study conditions: the prevalence of achievement norms, the structure of the curriculum and its practical components. Our main assumption is that these study conditions strengthen or mitigate gender-specific dropout factors, affecting men's and women's dropout intentions differently.

Regarding the effect of achievement norms, we test two opposite hypotheses. On the one hand, high achievement norms demand high accomplishments and lead to a mismatch for low performers, a phenomenon that has been described by Tinto (1975) as failed academic integration. This mismatch can lower students' probability of success and increase their dropout intentions. Due to men's on average lower performance (Heine et al. 2007), it can be expected that they are more likely to experience a mismatch with high achievement norms and thus show increased dropout intentions (see Fig. 1). We derive the following hypothesis:

H1a Higher achievement norms increase men's dropout intentions more than women's due to men's lower educational performance.

However, high achievement norms can also increase (non-monetary) study costs, such as the psychological burden, since this context is highly demanding and puts a lot of pressure on students. Thus, high achievement norms increase psychological burdens and lower the utility of a study degree, increasing students' dropout intentions (see Fig. 1). This should apply more to women, since they perceive events to be more stressful than do men (Buchmann et al. 2008; Tamres et al. 2002). Moreover, it has been shown that in fields of study that are characterised by self-enhancement values (competitiveness, self-affirmation, dominance), women struggle with a lower

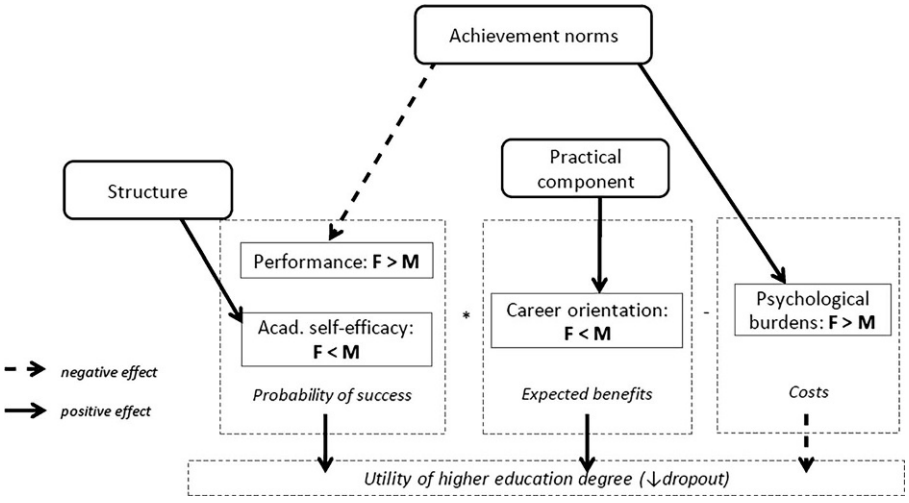

Fig. 1 The effect of study conditions on the dropout intentions of male (*M*) and female (*F*) students

sense of belonging and are less likely to pursue a given academic opportunity (Aelenei et al. 2020). Following this argument, our hypothesis is as follows:

H1b Higher achievement norms increase women's dropout intentions more than men's, by increasing their psychological burdens.

The structure of educational programmes is expected to increase students' academic self-efficacy. Since highly structured programmes provide clear guidelines and orientation for the acquisition of required study records, students fulfilling these requirements might consider themselves academically highly efficient. This should reduce their dropout intentions because high self-efficacy increases the probability of success and thus the utility of a higher education degree (see Fig. 1). This should be especially useful for students who struggle with lower self-efficacy, since they need more external guidance in order to accomplish defined study goals. Because women's academic self-efficacy is in many fields (except for languages) lower than men's, with a small but significant effect (Huang 2013; Kessels and Hannover 2008), a better defined structure should have a more pronounced effect on women than men. We derive the following hypothesis:

H2 Highly structured educational programmes reduce women's dropout intentions more than men's by compensating for women's lower academic self-efficacy.

Larger practical components in educational programmes should reduce students' dropout intentions by signalling the expected benefits of the degree, such as good preparation for the labour market after graduation. Indeed, earlier research has shown that larger practical components in education are related to higher labour market benefits, such as earnings (van de Werfhorst 2011) or job security (de Lange et al. 2014; Shavit and Muller 2000). As argued earlier, a strong career orientation increases students' expected benefits and thus the utility of a higher education degree, resulting in reduced dropout intentions (see Fig. 1). This should be especially true for men, who have been found to be more career-oriented than women (Beutel and Marini 1995; Braun and Borg 2004), although this gap has been declining over time (Galos and Strauß 2022; Haupt and Strauß 2022). Our hypothesis thus reads:

H3 A larger practical component in a study programme reduces men's dropout intentions more than women's due to men's stronger career orientation.

4 Data and method

4.1 Data

Our theoretical assumptions are tested using the German Student Survey *(Studierendensurvey)*, a long-term cross-sectional trend study that, since 1982, has been conducted every two to three years in Germany (Multrus et al. 2017). Data sampling occurs in two stages. A systematic selection of around 30 higher education insti-

tutions according to their distribution across federal states, size and type of higher education institution (university or university of applied sciences) is followed by a random selection of students within these institutions. The survey focuses thematically on study conditions and students' attitudes and has several advantages for our analyses. First, it contains suitable items for our cost–benefit equation at the individual level. Second, it offers many more items on study conditions than other datasets. Third, the number of cases per higher education institution permits an aggregation of these items at the subject group level, allowing for an inter-subject measurement of study conditions, which is (to our knowledge) not possible with other data.[1] Aggregation at the level of particular fields of study would offer even more information, but this is not feasible due to the limited number of cases.

We restrict the original sample of the waves for 2000 to 2016 (circa 43,000) to students no older than 40 who study no longer than for 20 semesters, to exclude senior auditors or enrolled mock students, resulting in around 40,500 cases. Our analytical sample is further reduced to at least 30 students per subject group (circa 33,000) in order to use aggregation of study conditions on the basis of normally distributed samples (for further details, see section on measuring study conditions below). Additional reductions result from systematic missing values in the control variables and main dropout factors, especially in study performance.[2] Our final analytical sample consists of about 24,000 observations (for sample descriptions, see Tables 8 and 9 in the supplementary material).

4.2 Variables

Since we use cross-sectional data, the *dependent variable* in this study is the dropout intention. Students are asked whether they are currently seriously considering giving up their studies. The response scale ranges from 1 (not at all) to 7 (very seriously). About 80% of students report that they are not considering dropping out at all, which leads to a highly skewed distribution (see Fig. 8 in the supplementary material). Although dropout intentions do not perfectly predict dropout, they are the main predictor for actual dropout (Fleischer et al. 2019; Pannier et al. 2020).

[1] Most student surveys, such as the National Survey of Students Engagement (NSSE), the Irish Survey of Student Engagement (ISSE), the National Student Surveys in the Netherlands (NSE) or UK (NSS), collect very limited or no information on study conditions. To our knowledge, only two German surveys focus on this dimension: the German Student Survey and the National Educational Panel Study (NEPS). The latter, however, offers relatively low case numbers per higher education institution, and thus the aggregation of study conditions at the subject group level is limited. By contrast, the higher case numbers in the German Student Survey provide reliable information for aggregation at the subject group level. Additionally, it contains more items pertaining to study conditions than the NEPS, and its long-term design provides information for different survey waves, allowing for greater variation at the aggregated level.

[2] The missing values in study grades result mostly from the difficulty of reporting these grades. In contrast, school grades contain substantially fewer missing values than study grades. Also, the missing values in study grades are highest for first-year students (who do not have grades yet) and for students studying traditional degrees (whose study records are graded less often than in BA or MA degrees). In addition, students with missing values in study grades show relatively high school grades and low dropout intentions, indicating that these missing values do not result from poor-performing students' non-responses. Beyond this, our analytical sample constitutes a representative sample of students in Germany with regard to gender, parental education and field of study.

4.2.1 Measuring cost-benefit components

For the individual-level independent variables that aim to measure predicted probabilities, costs and benefits, we propose the following measurements (for further details, see Table 3 in the supplementary material).

To assess the *probability of success*, its components are measured, starting with *performance*, which is represented by the students' self-reported current grades. Second, the measurement of *academic self-efficacy* contains information on four variables: whether respondents report being well-organised, whether they trust their cognitive abilities and whether they feel stressed about exams or worried about their studies (the last two items are inverted). These items are in line with theoretical definitions of self-efficacy (Bandura 2006) and cover the three main dimensions (organisation, motivation and cognition) of the acknowledged freshman self-efficacy scale proposed by Petri (2020). Additionally, they explicitly address *academic* self-efficacy in higher education, as opposed to the general self-efficacy scale (Beierlein et al. 2012), and offer a more precise insight into the characteristics of higher education students.

The items for career orientation, measuring *expected benefits,* are identified by three motives for subject choice: high income, a secure job and clear career targets. These items are suitable for our analyses addressing the role of a practical component: while the first two have been shown to be connected to a larger practical component (de Lange et al. 2014; Shavit and Muller 2000; van de Werfhorst 2011), regarding the third item we expect that study programmes with more practical components are more closely related to specific occupational careers, which might sharpen students' career targets. Generally, the inclusion of the three different aspects of career orientation (high income, secure job, clear career targets) makes it possible to assess the importance of these factors for dropout intentions.

Study costs are measured by two items for psychological burdens caused by high study requirements or exam requirements. These items cover higher education students' main psychological burdens in relation to high study requirements (Trautwein and Bosse 2017).

4.2.2 Measuring study conditions

The items for study conditions reflect the main outcomes of the Bologna Process (for further details on the items capturing study conditions, see Table 4 in the supplementary material). As already mentioned, the Bologna Process changed study conditions in higher education (European Education and Culture Executive Agency 2018): study programmes became more standardised, better structured and more modular (Bartolo et al. 2010). According to these outcomes, the index for *curriculum structure* contains information on examination requirements, the course structure and modules on offer within the study programme.

Apart from more structured programmes, the Bologna Process introduced a strict credit system, increasing the amount of study records, as well as students' workload and their learning outcomes (Kühl 2014). For measuring *achievement norms*, we thus consider items regarding high workload and factual knowledge acquisition or

regular study assignments. Additionally, the Bologna Process increased the practical component of higher education programmes, to better prepare students for the labour market (Schaeper and Wolter 2008).

The items for the *practical component* reflect whether the programme offers good vocational preparation and connects with professional practice, or whether a stronger vocational component is necessary (the latter indicator is inverted).

These selected items for study conditions were additionally considered in an explanatory factor analysis and the items were cumulated into the above-described dimensions.[3] The values of these items within each dimension have first been summarised as means at the individual level and then aggregated as means at the subject group level. To ease interpretation, we centre all aggregated study conditions at 0. The aggregation was computed for nine subject groups (humanities and arts, teaching, social sciences, law, economics, engineering, sciences, agricultural sciences and medicine), with at least 30 students in each of the 33 higher education institutions for each of the last six survey waves separately. The analysis focuses on the period between 2000 and 2016, during the implementation of the Bologna Process, which improved most of the study conditions considered in our study (Bartolo et al. 2010). Examining data from this time span allows for greater variation of study conditions at the aggregate level, as opposed to considering a single survey wave only.

4.2.3 Control variables

In order to separate the effect of study conditions from possible composition effects of study programmes (reflecting the characteristics of students studying these programmes), we consider a wide range of control variables. These consist of relevant individual dropout factors identified in previous research (for literature reviews, see Larsen et al. 2013; Neugebauer et al. 2019), namely: students' school performance and determination to study before entering higher education; their sociodemographic characteristics (parents' level of education, age, number of children); employment during study (including whether it is related to their chosen field or not); study characteristics (semester, intended degree); and survey year. We also control for teaching quality and social climate, aggregated at the study group level. Finally, to rule out the possibility that the effects are driven by gender composition, rather than by the measured study conditions, we also run robustness checks, considering whether students are enrolled in gender atypical programmes. Students are coded as tokens enrolled in a gender-atypical field of study if less than 30% of their fellow students (in their particular subject group) are of their own gender.

[3] We found two additional dimensions, teaching quality and social climate, but since their effects on gendered dropout intentions are mostly not significant, we decided to include them as control variables. For further details on these dimensions and the results, see Table 4 and footnote 3 in the supplementary material.

4.3 Method

Our analyses are based on linear regression models. Since the Bologna reform changed study conditions over time, students of particular subjects and in particular cohorts could study under different conditions than students of other subjects or in other cohorts. To account for this time variation we cluster the standard errors for all combinations of subject groups and years of observation.[4] To test our hypotheses, we perform two analytical steps. We first measure the effect of study conditions on men's and women's individual dropout intentions by using interaction terms. These terms illustrate how aggregated study conditions (at the subject group level) interact with gender at the individual level and affect the dropout intentions of men and women differently. In a second step, we identify the main mechanisms behind these effects by incorporating stepwise gender-specific dropout factors (such as grades and self-efficacy) into the models. Since the dependent variable shows a right-skewed distribution (see Fig. 8 in the supplementary material), Poisson regression models are run as robustness checks. These generalised linear regression models are designed for count-dependent variables and model the logarithm of the expected values (Berk and MacDonald 2008); since they do not assume a normal distribution, they provide a reliable estimation when considering variables with skewed distribution. Since the results of the Poisson regression (see Table 6 and Figures 5–7 in the supplementary material) strongly resemble those of the linear models (see Table 2 and Figs. 2, 3 and 4), the latter are presented in the results section to ease interpretation and reduce complexity.

5 The impact of study context on gendered dropout intentions: empirical findings

5.1 Descriptive findings

Before testing our hypotheses with multivariate models, we briefly describe the differences between men and women regarding their dropout intentions and the individual-level factors considered here that drive their cost–benefit calculations.

Table 1 shows that both groups do not significantly differ in their dropout intentions. These gender differences are not as large as they are for actual dropout (Heublein and Schmelzer 2018). We assume two possible explanations for these differences. On the one hand, men's higher dropout rate is mainly explained by their lower performance (Klein and Müller 2021) and this might indicate that men are forced to quit their studies (due to insufficient performance) without *intending* to do so in advance. On the other hand, women show greater insecurity and self-doubt (Aelenei et al. 2020), which might result in overestimated dropout intentions, that, however, do not necessarily lead to actual dropout.

[4] We follow the recommendations of Heisig et al. (2017) and additionally run multilevel random slope models, but since the variation at the aggregate level is rather small and the results are basically identical we favour linear regression models with clustered standard errors in order to reduce complexity.

Table 1 Description of gender differences in cost–benefit components

	Female	Male	t-test	Min	Max
Dropout intentions	1.41	1.43	ns	1	7
School grade	1.73	1.87	***	1	4
Study grade	1.98	2.10	***	1	4
Acad. self-efficacy	4.58	4.68	***	1	7
Worrying about studies (–)	4.42	4.74	***	1	7
Exam stress (–)	4.29	4.68	***	1	7
Learns easily	4.78	4.79	ns	1	7
Well-organised	4.80	4.49	***	1	7
Labour market orientation	4.24	4.30	***	1	7
Good income	4.04	4.33	***	1	7
Clear career aspirations	4.27	3.92	***	1	7
Secure job	4.40	4.63	***	1	7
Psychological burdens	3.93	3.80	***	1	7
High exam requirements	3.63	3.40	***	1	7
High study requirements	4.24	4.21	*	1	7
N	13,317	10,945			

Own calculations based on German Student Survey 2000–2016 data. Analytical sample
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

With regard to the cost–benefit factors, the gender differences mostly concur with previous research and our theoretical assumptions. While women perform better at school and in higher education, their academic self-efficacy is on average lower than men's (see Table 1). However, when looking at the items with which we measure self-efficacy, women report being more worried and stressed, but also being better organised. Thus, women have lower self-confidence on average, but men report poorer organisational skills more often than women. Regarding expected benefits, men show a stronger career orientation than women, although this difference is rather small. Gender differences are more pronounced regarding the particular items of career orientation: while men report a stronger interest in a higher income and a secure job, women study to achieve a particular career goal in the future. Thus, regarding career orientation, gender differences are less clear, indicating that both men and women are labour market-oriented, but in different ways. Regarding study costs, women report higher psychological burdens, especially because they struggle more with examination requirements.

5.2 Multivariate analysis

Table 2 demonstrates our linear regression models. Model 1 presents the coefficients of study conditions on students' dropout intentions. In line with our main assumptions, we see a negative correlation of dropout intentions with a greater curriculum structure or larger practical component, and a positive one with higher achievement norms. To test our hypotheses addressing the gendered effect of study conditions, we perform two analytical steps, which we present in the further models. First, we present interaction terms which address how study conditions interact with gender.

Table 2 Effect of study conditions on men's and women's dropout intentions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female (ref. male)	–0.03	**–0.04***	–0.03	**–0.07*****	**–0.06***	**–0.10*****	**–0.04***	–0.03
Study conditions								
Achievement norms	**0.10****	0.03	0.00	**–0.09***	**0.10****	–0.01	**0.10****	**0.11*****
Structure	**–0.09****	**–0.09****	**–0.12*****	–0.05	**–0.14*****	**–0.07***	**–0.09****	**–0.09*****
Practical component	**–0.07*****	**–0.07*****	**–0.08*****	**–0.05****	**–0.07*****	**–0.06****	**–0.09****	**–0.08****
Interaction terms								
Female # achievement norms		**0.10****	**0.08***	0.06				
Female # structure					**0.08***	0.05		
Female # practical component							0.03	0.02
Cost–benefit components								
Study grade (ref. 1 = best)[a]								
2			**0.16*****					
3			**0.47*****					
4 (worst)			**1.12*****					
Academic self-efficacy								
Worrying about studies (–)						**–0.19*****		
Exam stress (–)						–0.00		
Easy with learning						**–0.01***		
Well-organised						**–0.05*****		
Labour market orientation								
High earnings								0.01
Clear occup. aspiration								**–0.03*****
Secure job								–0.01
Psychological burdens								
Study requirements				**0.06*****				
Exam requirements				**0.13*****				
Intercept	1.63	1.64	1.41	0.75	1.65	2.79	1.63	1.72
N	24,262	24,262	24,262	24,262	24,262	24,262	24,262	24,262
R^2	0.062	0.063	0.091	0.114	0.063	0.187	0.062	0.066
AIC	71,901	71,895	71,168	70,537	71,897	68,440	71,902	71,824
BIC	72,160	72,162	71,459	70,821	72,164	68,739	72,169	72,115

Linear regression models with cluster-robust standard errors clustered at the combination of subject group and year. All models controlled for individual-level characteristics (school grade, the determination to study before entering higher education, working during period of study, study semester, intended degree, survey year, age, number of children, parents' education) and the subject group level (teaching characteristics, social climate). Data: Student Survey 2000–2016

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

[a]Study grade is coded as follow: 1 = 1.0–1.4; 2 = 1.5–2.4; 3 = 2.5–3.4 and 4 = 3.5–4

Second, to test the mechanisms behind these interaction terms, we include our individual-level explanatory variables addressing the cost–benefit differences (such as performance, self-efficacy etc.) in the models. This second step allows us to assess whether the individual gender differences mediate the interaction between study conditions and gender. In the following, we describe these two analytical steps for each aspect of the study conditions.

While Model 1 in Table 2 only includes our institutional variables, in Models 2–4 we assess the gendered effect of achievement norms. In our theoretical section, we proposed two contrasting hypotheses regarding the effect of this study condition on dropout intentions. On the one hand, we argued that achievement norms increase men's dropout intentions more strongly than women's by exacerbating men's performance deficits (H1a). On the other, we assumed that they increase women's dropout intentions more than men's by increasing their psychological burdens (H1b). What we see is that women's dropout intentions in particular increase with higher achievement norms (interaction term in Model 2, Table 2), confirming our second hypothesis (H1b). This finding is additionally illustrated by Fig. 2, which shows that women's dropout intentions are more affected by higher achievement norms than men.

When including individual-level variables to understand the mechanisms leading to this gender difference, we find that this interaction effect is mediated mainly by women's greater psychological burdens (the interaction term is lower and not significant in Model 4 in Table 2 when controlling for psychological burdens), as expected in our second hypothesis on the gendered effect of achievement norms (H1b). Interestingly, gender differences also slightly decrease when we control for performance (Model 3). Although women show higher performance in general, additional analyses reveal that women (rather than men) perform less well under pressure.[5]

These findings suggest that the greater disadvantage faced by women under achievement norms is caused by their declining performance and greater psychological burdens, but the latter appears to be decisive for women's higher dropout intentions, as suggested by H1b.

Models 5 and 6 present the findings regarding the curriculum structure. We expected that this structure would compensate for women's lower self-efficacy, decreasing their dropout intentions more than men's (H2). Contrary to our expectations, highly structured curricula are more important for preventing men's dropout from higher education than women's (interaction term Model 5, Table 2). This is further illustrated by Fig. 3: a higher degree of structure decreases the dropout intentions for men more strongly than it does for women.

Regarding the underlying mechanisms, the interaction effect between structure and gender is not significant when differences in academic self-efficacy are considered (Model 6, Table 2). This is contrary to our expectations, since women report on average lower academic self-efficacy than men. This finding might be related

[5] With increasing achievement norms, women show lower performance than men: the Pearson correlation coefficient between achievement norms and performance (=reversed German study grades) equals –0.20 for women and –0.05 for men (both significant at $p < 0.001$).

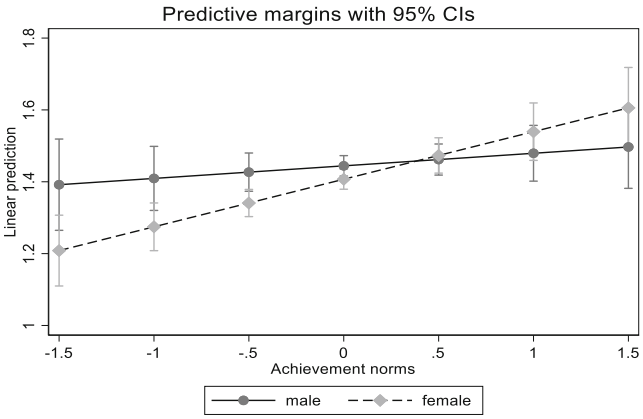

Fig. 2 Interaction term of achievement norms and gender

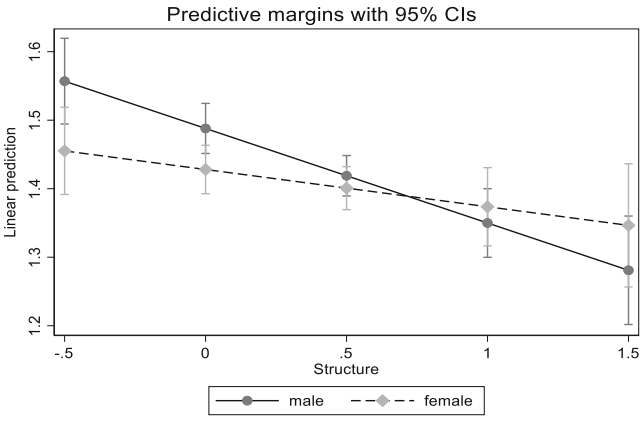

Fig. 3 Interaction term of structure of programmes and gender

to the sub-dimension of self-efficacy ('being well-organised'), on which men score lower than women. The results suggest that highly structured study programmes do not prevent dropout for less self-confident students but rather for less well-organised ones. Due to their on average lower degree of self-reported organisation, men benefit more from highly structured programmes than women, since structured programmes provide clear module divisions and study requirements.

In the remaining Models 7 and 8 we present the coefficients of the practical component of study programmes. We expected that a larger practical component would lower men's dropout intentions more than women's, due to men's stronger career orientation (H3). While the interaction term in Model 7 indicates that a larger practical component indeed lowers men's dropout intentions more sharply than women's, this term is not significant. Also, when controlling for gender differences with regard to career orientation, the interaction term does not change much (Model 8). Our empirical evidence thus does not confirm Hypothesis 3. We can rather conclude that both genders benefit from the practical component of a study programme (see

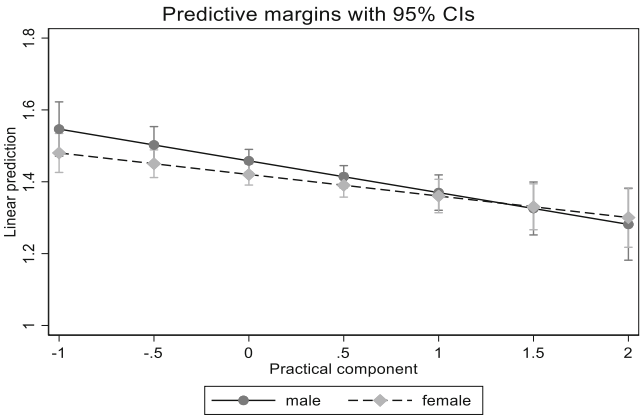

Fig. 4 Interaction term of practical component and gender. Plots from linear regression models with cluster-robust standard errors clustered at the combination of subject group and year. All models controlled for individual-level characteristics (school grade, the determination to study before entering higher education, working during period of study, study semester, intended degree, survey year, age, number of children, parents' education) and the subject group level (the remaining study conditions: structure, practical component, achievement norms, teaching characteristics, social climate). Data: German Student Survey 2000–2016

Fig. 4), because men's and women's career orientation is comparably high but differs in the sense that men report a stronger interest in a higher income and a secure job, while women typically study to achieve a particular career goal.

In sum, the results show that women's dropout intentions tend to increase in study contexts with high achievement norms, while men benefit more than women from highly structured study contexts. Both genders in turn benefit equally from a practical component in study programmes. We need to stress that these conclusions are based on coefficients that are rather small and the underlying mechanisms do not always fully explain the gendered dropout intentions driven by study conditions. However, these results are robust to different model specifications (running multilevel models or clustering the linear models at fields of study) or when applying regression models suitable for skewed distributions (Poisson regression). Additionally, to rule out the possibility that our measurement of study conditions is confounded by the gender composition of study programmes, we run robustness checks where we control for studying a gender-atypical programme (i.e. less than 30% of one gender group) (see Table 7 in the supplementary material). The results show that the above effect of study conditions on gender-specific dropout intentions is not driven by studying in a programme that is dominated by the opposite gender but by the above-described individual-level characteristics in which men and women differ.

6 Conclusion

This paper set out to better understand (1) how different aspects of study conditions (achievement norms, structure and a practical component) impact differently

on men's and women's dropout intentions, and (2) what individual-level factors (performance, organisational skills and psychological burdens) explain these gender differences.

First, the results confirm our expectations that study contexts with high achievement norms impact more on women's dropout intentions than men's. This seems to be explained mainly by women's higher psychological burdens when studying under pressure. This complements earlier research findings that women perform less well under pressure (Dweck 2007; Montolio and Taberner 2021), by emphasising that pressure also increases women's psychological burdens.

Second, men benefit more than women from highly structured study contexts, which seems to be predominantly related to their on average lower organisational skills. Contrary to our expectations, we do not see that women—who tend to be less self-confident—benefit more from highly structured study programmes. This points to the importance of the individual-level variable of organisational skills for dropout intentions, which earlier studies have overlooked. On the other hand, it shows how highly structured study contexts can help students with poorer organisational skills (mostly men) to master their studies.

The practical component of a study context is not related to gender differences in dropout intentions. Men's and women's career orientation differs in the sense that men report a greater interest in a higher income and a secure job, while women study to achieve a particular career goal. Consequently, both genders benefit from a study programme's practical component, by showing lower dropout intentions. This provides a more nuanced picture of gendered dropout compared to previous research that emphasises men's stronger career orientation (Beutel and Marini 1995; Braun and Borg 2004). It also matches nicely with more recent findings about the closing gender gap in higher education students' career orientation (Galos and Strauß 2022).

When thinking about policy implications, our results suggest that study conditions that have been implemented as part of the Bologna Process, such as higher achievement norms and a better structure of the curriculum, have had unintended consequences for gendered dropout intentions. Generally, it is important to note that equally high shares of dropout intentions among male and female students in higher education underscore the political need to address this issue for both genders. Due to differences in men's and women's reactions to various aspects of study conditions, it is, however, important to consider gender-specific policy interventions to achieve this goal. Women could benefit from measures that compensate for higher performance pressure, such as tutorial support, which clearly lowers students' stress level and increases their ability to cope (Gammon and Morgan-Samuel 2005). Also, extracurricular services, such as cognitive, behavioural and mindfulness interventions, are especially effective in reducing students' anxiety (for a meta-analysis, see Regehr et al. 2013). These interventions might counteract women's psychological burdens when facing study conditions with high achievement norms. Men in turn could profit from so-called learning communities that have been identified as having a positive impact on study success (Tinto 2000), via social engagement (Rocconi 2011). The idea of learning communities involves a structured first-year programme, especially for undergraduates, with regular possibilities to discuss experiences (Rocconi 2011).

This approach might help men, who appear to benefit from highly structured study programmes that compensate for their on average lower organisational skills, and additionally might increase their on average lower performance.

Our study comes with a number of limitations. First, since we have not observed students over time, we cannot observe actual dropout behaviour and instead have to rely on dropout intentions. Although dropout intentions are the most important predictor of actual dropout behaviour (Fleischer et al. 2019; Pannier et al. 2020), they do not perfectly predict actual dropout rates. Moreover, although there is ample empirical evidence that men are more likely to drop out, this gender gap cannot be seen when measuring dropout intentions. As discussed earlier, this could be related to women's greater self-doubt, which increases their dropout intentions (but not necessarily their actual dropout), while men's overrepresentation in fields of study with high performance pressure might lead to higher actual dropout among men, who drop out because they do not pass the exams (without having had dropout intentions before). Although we consider these gender differences (performance, self-doubt etc.) as main mechanisms behind gendered dropout intentions, we cannot assume identical results for real dropout, which remains a clear limitation of our study. Given the limitations of our cross-sectional data, we leave the empirical test of these assumed mechanisms for future research. Second, although we measure study conditions more directly than previous research, by aggregating individual views at the level of subject groups instead of relying on individual-level measurements, subject groups are still rather heterogeneous, and a measurement at the level of study programmes would be preferable, if case numbers allow. Third, while our results are shown to be robust to a variety of checks, the coefficients of the interaction terms presented in the findings section are often rather small, which is why caution must be applied in interpreting the findings.

Nonetheless, we believe that our study provides important evidence to help understand the gendered roles of different aspects of study conditions in regard to dropout intentions. Our results show that some of the study conditions that are at the centre of the Bologna Process might actually have had unintended consequences for gendered dropout intentions. They also show how important it is to consider study conditions in addition to individual-level factors when trying to understand men's and women's dropout behaviour in higher education.

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