Beyond the Binary: A Comparative Analysis across Europe of Non-Binary Student Experiences and Methodological Considerations for Gender Measurement

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Abstract

Gender is a complex variable that is no longer understood as a binary construct. It is a constant task of social science to critically question variables and survey instruments and to close the gap between theory and empiricism. Thus, higher education research must also design the measurement of gender in such a way that gender-inclusive and theoretically valid results can be gained. To date, trans and inter students have hardly been included in the analyses of European higher education research. This paper presents the first European comparative analysis of non-binary students based on the EUROSTUDENT VII microdata set published in 2023 (Cuppen et al. 2023). This dataset covers 17 countries of which eight include information on more than fe(male) students. Bivariate-descriptive as well as multivariate analyses based on these eight countries show that students with a non-binary gender indication are more likely to be affected by psychological stress and financial difficulties across countries and are more often considering dropping out of their studies. Thus, non-binary students belong to the group of vulnerable and disadvantaged students whose inclusion is claimed to be essential in the "Principles and Guidelines to Strengthen the Social Dimension of Higher Education" (Advisory Group 1 on Social Dimension, 2020) for the European Higher Education Area (EHEA). The methodological obstacles encountered during the research process are used to reify the criticism of the operationalization of gender in quantitative research. Finally, possibilities for improved gender measurement are discussed. Accordingly, the paper provides answers to two research questions: 1. In which aspects does the study and life situation differ between students with a non-binary gender indication and those with a female or male gender indication in an international comparison? 2. How can a gender-sensitive and research-practical set of gender questions be implemented in student surveys?

1. Introduction

The conventional construction of gender in social sciences typically simplifies human beings into two categories: men and women. All people can be categorised in one of these categories and the task of social research is to investigate differences between these two groups. Most people who have been socialised in the so-called Western world, used to believe that there are only two possible gender categories. Every day we move within this binary gender order. When we meet or describe people, we often immediately categorise them as man/woman and are confused when we are unable to do so. This reveals what is described in queer-feminist theory as heteronormative hegemony (Ludwig, 2011), a concept that also criticises the notion that gender differences are inherently natural.

But the social world is much more complex. Similar to earlier feminist perspectives in regard to the construction of women as subordinate to men, a queer-feminist perspective exposes the binary categorization of gender as a powerful, socially constructed order that limits individuals beyond conventional norms and deprives people of opportunities to live – or even to survive – as recognized subjects. This critical perspective is gradually influencing legal frameworks, medical practices, language usage, and everyday situations, creating space in societal discourse for individuals existing beyond the categories of man and woman. Consequently, empirical social sciences face the challenge of expanding their gender categories to encompass intersex and transgender individuals in their analyses. While there has been contemplation on this matter for more than 25 years (Sumerau et al., 2017), the actual implementation in research practices is slow and comes with unresolved challenges. So, there are also gaps in European higher education research, both in the inclusion of intersex and transgender students in the analyses as well as in the methodology of gender-specific data collection.

To fill these gaps, this article reports the results of the first international comparative analysis of the study and living conditions of students with a non-binary gender indication in European countries (Dau, 2023). The analysis is based on the microdata obtained from the EUROSTUDENT VII project in which data from student surveys of European countries are processed and collected for internationally comparable analyses[1]. This paper summarises the main results and thus provides an initial insight into the living and study conditions of students with a non-binary gender indication. Finally, the methodological challenges of collecting data on gender are briefly discussed and a proposal for a new question design is made. The paper thus addresses two questions:

1. In which aspects does the study and life situation of students with a non-binary gender indication differ from those with a female or male gender indication in an international comparison?

2. How can a gender-sensitive and research-practical question about the respondent's gender be implemented in student surveys?

2. State of Research

A quantitative analysis of individuals with a non-binary gender identity encounters an initial challenge due to the limited estimates available regarding their proportion in the general population, made more

[1] The used EUROSTUDENT VII micro dataset, first published in 2023, covers 17 countries of which eight include information on more than female or male students (Cuppen *et al.*, 2023).

difficult by the lack of standardized counting methods. Some estimates rely solely on medical predefined characteristics (often defined by the term sex), while other counts include lived gender expression or gender identity in everyday life. Officially documented records of non-binary gender usually only document intersexuality, thus, only including individuals with medically confirmed non-binary sex characteristics. But even within medical literature, there is disagreement about which physical characteristics categorise a person as neither 'fully' male nor 'clearly' female because "sex is given by our position in a multidimensional graph (in which the axes represent genotypic sex, gonadal sex, phenotypic sex, and hormonal sex)" (Cresti, Nave and Lala, 2018). Lower estimates, for instance, consider individuals only as intersex if the medically defined sex characteristics do not match the phenotypic binary categories at the chromosomal level (Sax, 2002). Higher estimates include a broader physical variation at the chromosomal, hormonal, or anatomical level, which can be found in about 1.7% of live births (Blackless *et al.*, 2000; Preves, 2002). Moreover, gender variations can be present from birth or develop later during puberty. In addition, those whose physical characteristics align with the medical definition of female or male but identify as non-binary based on their lived gender identity are not documented in the official statistics. However, it is evident that psychological and lived gender identification and attribution has a tangible impact on life situations, including academic experiences, which is of greater interest to social science and higher education research than the physical, often not (directly) visible bodily traits. But current sources capturing the lived gender identity are scarce and country specific. Studies in the United States estimate that approximately 0.6% of adults and adolescents self-identify as transgender (Herman et al., 2022). A study among Brazilian adults estimates a prevalence of 2% transgender and non-binary individuals (Spizzirri et al., 2021), while in the United Kingdom, the estimated proportion in the general population is around 1% (GIRES, 2011). Thus, it is reasonable to assume a proportion of up to 2% non-binary individuals in the overall population, though the distribution within the European student population may vary, but for which no population data is currently available.

The living situation of transgender and intersex individuals, in comparison to cisgender[2] binary individuals, has been examined in various studies (Grant *et al.*, 2011; de Vries *et al.*, 2020; European Union Agency for Fundamental Rights, 2020; Kasprowski *et al.*, 2021). Available information indicates that transgender and intersex individuals appear to experience a higher prevalence of mental health challenges, such as depression and anxiety, and are subjected to increased stigmatization (Bradley, 2020; Zeeman and Aranda, 2020). Individuals with intersex variations also report physical and psychological impacts of medical treatments, often carried out at birth or during childhood (Blackless *et al.*, 2000; European Union Agency for Fundamental Rights, 2020). Moreover, instances of school dropouts and elevated levels of suicidal ideation or attempts are more frequently observed within the intersex and transgender population (Jones, 2016; Herman, Brown and Haas, 2019). For EU countries, it has been demonstrated that challenging financial circumstances represent another domain disproportionately affecting intersex and transgender individuals. More than half of the intersex and transgender respondents in the LGBTI Survey conducted by the European Union Agency for Fundamental Rights (2020) reported difficulties in making ends meet financially; reasons for this include higher unemployment rates due to discrimination in the labour market based on their gender expression or transition process (European Commission, Directorate-General for Justice, Tobler and Agius, 2012). In summary, existing research findings highlight disparities in educational attainment,

[2] Trans, trans* or transgender is used as a generic term for/by people who do not or only partially identify with the gender assigned to them at birth. In contrast, cisgender means that the gender identity corresponds to the gender assigned at birth. Inter, inter* or intersex are (self-)descriptions of people with physical characteristics that do not clearly correspond to the cultural-medical norms of male or female (see also for an overview of various basic terms here European Commission. European Union's Judicial Cooperation Unit., 2012).

socio-economic status, labour market positioning, and overall health conditions between individuals with cisgender and intersex respectively transgender identities (Grant *et al.*, 2011; Harrison, Grant and Herman, 2012; Nowakowski, Sumerau and Mathers, 2016).

For the situation of students identifying as intersex and transgender in Europe, predominantly critical discussion, field reports, and some recommendations on how to deal with trans and intersex students at universities exist. For the USA, for example, (Beemyn, 2019) published the anthology *Trans Students Book* in 2019, which provides insightful summaries of a range of recent and older studies on transgender and intersex students in the United States, but also claims that more nuanced research is still needed. However, based on the existing results, it is clear that transgender and intersex students more frequently experience verbal, physical, and sexual assaults than the general population. A study conducted in 2009 in England, Wales, and Northern Ireland, for example, reveals that transgender students often experience discrimination in various forms (Valentine and Wood, 2009). For instance, they may avoid using binary-coded restrooms due to fear of verbal or physical attacks and worry about not being addressed with the correct pronouns or names, which increases the likelihood of involuntary disclosure and potential bullying (ibid.). Subsequently, this leads to "stress or loss of confidence, and self-exclusion from specific spaces within the university" (ibid., p. 2), thereby raising the likelihood of skipping classes or abandoning their studies altogether. Furthermore, Garvey and Dolan (2021) illustrate how cis-normativity[3] negatively impacts the academic success of queer and transgender students, primarily drawing on results from American students. They state that the academic success of intersex and transgender students is impaired by verbal and physical attacks, and stigmatization in the academic environment, resulting in a sense of exclusion. Moreover, they also mention a lack of financial support from their families as a disadvantage that seems to affect transgender students more often (Sources, zit. N. xx). This is mainly due to the fact that parents often reject their transgender children and parents reduce financial support services for this reason (see also in Valentine & Wood, 2009). Garvey and Dolan (2021) also report that experiences of discrimination faced by transgender students resulting from infrastructural constraints or administrative obstacles, as well as a lack of representation (and role models) in teaching and research.

Overall, the studies as well as the recommendations for action identify recurring areas in which transgender and intersex students encounter discrimination. These are: a) infrastructural barriers such as binary organised sanitary facilities, changing rooms or accommodation for students, b) administrative requirements such as registration in university administrative systems, c) communication in various speaking situations, e.g. during lessons and d) representation in research and teaching.

Drawing on the results of the barriers faced by transgender and intersex persons in general and the existing results on non-binary students, it can be stated that persons who identify as intersex and transgender are more frequently affected by psychological stress, experiences of discrimination and financial insecurity. Therefore, the hypotheses have emerged that a European country comparison will also show that non-binary students are more affected by

1.) mental health problems,
2.) financial difficulties,
3.) and rate their study situation worse than students in the female or male gender category.

[3] Cis-normativity refers to the idea that all people are (binary) cisgender and that physical sex characteristics determine gender identity and gender expression (see also Lindqvist et al., 2021).

3. Methods

To understand how the results presented in the next section were attained, this section describes how the sex/ gender characteristic was collected for the project (see Figure 1). This also gives an insight into the methodological challenges involved in analysing non-binary students.

Figure 1: Formulation of the sex/ gender question for the EUROSTUDENT VII project

6.2. **What is your #sex?**

Single choice.

- ○ Female (→ please go to question 6.4)
- ○ Male (→ please go to question 6.4)
- ○ *[if existing as official category in #country] #Other* (→ please go to question 6.4)
- ○ *[Optional]* #I prefer not to assign myself into the above-mentioned categories (→ please go to question 6.3)

Source: EUROSTUDENT Questionnaire (IHS & DZHW, 2019).

The hash # in the question text "What is your #sex?" indicates that the researchers should use the official wording for sex which is common in the higher education statistics of their respective country. As the English language reveals, the terms sex or gender alone result in different theoretical understandings of gender.[4] A first ambiguity in the operationalisation used is therefore that it leaves room for interpretation as to which understanding of gender is being surveyed. Hence, respondents cannot conclude if the officially registered sex entry or gender identity is surveyed.[5] Secondly, the response categories are also vaguely formulated, e.g.it remains open what exactly is meant by "Other". In particular, "I prefer not to assign myself" is a 'black box', as several interpretations are possible here. So, on the one hand it might be that the respondents with a non-binary gender identity cannot or do not want to identify with the term "Other"[6] and "I prefer not to assign myself to the above-mentioned categories" suits them better. On the other hand, it is equally conceivable that respondents solely choose the fourth category because they want greater anonymisation in the questionnaire. Due to these uncertainties in the operationalisation, the two non-binary gender categories are considered separately in the analysis.

[4] A much discussed and well-known distinction in early feminist debates is that between sex and gender, whereby *sex* often refers to the anatomical differences between male and female bodies and *gender* to social attributions and personal identification. One concern of feminist theory was and is to criticise the fact that conclusions are often drawn from physical characteristics to character traits, which are therefore considered natural and unchangeable. Furthermore, Judith Butler (1990) is known for having emphasised that what is socially understood as sex is also socially constructed.

[5] The officially registered gender entry is usually negotiated as sex, as it reflects the assignment made at birth, which was based on the physically visible sexual characteristics at that time. Moreover, gender identity can theoretically also be differentiated into the self-assigned gender identity, the externally perceptible gender expression, and respondents can also more or less fulfil gender role expectations. If only gender/ sex (or the corresponding country-specific wording of the official statistics) is used without a short explanatory text, no valid conclusions can theoretically be drawn from the responses, as the common understanding is questioned. Here, Queer Theory points out that these levels of gender can diverge.

[6] Because "Other" can be read as a negatively formulated umbrella term for a deviation from the norm of the binary gender. This is when the concept of *Othering* takes place: " [...] a practice which may reinforce and reproduce subordination by defining who differs from the norm" (Johnson et al., 2004 cited in (Lindqvist, Sendén and Renström, 2021).

The EUROSTUDENT VII microdata set covers 17 countries of which only eight include information on more than female and male students (see Table 1). Another aspect worth mentioning is that for the analysis, four countries have been grouped together due to insufficient case numbers in the non-binary gender category (n<30). This resulted in a total of five country categories for the international comparison (AT, FI, IR, NL, and the grouped country variable consisting of HR, LT, LUX, SI).

Table 1: Frequency table of weighted case numbers by sex/ gender indication (only countries with case numbers in at least one non-binary gender category)

What is your #sex?	Austria	Croatia	Finland	Ireland	Lithuania	Luxem-bourg	Nether-lands	Slovenia	**Total**	**Total in %**
Female	22 155	1 045	3 716	10 333	1 887	389	8 286	1 209	49 020	53%
Male	18 615	771	3 188	9 354	1 447	321	7 832	879	42 407	46%
Other	86		30						116	0.1%
I prefer not to assign myself	1 080	24	73	213	22	9	157	24	1 602	1.7%
Total	41 936	1 840	7 007	19 900	3 356	719	16 275	2 112	93 145	100%

Empty cells : Category not included in the national questionnaire.
Source: Weighted data, EUROSTUDENT VII Micro Data, Cuppen et al., 2023.

The investigation first conducted exploratory bivariate descriptive analyses with cross-tabulations for six thematic areas that provide an overview of the study and life situation of non-binary students: socio-demographic characteristics, higher education characteristics, health, financial situation, employment, and the assessment of different aspects of the study situation. In a first step, *intra*national significant differences between non-binary and binary students within each country have been identified. The identification of clear, i.e. significant differences relied on confidence intervals instead of conventional significance tests such as the Chi2 test. That is because the latter quickly run towards zero due to the high case numbers in the female and male categories (see Table 1) and thus tend towards alpha errors type I (false positive) (Lin, Lucas and Shmueli, 2011, 2013). Ultimately, an *inter*national trend was identified only if non-binary students in at least four of the five countries differed significantly from male *and* female students, i.e. the confidence intervals did not overlap with those of the non-binary categories. This seemed to be the most promising and statistically rigorous way to deal with the challenges posed by the ambiguous wording of the gender question in the response categories and the different case numbers in the gender categories or low case numbers in the non-binary categories. In the second stage, multivariate logistic regressions were run to analyse the effect of the sex/ gender indication on the three hypotheses (see page 4) in comparison to other predictors. Overall, despite the ambiguous operationalisation, the results were very clear in some areas.

4. Key findings

This section reports the results that are considered as cross-national trends from the exploratory bivariate descriptive analyses. Followed by a brief contextualising of the hypotheses by drawing on the

results of the multivariate analyses and findings from the literature. The following cross-national trends were observed: [7]

- In all countries, students with a non-binary gender indication state more frequently that their parents are financially not well-off (at all).
- In all countries, non-binary students are many times more likely to study subjects in the ISCED field of study "Arts and Humanities".
- In all countries, non-binary students are more frequently affected by at least one health problem (depending on the country, up to four times more frequently than students with a female/male gender indication). Mental health problems are far more often reported by students with a non-binary gender indication (twice to six times as often, see Figure 2). Another long-standing health problem (not further specified in the questionnaire) is also reported twice to four times more frequently across countries.
- Non-binary students in four countries (excluding Ireland) are around 10 to 20 percentage points more likely to report financial difficulties. In these four countries, non-binary students also state that they are unable to pay an unexpected bill (neither themselves nor can they count on support from others) (see Figure 3).
- In three countries, non-binary students are more likely to seriously consider dropping out of university and in two countries they are more often unsure about this (see Figure 4). Furthermore, non-binary students in all countries are more likely to consider changing their study programme than students in the female or male gender categories.
- In all countries, non-binary students state more frequently that they get along less well with teaching staff.
- In all countries, non-binary students state less frequently that they have a lot of contact with their fellow students.
- In four countries, non-binary students are more often dissatisfied with the learning support provided by their universities.
- In all countries, non-binary students are less likely to recommend their study programme to others.

Overall, students with the non-binary gender indication "Other" and "I prefer not to assign myself" are very similar in all aspects analysed. In addition to these clear cross-national trends, some tendencies across several countries exist.[8] Tendencies among non-binary students are, for example, that they rate the higher education infrastructure less favourably, are more likely to feel that teachers are not interested in what students have to say, indicate less often to feel that they belong in higher education and are more likely to have completed their schooling abroad (i.e. to be international students). At the same time, they show no or only rarely cross-national differences in some key characteristics compared to students with a binary gender indication, such as age or their primary source of income, the extent of employment, the intensity of study, the assessment of their own performance compared to fellow students or the intention to study one day.

[7] This paper is a condensed summary of an extensive research project (Dau, 2023). A cross-national trend means that at least four of the five countries analysed showed significant differences between non-binary and binary students for the same characteristic.

[8] Tendency means either that non-binary students are similar in one aspect across at least four out of the five countries analysed, but the differences are not significant (i.e. not clear enough) or that only three countries show significant differences between non-binary and binary students.

To put these observable results into an explanatory context, at least the three identified trends described in the hypotheses were analysed using logistic regressions: In a comparison of several substantiated factors, a non-binary gender indication seems to have a strong effect on the probability of mental health problems occurring (see Figure 5). For the probability of financial difficulties (see Figure 6) and an increased intention to drop out of university (see Figure 7), a non-binary gender does not increases the probability of occurrence as much as other factors, other variables are much more helpful for the prediction .

But how can this relatively strong structural connection between a non-binary gender indication and a mental health burden can be interpreted? Firstly, the regression model for mental health among students has a low explanatory power overall (McFadden $r^2 = 0.07$). This means that there are other explanatory factors behind this relation that could not be included in the model because relevant variables are missing in the data set. For the connection between gender and mental health problem, it is particularly important to emphasise that this result can be explained by social factors. It is not sex/ gender per se that is responsible for the high prevalence, but rather socio-cultural factors resulting from the experience of living with a non-binary gender.

Due to the imprecise operationalisation (formulation of the response categories and the question text, see chapter3), it is strictly speaking not theoretically flawless to draw conclusions about intersex and transgender students from respondents with non-binary gender information. Nevertheless, the empirical results on these gender categories are consistent with the results found in the literature on trans and intersex students. This includes, above all, the result on the increased impact of psychological stress. It is known in theory and from other research that people with non-conforming gender experiences are often affected by exclusion, stigmatisation, and discrimination in their everyday (student) lives. It is worth recalling studies in which this socio-cultural, psychological context is referred to as "minority stress" (Williams, 1992; Bockting *et al.*, 2013; Tankersley *et al.*, 2021). The non-binary gender specification can therefore be read here as a proxy for experiences of discrimination and points to a complex relationship that cannot be explained with quantitative social science data alone. The current state of research shows that intersex and transgender students are often confronted with stigmatisation and violent attacks in a world that denies their existence. Thus, it is primarily reasonable to interpret a non-binary gender indication as an indicator of the experiences of discrimination associated with gender non-conforming gender affiliation. But such experiences could not be depicted in the model. It should also be borne in mind that the surveys took place before the COVID-19 pandemic and studies show that mental health has deteriorated among students as a result of the COVID-19 pandemic (Holm-Hadulla *et al.*, 2021; Vötter, 2021; Chen and Lucock, 2022). All of this provides a motivational basis for further research.

As described, a non-binary gender indication does not appear to be predictive for the presence of financial difficulties (see Figure 6). However, the descriptive analysis shows that non-binary students are more frequently in categories that, according to the logistic regression model, increase the probability of financial difficulties occurring. This may explain why non-binary students are more frequently affected. According to the calculated regression model, the parents' financial situation appears to have a major influence on the existence of financial difficulties in comparison to other characteristics and across all students. As the analysis shows that non-binary students frequently indicate that their parents are financially not well-off this may explain a part of the higher prevalence of financial difficulties among them in the present analysis. . Another reason cited in the literature is the often-strained relationship between parents and intersex and transgender students, which often leads to them not providing financial support if they reject the children's gender-non-conforming identity (Ryan et al. 2009, cited in Garvey and Dolan 2021; Valentine and Wood, 2009). This argument

gains weight in light of the fact that, according to the regression model, it is primarily parents' financial situation that determines the students' financial situation (see Figure 6).

A non-binary gender indication alone also does not make a significant explanatory contribution to the probability of dropping out of university (see Figure 7). However, the higher prevalence of intention to drop out among non-binary students is also explained by the fact that they are more likely to be found in the categories that make dropping out more likely in general. The descriptive results show that non-binary students are less likely to feel a sense of belonging to the academic world and are less likely to recommend their study programme to others. These aspects in turn have the strongest influence on the intention to drop out of university in the model calculated. The descriptive results also show that non-binary students are more likely to be found in other less influential but nevertheless explanatory factors for an increased probability of dropping out. These include having little contact with other students, getting along less well with lecturers, having financial difficulties, or health problems. In contrast, the age structure among non-binary students is not different to that of binary students and they rate their academic performance just as highly or are employed just as often as female and male students. The increased intention to drop out therefore appears to be more caused by university-related characteristics. This means that a worse experience in higher education settings in particular can be used as an explanation for the increased intention to drop out among non-binary students.

In summary, it can be said that the literature and the current state of research as well as the combination of bivariate-descriptive analyses with multivariate methods converge towards similar conclusions. It is also clear that the quantitative methods have their limits and cannot explain these multifaceted interrelationships on their own, especially if little is known about the object of investigation. However, the insights generated by this research can provide the basis for further hypotheses that can be tested with improved surveying on gender and other research designs. Multidisciplinary and intersectional approaches as well as qualitative methodology would make a constructive contribution to explaining these results.

5. Implications for higher education policies

The "Principles and Guidelines to Strengthen the Social Dimension of Higher Education" (Advisory Group 1 on Social Dimension, 2020) for the European Higher Education Area (EHEA) aim to promote the inclusion, equality, and diversity of vulnerable, disadvantaged, and underrepresented students. Intersex and transgender students are underrepresented in higher education research and policy (source needed?). They are also among the most vulnerable students because they are more exposed to the risk of discrimination: "[…] people who continually occupy a space of non-conformity— as many non-binary people do— may also continually occupy a position of vulnerability." (Frohard-Dourlent *et al.*, 2017, p. 4). The results of this study also show that they are among the most disadvantaged students because they are often burdened by health problems and financial difficulties. This means that there is an urgent need for focused higher education policy interventions for this group of students based on internationally established guidelines.

If the insights gained about non-binary students in an international comparison would be used as a data basis for an evidence-based improvement of the social dimension of higher education, the following higher education policy implications could be formulated:

Since experiences of discrimination based on non-conforming gender increase the presence of mental health problems among students, psychological counselling centres can be set up whose staff are also trained to deal with LGBTQIA[9] concerns and gender-sensitive issues.

If financial difficulties among transgender and intersex students are also due to a strained parent-child relationship, more scholarships can be offered to students affected by gender-based stigmatisation regardless of the parents' income. Health impairments also have an impact on the financial situation, with the results suggesting that low-cost psychotherapeutic support should be made available to (all) students. The COVID-19 pandemic has also shown the general need for this.

The analyses also show that university-related characteristics such as a lack of a sense of belonging or a negative teacher-student relationship are decisive factors that cause gender non-conforming students to drop out of their studies more frequently. More awareness, recognition, and inclusion of these groups in teaching and research would therefore appear to be helpful steps. The empirical analyses and the literature also indicate that peer groups (or interest groups) and specific contact points at universities can be particularly helpful for gender non-conforming individuals.

Since all the disadvantages described here are due to stigmatisation, discrimination, and exclusion of gender non-conforming students, greater acceptance, representation, and inclusion of these groups at universities seems to be of primary relevance. Specific measures that have not already been mentioned include allowing registration with a self-chosen pronoun and name, making infrastructural adjustments (sanitary facilities, changing rooms, accommodation), integrating or implementing gender-sensitive knowledge into teaching content, offering educational programmes and also employing intersex and transgender individuals as teaching staff, as well as involving them in the development of measures

The concerns and existence of these groups must also be integrated into higher education policy development guidelines. Finally, it should be emphasised how important the adequate inclusion of intersex and transgender students in higher education research is and that improved survey methods are necessary for this.

[9] Lesbian, Gay, Bisexual, Transgender, Queer/ Questioning, Intersex, Asexual

Table 2: Suggestions for improving the study situation for non-binary students at the micro, meso, and macro level of measures

Individual level	University level	Governmental level
Use of gender-neutral pronouns or ask for self-chosen pronouns in spoken and written interactions	Adopt internal documents (policies and protocols) that explicitly consider gender identity and gender expression	Develop transgender-inclusive curricula in research and teaching
Build a sense of belonging for intersex and transgender students and do not assume the gender of a person only by physical appearance	Promote contact points and student associations for gender-non-conforming people to find like-minded people and advice	Support adjustments in the infrastructure like sanitary facilities, changing rooms, accommodation for intersex and transgender students and university staff
As teachers: Avoid reading lists of names out loud or using only examples of men and women in teaching content	Psychological counselling centres can be set up whose staff are also trained to deal with LGBTQIA concerns and gender-sensitive issues	Offer and facilitate financial support for low-cost psychotherapeutic treatments for students
Request or conduct workshops, events and other educational programs that promote awareness, recognition, and inclusion of transgender and intersex people	Offer educational content, events on LGBTIQA-related topics or make a statement on inclusion on the website	Allow registration with a self-chosen pronoun and name at universities
	Employment and involvement of intersex and transgendered academic staff in teaching and researching and the development of measures	Involvement of intersex and transgendered academic staff in the development of measures
	More scholarships to students affected by gender-based stigmatisation	More scholarships to students affected by gender-based stigmatisation (regardless of the parents' income)

6. Measurement of Gender in Large Student Surveys

Finally, this section presents a proposal for operationalising the gender question for the EUROSTUDENT project based on the methodological critique of other research (Bauer *et al.*, 2017; Frohard-Dourlent *et al.*, 2017; Garvey, 2019; Lindqvist, Sendén and Renström, 2021; Muschalik *et al.*, 2021; National Academies of Sciences, Engineering, and Medicine, 2022; Diethold, Watzlawik and Hornstein, 2023) and observations during the analyses conducted for this project. The following aspects can be derived from the criticism of gender measurement in the social sciences (and beyond):

- When designing the intended research project, it is important to determine at the beginning which aspects of gender are of interest and aim to have an unambiguous understanding of gender. For example, is the research interest more focused on gender roles, gender expression, gender identity or physicality?

- According to the research interest, the question text and response categories must be coherent, distinctive, not too complex, and inclusive. Question modes that allow multiple responses are sometimes practical, but require ex post hierarchisation by researchers, which should be avoided.
- Currently no standardised solution for the missing reference statistics on non-binary gender individuals exists and alternative approaches for weighting must be considered.
- Practical research aspects must also be taken into account. For example, a comparison with official data must be possible to be able to weigh the survey data representatively. The question design must be comprehensible for the respondents and should not provoke respondents to cancel the questionnaire (e.g., people who reject gender diversity also should be considered when formulating the question). At the same time, discrimination through too few response categories or degrading formulations must be avoided and theoretically valid analysis categories for a coherent interpretation must be possible.

A three-step query is proposed to cover as many aspects as possible, knowing that this suggestion cannot meet all needs, but serves as basis for discussion:

The first step would be to clearly ask for the officially registered gender entry, whereby a reference text should make the purpose of the question clear (this is the comparability with official statistics). In the second step, the correspondence between the officially registered sex/ gender entry and one's own gender identity would be asked, whereby this can be answered with a simple yes/no. One of the aims of this mode is to prevent respondents who do not (or do not want to) understand the question about gender identity from cancelling the survey.

In the next step, people who have previously selected "No" would be asked about their self-chosen gender designation, with an open response field available. Research suggests that this offers some advantages over fixed gender categories.

1. *[Mandatory]* With which sex are you officially registered at the university?
   Explanation text: This question is for statistical reasons. Your self-attributed gender is asked following.
   Response options: Categories officially registered
2. Does the registered sex match your gender identity?
   Response options: Yes/ No
3. *[If No was selected]* Which gender do you currently identify with?
   Response option: Open field

Overall, for a gender-sensitive, theoretically precise, and yet practicable data collection, several aspects must be considered, and the data collection variant depends heavily on the overall design of the research and the research interest. It should be noted that some contradictions must be overcome to be able to research with quantitative methods on marginalised groups at all. From the perspective of critical quantitative research, marginalised and under-researched groups should be included in the investigation and reporting, even without a perfect solution, so that initial results can be obtained and a basis exists on which the survey methods can be further developed (Garvey *et al.*, 2019). In any case, it must be noted: It is not the gender-non-conforming persons who are the problem, but the survey methods that do not allow their reality of life to be reflected in the analyses.

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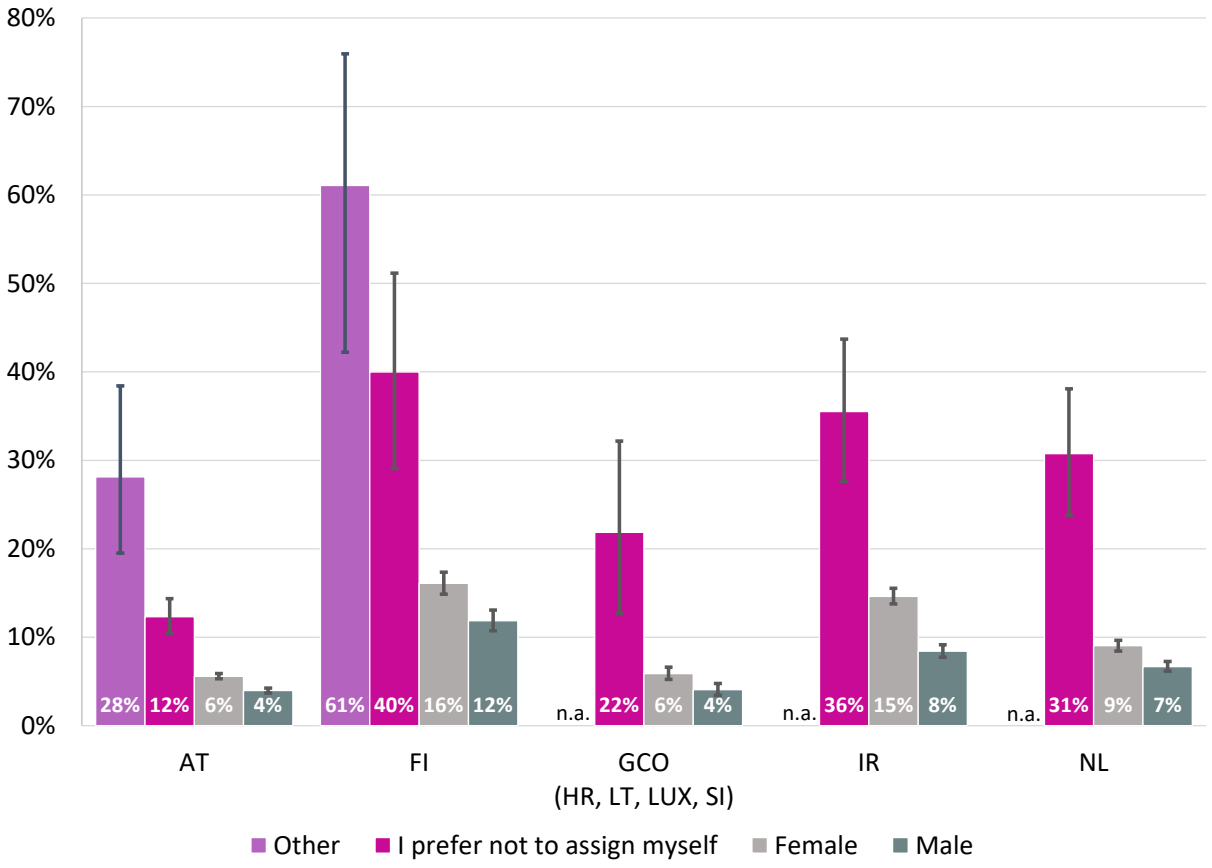
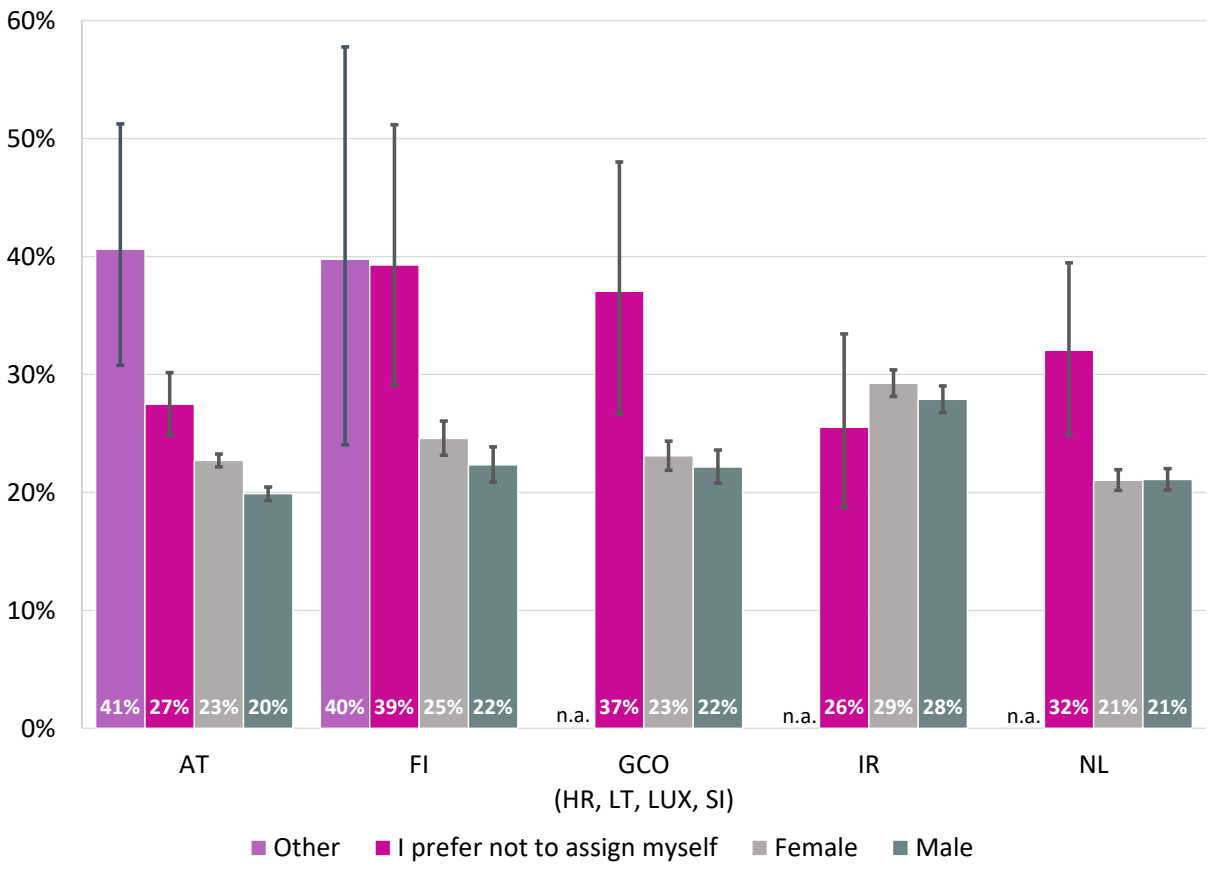
8. Appendix

Figure 2: Proportion of students with a mental health problem by sex/ gender and country with 95% confidence intervals (axis section 80%)



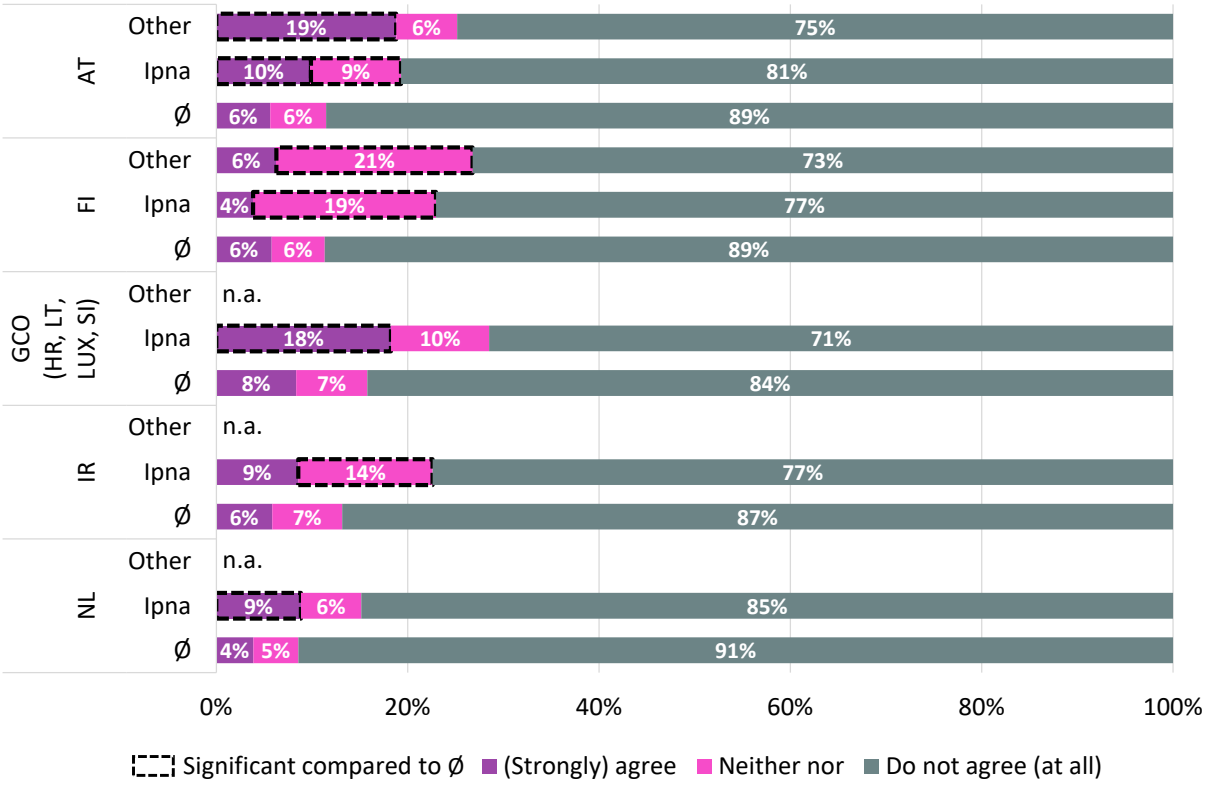
If the confidence intervals do not overlap, there are significant differences between the groups. Wide spreads of the confidence intervals exist due to low case numbers.
n.a.: not available as there is no response category "Other" in these countries.
AT: Austria, FI: Finland, GCO: Grouped countries (Croatia, Lithuania, Luxembourg, Slovenia), IR: Ireland, NL: Netherlands.
Source: Own calculations with weighted data (Dau, 2023) based on EUROSTUDENT VII micro data (Cuppen et al., 2023).

Figure 3: Proportion of students with financial difficulties by sex/ gender and country with 95% confidence intervals (axis section 60%)



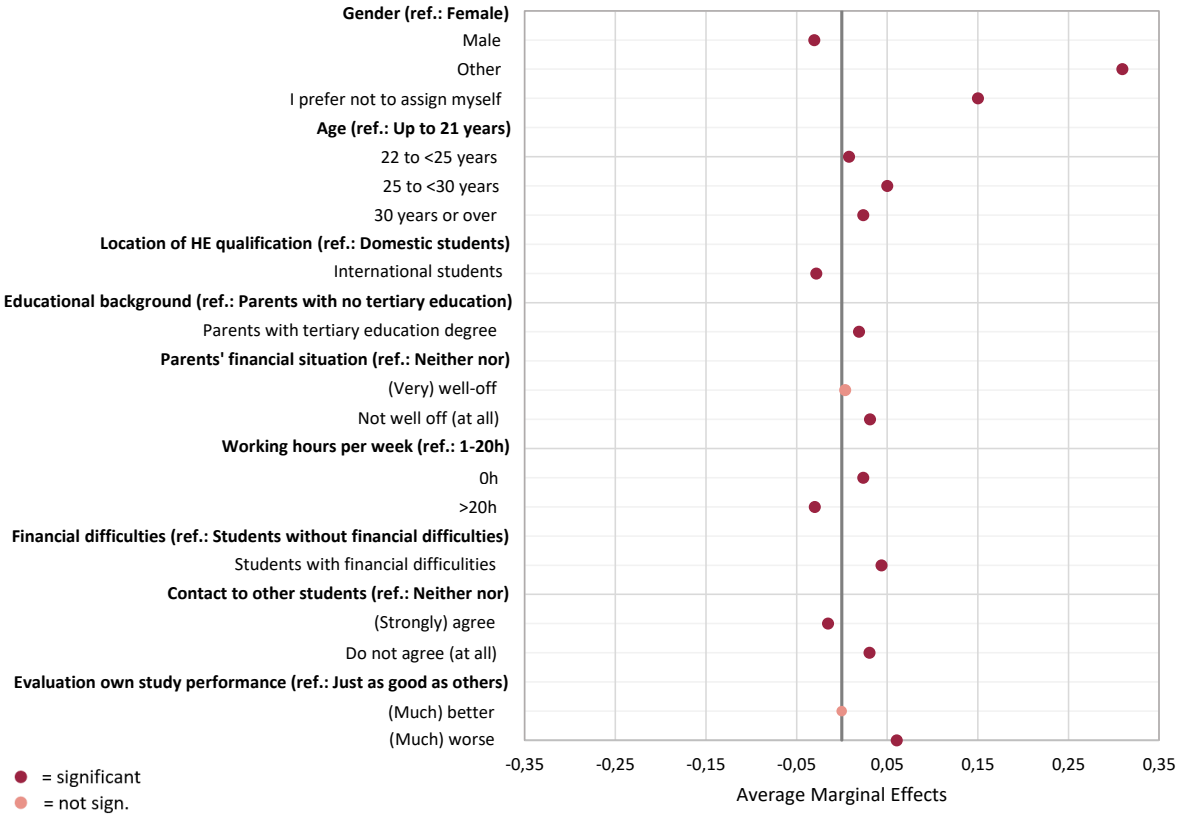
If the confidence intervals do not overlap, there are significant differences between the groups. Wide spreads of the confidence intervals exist due to low case numbers.
n.a.: not available as there is no response category "Other" in these countries.
AT: Austria, FI: Finland, GCO: Grouped countries (Croatia, Lithuania, Luxembourg, Slovenia), IR: Ireland, NL: Netherlands.
Source: Own calculations with weighted data (Dau, 2023) based on EUROSTUDENT VII micro data (Cuppen et al., 2023).

Figure 4: Intention to drop out of higher education by sex/ gender and country (agreement with the statement "I am seriously thinking of completely abandoning my higher education studies")



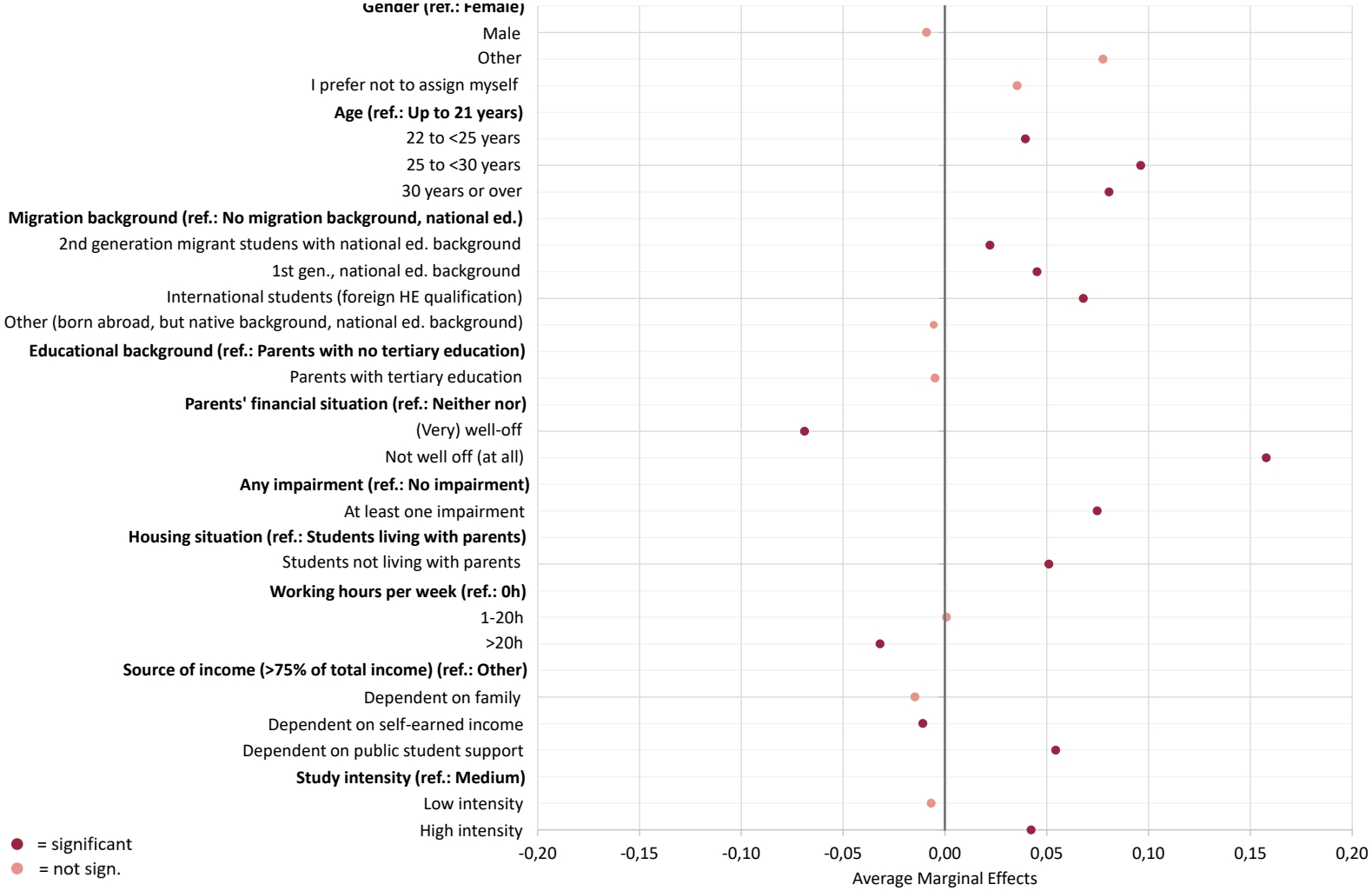
The response options were recoded from a 5-point scale to a 3-point scale.
The response categories "1+2 (strongly) agree" and "3 neither nor" with a black dotted border indicate a significant difference to the average. Due to the much higher number of cases in the gender categories “female” and “male”, the average value is almost identical to that of all students in the binary gender categories and expresses their response behaviour.
Ipna: "I prefer not to assign myself".
If the confidence intervals do not overlap, there are significant differences between the groups. Wide spreads of the confidence intervals exist due to low case numbers.
n.a.: not available as there is no response category "Other" in these countries.
AT: Austria, FI: Finland, GCO: Grouped countries (Croatia, Lithuania, Luxembourg, Slovenia), IR: Ireland, NL: Netherlands.
Totals >100% result from rounding differences.
Source: Own calculations with weighted data (Dau, 2023) based on EUROSTUDENT VII micro data (Cuppen et al., 2023).

Figure 5: Logistic regression model "Mental health" with Average Marginal Effects (axis section ± 35% points)



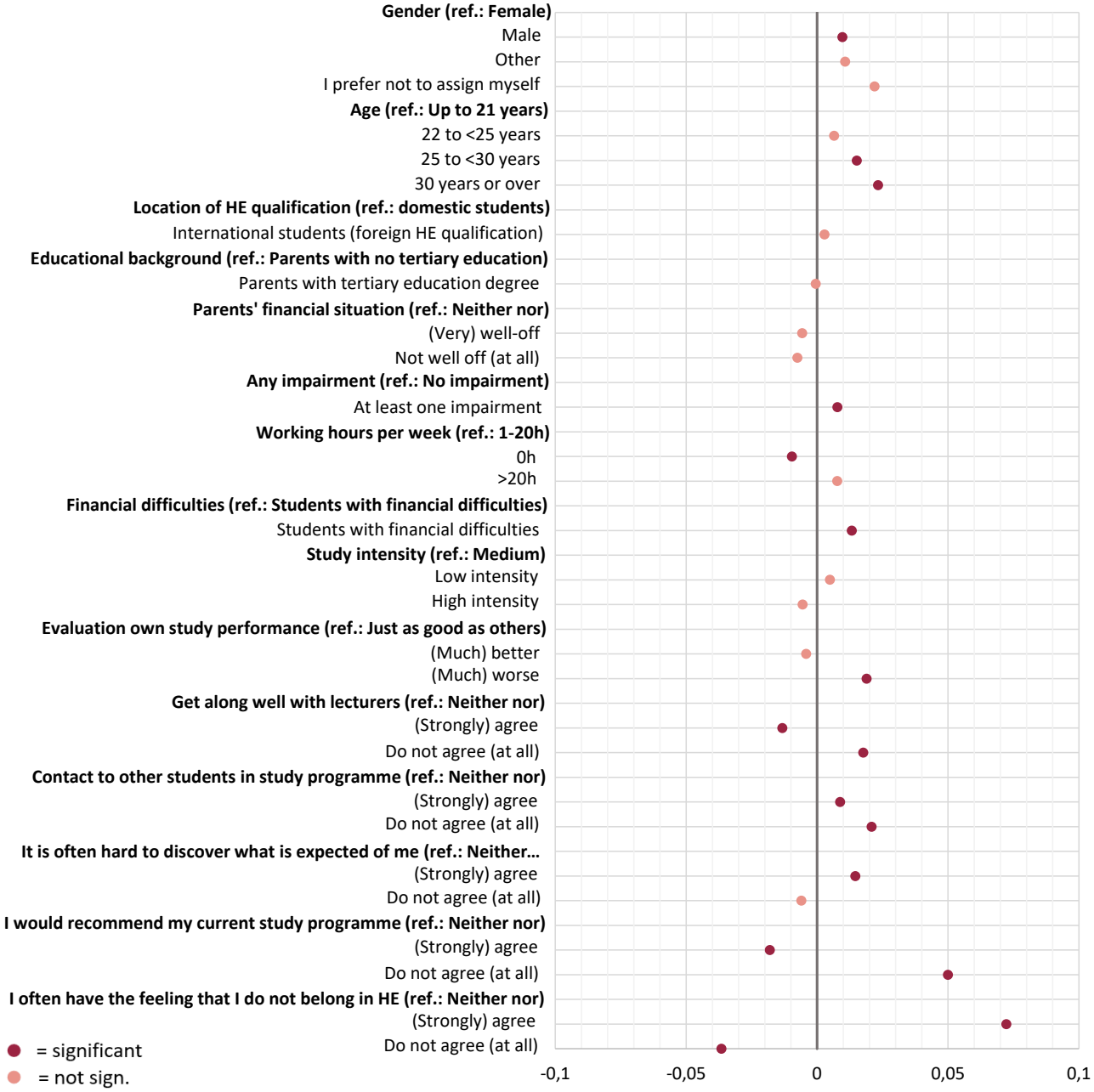
Dependent variable: mental health problem (1 = Yes, 0 = No).
If a value lies to the right of the reference line (value 0), the Average Marginal Effect is positive, i.e. this characteristic increases the probability of a mental health problem and vice versa. The further away the marker is from the reference line, the greater the effect.
N = 54,808. Pseudo-r2 (McFadden) = 0.07. Significant = p-value < 0.05. Dark: Significant. Light: Not significant.
Source: Own calculations with weighted data (Dau, 2023) based on EUROSTUDENT VII micro data (Cuppen et al., 2023).

Figure 6: Logistic regression model "Financial difficulties" with Average Marginal Effects (axis section ± 20% points)



Dependent variable: financial difficulties (1 = Yes, 0 = No).
If a value lies to the right of the reference line (value 0), the Average Marginal Effect is positive, i.e. this characteristic increases the probability of having financial difficulties and vice versa. The further away the marker is from the reference line, the greater the effect.
N = 41,762. Pseudo-r2 (McFadden) = 0.08.
Significant = p-value < 0.05. Dark: Significant. Light: Not significant
Source: Own calculations with weighted data (Dau, 2023) based on EUROSTUDENT VII micro data (Cuppen et al., 2023).

Figure 7: Logistic regression model "Intention to drop out of higher education" with Average Marginal Effects (axis section ± 10% points)



Dependent variable: drop out intention (1 = Yes, 0 = No).
If a value lies to the right of the reference line (value 0), the Average Marginal Effect is positive, i.e. this characteristic increases the probability of an intention to drop out and vice versa. The further away the marker is from the reference line, the greater the effect.
N = 36,731. Pseudo-r2 (McFadden) = 0.26. Significant = p-value < 0.05. Dark: Significant. Light: Not significant.Source: Own calculations with weighted data (Dau, 2023) based on EUROSTUDENT VII micro data (Cuppen et al., 2023).