

FEMALE CHEMPRENEURS: DIFFERENCES IN MOTIVATIONS AND BARRIERS OF STUDENTS DEPENDING ON GENDER AND THE IMPACT ON ENTREPRENEURSHIP - A COMPARATIVE STUDY OF POLISH AND GERMAN STUDENTS

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ABSTRACT

The expectations of universities, as educational institutions, are to train chempreneurs, entrepreneurs from chemistry faculties. These chempreneurs are expected to transform the chemical industry towards sustainability in the future and change their respective industries. Despite over 20 years of progress, entrepreneurship in the STEM community remains male-dominated (Beede et al. 2011; Minniti et al. 2005; Kelley et al. 2017). German chemistry students are 54% less likely to start their own business than the average German student. Therefore, we conducted a comparative study among male and female chemistry students of all grades in Germany and compared them with samples of male and female Polish chemistry students to understand motivations, barriers and intentions and to identify possible differences between men and women.

By including samples of students with significant differences in culture, economics and educational background, we developed and tested hypotheses about the influence of these factors on the intentions, perceptions, motivations and barriers of four groups. A random sample of chemistry students was included for both Germany and Poland. We distinguished between intrinsic and extrinsic factors. We found a number of significant differences between the four groups. We discuss the results and suggest new approaches for the education of chemistry students and for future research approaches.

Keywords: Chempreneurs, Entrepreneurs, Chemistry Students, Germany, Poland

INTRODUCTION

Products, concepts and innovations from the chemical industry, as well as their opportunities and applications, are related to global challenges such as human health, crop production, energy conversion and storage, safe and abundant water, climate change (Confalone, 2014). The application of scientific knowledge in entrepreneurship is essential for this, for which technology transfer can be used (Sachse & Martinez, 2016). The product implementation of academic research can take place through patenting, licensing, start-ups or university spin-off organisations (USOs). Innovation is the coincidence of an idea, product or service (invention)

with a specific market (diffusion) (Dörr, N., & Müller-Prothmann, 2014) (Wolf, Dobrucka, Przekop, & Haubold, 2021). The development of entrepreneurship into an important field of research in its own right occurred through the attention of many disciplines on entrepreneurship as part of the innovation foundation (Kirzner, 1985).

LITERATURE REVIEW

Due to the view that entrepreneurship could be learned, many studies have been conducted on entrepreneurial intentions among university students e.g. (Abigail, Jeslin, Vijayarangan, & Rakhi, 2022) (Ajzen I. , 1991) (Franke & Lüthje, 2004). Among the best-known models for studying the factors that influence intention and willingness to start a business are the entrepreneurial event model (EEM) (Shapero, 1985) and the theory of planned behaviour (TPB) (Ajzen I. , 1985), although the explanatory power of the models and the elements integrated into them may differ from country to country and from discipline to discipline (Engle, et al., 2008). Moreover, understanding cultural diversity has become increasingly important due to globalisation, which has led to cross-cultural comparative studies of entrepreneurial intentions, such as (Giacomin, et al., 2011), (Pruett, Shinnar, Toney, Llopis, & Fox, 2009) or (Sesen & Pruett, 2014). The focus of cross-national comparative studies on this topic is increasingly on three basic factors: culture, economic climate and education. National cultural diversity as the first factor seems to reveal differences in entrepreneurial intentions among university students. Culture is defined according to Mead (1985) as a set of shared values and beliefs among groups of people. In the context of entrepreneurship, as mental programmes that are similar or different in relation to entrepreneurial intentions (Hofstede, 1980).

Research articles have identified family responsibilities (Busolt and Kugele 2009), gender bias in the entrepreneurial ecosystem of university ecosystems (Giuri et al. 2018), entrepreneurial funding (Alsos and Ljunggren 2017; Gicheva and Link 2013), entrepreneurship and innovation policy (Ahl and Nelson 2015; Pettersson 2007), academic background (Woolley 2019) and supportive infrastructure such as technology incubators (Marlow and McAdam 2012). The study by Karataş-Özkan and Chell (2015) point to gender inequalities at all levels, micro, meso, macro. For the micro level, they describe the different perceptions of academics achieving an established position, while this is only a step on the career ladder, we answer this with questions about lifestyle. Within the meso level, some gendered practices with major impacts on career development are described, which include high demands for flexibility, mobility, long working hours and insufficient or no role models, mentoring programmes or incentive mechanisms (Kuschel et al. 2017; Byrne et al. 2019). At the macro level, interactions between the STEM field and the commercial world of technology transfer are described, with women using gendered language and attitudes to financial actions and often relying on a support network in a male-dominated commercial environment.

Another factor mentioned is entrepreneurial education, which is used to explain differences between entrepreneurial intentions in different countries but also within a country with different subgroups. One study that took this comparative approach was that of Giacomin, Janssen, Pruett, Shinnar, Llopis and Toney (2011), which examined the influence of entrepreneurial education and its relationship to entrepreneurial intentions among American, Asian and European students. They found that entrepreneurial intentions differ from country to country and that this should lead to adjustments in entrepreneurship education to take cultural

differences into account. Furthermore, entrepreneurship education can have an impact on students' entrepreneurial attitudes (Packham, Jones, Miller, Pickernell and Brychan, 2010). Both positive effects of entrepreneurship education among French and Polish students and a negative effect among male German students were found.

The main objective of this study is to compare the entrepreneurial intentions of male and female chemistry students in Germany (GER) and Poland (PL). Previous studies compared countries or regions with sometimes different economies, cultures or entrepreneurial educations, but often business students (e.g. (Autio, Keeley, Klofsten, Parker, & Hay, 2001); (Boissin, Branchet, Emin, & Herbert, 2009); (Franco, Haase, & Lautenschlager, 2010) & (Lee, Chang, & Lim, 2005). In contrast, this study compares entrepreneurial intentions in two relatively different neighbouring countries to develop an understanding of how we can increase the number of innovations in the chemical industry.

We assess the entrepreneurial education, cultural context and economic environment in the two countries to elucidate possible differences in the entrepreneurial intentions of male and female students. In this way, we answer the following research questions:

1. do curricula differ genders in terms of university stimulation, entrepreneurial intentions and career aspirations?
2. do genders differ in terms of their motives for starting a business?
3. do genders differ in terms of obstacles to starting a business?
4. do the genders differ in terms of the relative importance of factors for entrepreneurial intentions?

The study is divided into four main parts. After the introduction, the article first begins with a brief overview of the literature on entrepreneurial intentions, the motives and obstacles to entrepreneurial action and sets out the hypotheses. The third part presents methods and research findings, while the last part contains the discussion and conclusions.

The research model for this study, based on the theory of planned behaviour (after Ajzen 1991, p. 182), is shown in Figure 1. The model includes intention to found as the dependent variable and the mediators attitude, subjective norm and perceived behavioural control, as in the model of planned behaviour described by Icek Ajzen. In addition, the four independent variables start-up knowledge, perceived educational support, perceived university/research institution support and perceived career opportunity are examined for start-up intention.

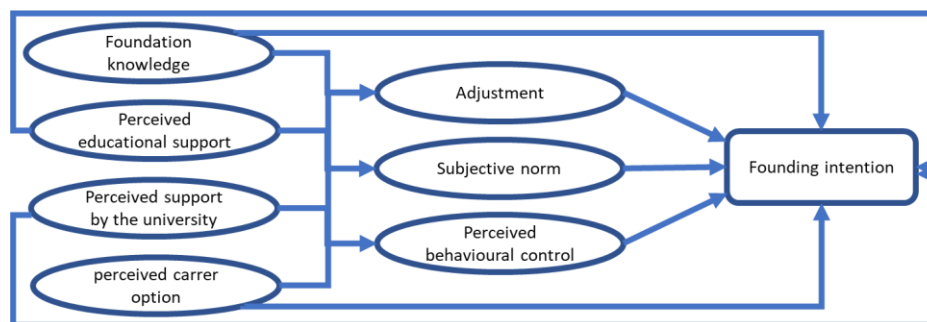


Figure 1
ADAPTED RESEARCH MODEL ACCORDING TO THE THEORY OF PLANNED BEHAVIOUR

University Education and Entrepreneurial Intentions

Within entrepreneurship research, entrepreneurship education has played an increasingly important role since the beginning due to the common belief that entrepreneurship can be learned. An entrepreneur is defined as a person who recognises profit opportunities and takes the initiative to satisfy an unmet demand (Kirzner 1985). While earlier research views entrepreneurship as an innate behaviour, more recent approaches focus on intentions as the best predictor of entrepreneurial behaviour (Ajzen (1991), Davidsson (1995), Krueger & Carsrud (Entrepreneurial intentions: Applying the theory of planned behaviour, 1993); (Krueger, Reilly, & Carsrud, Competing models of entrepreneurial intentions, 2000); (Robinson, Stimpson, Huefner, & Hunt, 1991); Shapero, 1982)).

Entrepreneurial intention can be defined as a person's intention or commitment to start their own business (Drennan, Kennedy & Renfrow, 2005; Krueger & Carsrud, 1993; Souitaris, Zerbinati & Al-Laham, 2007). Thus, entrepreneurial intention can be viewed as a mental process that guides the planning and implementation of a business plan (Boyd & Vozikis, 1994; Gupta & Bhawe, 2007). Current research recognises that this mental process and the entrepreneurial decision of individuals can be influenced by entrepreneurship education and an entrepreneurial university environment (Fayolle, 2008; Katz, 2003; Robinson & Hayes, 1991; Solomon, Duffy & Tarabishy, 2002).

Higher education can influence students' entrepreneurial intentions in two different ways. The first factor described is the presence of entrepreneurship education in higher education (Kolvereid & Moen, 1997). The authors point out that besides the direct effect on entrepreneurial intentions, entrepreneurship courses also influence the formation and realisation of intentions. The second factor described is the general educational environment at the university. Here, the influence of the students' assessment of the university environment was described by a proportional correlation between positive assessment and significantly higher entrepreneurial intentions (Franke & Lüthje, 2004). This correlation was confirmed by the study by Schwarz, Wdowiak, Almer-Jarz and Breitenecker (2009), who also found that the educational environment has a significant influence on start-up intentions. Entrepreneurship education can lead to different influences between the genders, while a positive influence is described for students in France and PL, the effect on German male students is negative (Packham et. al., 2010). The embedding and establishment of entrepreneurship education in higher education programmes is described in studies of British students (Smith, Collins and Hannon, 2006) or on Indian students (Abigail Jennifer G., 2022) with Indian students in order to promote the entrepreneurial intentions of the students. Another factor described for entrepreneurship is entrepreneurial self-efficacy, which is lower among women in a gender comparison (Chowdhury and Endres 2005). This means that some women do not believe that they have the skills to become successful entrepreneurs and therefore do not see themselves as entrepreneurs.

The spread of courses on entrepreneurship within GER is described at over 100 higher education institutions (Stiftung Entrepreneurship (2015) - "Entrepreneurship Education in German Higher Education: Status Quo und Empfehlungen zur Verbesserung"). At the same time, a direct comparison of start-up centres shows 633 in GER and 53 in PL ((Gründungsradar 2021, Federal Ministry for Economic Affairs and Energy (BMWi)). ("Polska Sieć Inkubatorów Społecznych" (Polish Network of Social Incubators) 2021)).

Against the background of previous studies, we hypothesise the following.

Hypothesis 1: Lower rated by women as they have less entrepreneurial self-efficacy and therefore see no need for entrepreneurship education.

Subjective Norm

The literature points to different perceptions of the entrepreneurial environment, which can lead to women experiencing gendered inequalities (Karatas, Özkan & Chell, 2015). Women are socialised differently and thus perceive opportunities differently (DeTienne, 2007). They point to the possibility of gender specificity in the processes, structures and discourses of academic entrepreneurship (Fältholm, et al., 2010). Further research showed a higher proportion of male students in entrepreneurship courses and a degree with a focus on entrepreneurship when pursuing a business degree compared to their female peers (Menzies & Tatroff, 2006), which led the authors to conclude that there may have been an influence of commonly held myths on the female respondents. This refers to negative gender stereotypes in the social environment of women entrepreneurs that persist in their lives as business owners (Baron, et al., 2001). These stereotypes can have a distorting effect on the concept of entrepreneurship in terms of gender (Nilsson, 1997); (Delmar & Holmquist, 2004). In this context, research reports that students see a successful manager as having typical masculine attributes (Yim & Bond, 2002). This means that society has less normative support for women entrepreneurs and implicitly interprets this as less desirable (Baughn, et al., 2006); (Langowitz & Minniti, 2007). As a result, women themselves perceive starting a business as a career option as less desirable (Veciana, et al., 2005)). This results in the following hypothesis:

Hypothesis 2: The subjective norm is rated lower for women.

Economic Differences and Entrepreneurial Intentions

The gender pay gap has been described and reduced since the 1970s (Blau & Kahn, 1994). The gender pay gap has existed for several decades despite the fact that women make up the majority of university graduates (DiPrete & Buchmann, 2013); (Goldin, 2002)). This distribution does not apply to GER, where 39 % of chemistry graduates in 2021 will be female (Gesellschaft deutscher Chemiker, 2022). At the same time, women who have studied STEM subjects are less likely than their male counterparts to enter or remain in STEM professions (Glass, et al., 2013); (Yingyi & Savas, 2014); (Mann & DiPrete, 2013); (Sassler, et al., 2011)). Studies show persistent gender pay gaps regardless of fields or specific degrees (Ginther, 2003). In comparison, GER shows a gender pay gap of 17.6 % and PL 4.5 % in 2021 (Eurostat, 2021). The gender pay gap could serve as a motivation for women to start a business in order to achieve independence.

A research focus in literatures on entrepreneurship or entrepreneurial intentions is on the role of gender in the emergence of entrepreneurial intentions. The view of women entrepreneurs as a potential source of sustainable development in the economic and social spheres has increased research on entrepreneurial development (Akter, et al., 2013). In addition to the increase in the number of women entrepreneurs (De Bruin, et al., 2006), studies indicate that women have a lower propensity to engage in entrepreneurial activities or to start new businesses

(García-Aramayo & Contreras-Espinosa, 2014). Other research points to a direct link between entrepreneurial intentions and male characteristics (Gupta, et al., 2009) and a significantly lower entrepreneurial intention among women (Langowitz & Minniti, 2007). Data collection from GEM reports internationally has shown a gender gap within start-up activity in most countries for over 20 years. In 2022, the analysis of TEA rates for GER and PL again showed a higher proportion of male entrepreneurs with a ratio of 1.58 for GER and 1.42 in PL (Sternberg, et al., 2022). It is therefore assumed that:

Hypothesis 3: Male students white higher entrepreneurial intention than their female counterparts.

Motives and barriers to entrepreneurship

The perceptions of men and women differ. For example, men have different motivations for starting a business (Klyver & Grant, 2010) and are likely to have a larger network of entrepreneurial contacts (Humbert & Drew, 2010). In this context, studies show higher motivation through possibly greater self-confidence (Kirkwood, 2009) and at the same time lower barriers such as fear of failure (Shinnar, et al., 2012). Other motives for starting a business include the pursuit of wealth, financial security and life security, which are stronger among men than women (Johan, et al., 2013). Further studies show challenging work as well as the attainment of wealth as motives for starting a business for men (Johan, et al., 2013), while for women the work-life balance and the possibly resulting free allocation of time as an entrepreneur are more preferred (Ahmad, et al., 2014). Another motivating factor for women to start a business is the desire for independence and freedom from any control (Naituli, et al., 2008). These findings are in line with the results of another study, which found that women have more self-confidence and become less risk averse than men (Brindley, 2005). However, due to the generally lower propensity of women to start a business, we put forward the following hypotheses

Hypothesis 4: Men have higher ratings of motives than women.

Hypothesis 5: Women have higher barrier ratings than men.

METHODOLOGY

This study is part of a comparative study of German and Polish chemistry students that examines innovation-oriented technology transfer from the students' perspective. Due to time and cost constraints, a longitudinal design was chosen for our study. The chosen method was a survey with one measurement point (August 2022 - January 2023) to collect prospective and current data using an online questionnaire.

Additional questions were added to the questionnaire used in this article. The questionnaire was translated into English, French, Spanish and Polish by specialised staff and then checked for loss of meaning. The target group for the survey was students from the departments of chemistry as well as related fields (biochemistry, analytics, industrial chemistry, process engineering, industrial biology and food chemistry) who were contacted by mail, personally in lectures or via online social media networks like Instagram.

Questions

The questions for the survey used in this study come from different studies (e.g. Genesca and Veciana (1984), Giacomini et al., 2011; Pruett et al., 2009; Veciana, Aponte & Urbano, 2005). The questionnaire consisted of 10 parts in total. After the demographic questions on gender, migration, nationality and age, participants were excluded based on their student status to ensure the desired data. Subsequently, study-relevant characteristics such as place of university, subject area, intended degree, total duration of studies, type of employment or the presence of founders in the environment were recorded and questions were asked to determine the latent constructs. For this, questions from different studies were used, which were adapted to a 6-point Likert scale to force selection. Absolute ignorance (1) to comprehensive knowledge (5) for questions on basic knowledge, or I don't know (0), don't agree at all (1) to completely agree (5) for the others. The probability of founding a company was asked through two different types of questions, on the one hand the probability of founding a company after graduation from very unlikely (1) to very likely (6) and on the other hand the career intentions with the options public service, employment and founding a company. Based on the career intentions, the entrepreneurial intentions (TEA rate) for the students are determined by percentage calculation. In addition, the option "I don't know" was given for questions on external factors, an example is shown in Figure 2.



Figure 2
SCHEMATIC REPRESENTATION OF THE SCALE USED

The questions for the survey were taken from the studies by Roy, Akhtar & Das (2017) ("Foundation knowledge" & "Perceived Career options"), Saeed et al. (2015) ("Perceived educational support" & "Perceived support of the university"), Zapkau et al. (2015) ("Subjective Norm" & "Founding intention"), Pruett et al. (2009) ("Intention" & "Barriers") and Giacomini, et al., (2011) ("Perceived Behavioural control" & "Self-assessment for the foundation"). The response option "I don't know" was used for all variables except for the areas "Foundation knowledge", "Subjective Norm" and "Founding intention". As a further question category, the participants were asked about their career option in the context of their intention to found a company, with a choice between "industry", "public service" and "starting a business".

Participants

A total of 4,367 people and 120 professors or student representatives were contacted. In February 2023, we received completed questionnaires from 1,287 participants, a response rate of 29.4 %, which is acceptable compared to other web-based studies (Cook, Heath, & Thompson, 2000). Before conducting our statistical analyses, we excluded 320 participants due to incomplete data. We also excluded participants who reported that they were not currently a student (n = 135), or belonged to another field (such as teaching or electrical engineering), or were studying in another country (n = 21). The final sample thus consisted of 811 students, 498 from GER and 313 from PL. A summary of the distribution of study participants can be found in Figure 3. The diverse genders were not considered further in the course of this evaluation.

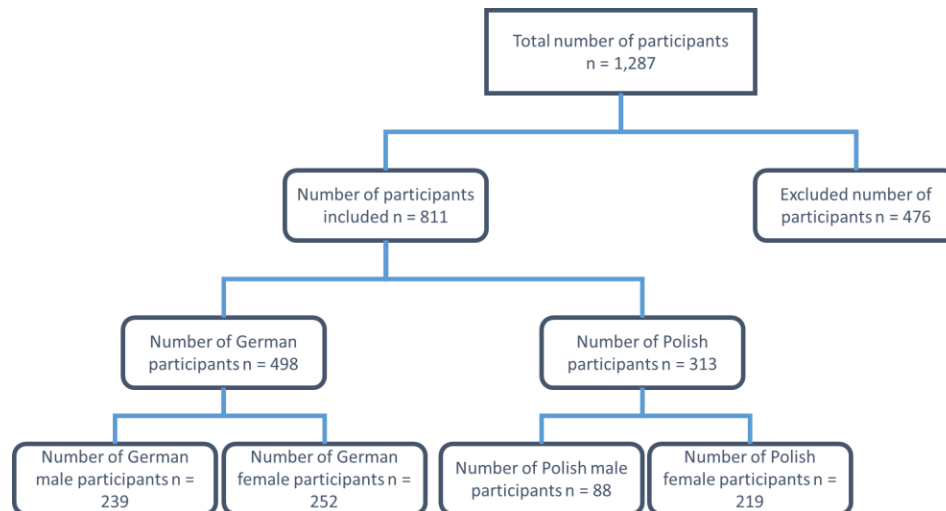


Figure 3
SUMMARY OF THE STUDY PARTICIPANTS

The students from GER were on average 24.2 years old ($SD = 3.42$, range 17-35) and almost homogeneously divided between men (48.0 %) and women (50.6 %). Almost a quarter (23.3 %) have a migration background, while 84.5 % have German citizenship. Most of the participants (64.5 %) are studying chemistry at a public university (79.9 %) and 52.6 % are in a Bachelor's programme (25.3 % Master's programme, 22.1 % doctoral programme). Only 36.7 % of the students ($n = 183$) do not have an income from employment, whereas 6.8 % ($n = 34$) reported full-time employment. Most students have no founders among their acquaintances ($n = 294$, 59.0 %).

The students from PL were on average 22.9 years old ($SD = 2.82$, range 18-40) and not evenly distributed between men (28.1 %) and women (70.0 %). Almost one fifth (20.4 %) have a migrant background, while 96.2 % have Polish citizenship. Most of the participants (45.4 %) are studying chemistry and 71.6 % are in a Bachelor's programme (20.4 % Master's programme, 8.0 % doctoral programme). Only 59.7 % of the students ($n = 187$) do not have an income from employment, whereas 5.4 % ($n = 17$) reported full-time employment. Most students have no founders among their acquaintances ($n = 196$, 62.6 %).

Statistical analysis

The statistical analysis was carried out with IBM SPSS Statistics version 28.0.1. Before ANOVA, the data were tested for normal distribution using Shapiro-Wilk tests. Since the data were not normally distributed, the Kruskal-Wallis-Test was used for independent samples, which is a non-parametric alternative to ANOVA. Kruskal-Wallis-Test compares the ranks of the data. The result of an ANOVA analysis is the standardised z-value, which indicates how many standard deviations the test statistic deviates from the expected value, and the significance level (p-value) determined by the distribution function of the test. The significance level was defined as 5 %. The calculation of the probability of founding a company is based on the percentage of participants who selected founding a company as a career option. The results are presented as a table showing the factor, country, number of "I don't know" statements, proportion of "I don't know" statements, sample size (n), mean, median, z-value (z) and p-value (p).

RESULTS

Foundation Knowledge

Table 1 shows the results for the male and female students from GER and PL with regard to their knowledge of business start-ups in relation to the questions on the tasks within a business start-up, the distinction between "good" and "bad" start-up ideas and the knowledge of support institutions for business start-ups.

With regard to the tasks involved in setting up a business, significant differences were identified between the assessments of German men ($M = 3.1$) and German women ($M = 2.2$) ($z = 3.814$, $p = 0.001$). In addition, a significant difference was found between German women ($M = 2.2$) and Polish women ($M = 3.1$) ($z = -3.543$, $p = 0.002$). For the factor "To what extent can you distinguish between a "good" and a "bad" start-up idea?" the comparison of German men ($M = 3.9$) and Polish women ($M = 3.0$) revealed a significant difference ($z = 3.200$, $p = 0.008$). For the factor "Do you know of any funding organisations that can help you with your start-up?" only the comparison of German men ($M = 3.7$) and German women ($M = 3.2$) showed a significant difference ($z = 2.697$, $p = 0.042$). The significant differences within the area of foundation knowledge for the German study participants confirms the research that male students are more likely to look at other areas outside of their core studies than women (Severiens and ten Dam 1994), which can have a positive influence on foundation behaviour.

Perceived educational support (PES) / Perceived Support of the university (PSU)

Table 2 shows students' scores on the extent of knowledge about business start-up included in the curriculum of the respondent's field of study and the extent to which universities encourage and support students to become entrepreneurs.

All questions in this category except for "My college/university motivates students to start a new business. & "My college/university provides students with ideas for starting a new business." show significant difference in at least one comparison. The question "My college/university offers lectures on the topic of start-up/entrepreneurship. shows significant differences ($z = 2.844$, $p = 0.027$) when comparing German men ($M = 4.5$) with Polish men ($M = 2.0$), and German women ($M = 4.1$) with Polish women ($M = 3.1$) ($z = 3.132$, $p = 0.010$). The comparison of the groups German men with Polish men, German men with Polish women, German women with Polish men and German women with Polish women revealed significant differences in each case for the questions "My college/university offers projects on the topic of start-up/entrepreneurship.", "My college/ university hosts conferences /workshops on start-up/entrepreneurship.", "My college/university puts students interested in starting a business in touch with each other." and "My college/university has a start-up centre.". For the factor "My college/university provides students with the knowledge needed to start a new business." the results differ significantly ($z = -3.574$, $p = 0.002$) when comparing the groups of German female chemistry students ($M = 3.2$) with Polish male chemistry students ($M = 3.2$). For this comparison group, there were also significant differences in the factor "I am aware of foundation events outside my university for people interested in founding their own business. The comparison grouping of German male chemistry students ($M = 3.7$) with Polish female chemistry students ($M = 2.9$) revealed a significant difference in the factor "My university has clear rules for the

transfer of ideas from research to a start-up company" ($z = 3.049$, $p = 0.014$). These respective differences between the countries for the identical gender can be attributed to cultural differences. Cultural influences cannot be excluded from the significant differences between the genders from different countries. While gender-related differences within a country could not be proven for any of the factors. The results for factors of Perceived educational support (PES) / Perceived support of the university (PSU) show primarily higher ratings for the female study participants from Poland and at the same time low agreement with the question about the existence of a start-up centre. The study by Packham et al. (2010) shows that entrepreneurial education has a positive influence on the entrepreneurial attitude of Polish students. This could either be due to the lack of knowledge of the students about the existing offers on the part of the university, or to the lack of offers.

Hypothesis 1, lower evaluation by women because they have lower entrepreneurial self-efficacy and therefore see no need for entrepreneurial education, is thus rejected because only one significant difference was discernible and this is not directly related.

Subjective Norm (SN)

Table 3 contains the assessments of the chemistry students from GER and PL for the subjective norm in the respective gender comparison.

As the results show, students' assessment of the direct environment of people is higher in PL than in GER. The two factors "People who are important to me expect me to start a business after graduation" and "People who are important to me think that I should start a business after graduation" show significant differences. In addition, the factor "People who are important to me think that I should start a business after graduation" shows significant differences when comparing male ($M = 3.2$) and female ($M = 2.4$) students from PL ($z = 3.429$, $p = 0.004$).

Hypothesis 2, that the subjective norm is rated lower for women, is accepted because Polish men have a higher rating for "People who are important to me think that I should start a business after I graduate" and this represents a significant difference.

Perceived Career options (WCO)

Table 4 shows the results from the survey for the factors from the area of perceived career options.

Overall, all factors except "I keep getting different opinions about my career choice from important people in my life." at least one significant difference in the comparison groups used. Within the factor "The choice between the different career options is so complicated that I can't decide." the comparison of German male chemistry students ($M = 3.5$) with male Polish chemistry students ($M = 4.1$) as well as female Polish chemistry students ($M = 3.7$) revealed significant differences. The factor "I give a lot of thought to choosing the right career." revealed significant differences ($z = -4.611$, $p < 0.001$) when comparing male German chemistry students ($M = 4.9$) and female Polish chemistry students ($M = 5.2$). Significant differences between the sexes within a country could be found in GER with the factors "The more I try to find out about different career options, the more confused I get." ($z = -3.467$, $p = 0.003$) and "I

can imagine that being an entrepreneur would give me great satisfaction." ($z = 4.212$, $p = <0.001$) are analysed. Among the Polish students, a significant difference ($z = 3.240$, $p = 0.007$) between the sexes was found for the factor "I'm not afraid of overlooking a career option." to be identified. The fact that women perceive opportunities differently as described by DeTienne (2007) can be seen in the evaluations of German chemistry students for "The more I try to find out about different career options, the more confused I get". where women show greater uncertainty.

Entrepreneurial Intentions

The Table 5 contains the results for the entrepreneurial intention of the male and female study participants from GER and PL

The results in Table 5 show significant differences between all comparison groups except German men and women. The willingness to start a business is strongest among Polish men ($M = 3.1$). The significantly lower propensity of female Polish students to start a business is in line with the results of earlier studies (Kelley et al. 2012; Kurczewska und Białek 2014). The results for Poland thus fit with the general findings from the STEM field that women are consistently underrepresented in all areas such as education, science, employment, leadership positions as well as business start-ups. (Beede et al. 2011; Legewie and DiPrete 2014). The TEA rate based on the students' career goals confirms the likelihood of founding with the order Polish men (29.5 %), Polish women (14.2 %), German men (12.6 %) and German women (4.8 %). Thus, the results of the survey show a gender ratio of about 2:1 (2.1) in PL and 2.6 in GER, which corresponds to a significantly higher gender gap than the GEM reports (1.58 for GER and 1.42 in PL (Sternberg, et al., 2022).

Hypothesis 3, Male students have a higher entrepreneurial intention than their female peers, is accepted as the entrepreneurial intention of Polish male students is significantly higher than that of their female peers.

Perceived Behavioural Control (PBC)

Table 6 contains the results from the survey for the factors from the area of perceived behavioural control.

The results show no significant differences in the comparison groups for the factors "Whether I am successful in life or not depends mainly on my abilities.", "Hard work is something I like to avoid." and "I am not willing to take risks when choosing a job or a company.". Significant differences in the comparison of female German chemistry students and female Polish chemistry students could be found in the factors "My life is determined by my own actions." ($z = 2.883$, $p = 0.024$) and "When I get what I want, it's usually because I'm lucky." ($z = -3.310$, $p = 0.006$) can be identified. In addition, the comparison of German male and Polish female chemistry students shows significant differences in the factors "When I get what I want, it's usually because I'm lucky." ($z = -3.214$, $p = 0.008$), "What happens in my life is mostly determined by powerful others." ($z = 3.693$, $p = 0.001$) and "Economic security is important to me." ($z = -4.672$, $p = <0.001$). For the factor "It is important to me to be better at a task than

others." the comparison of German female study participants with male and female chemistry students revealed significant differences.

Self-Assessment for the Foundation (Sf)

The results for the factors from the area of self-assessment for the foundation can be found in Table 7.

In the area of factors of self-assessment for the foundations, all questions differ significantly for the groups of German male and female chemistry students and furthermore for the German female chemistry students in comparison with the Polish ones regardless of gender. The mean values for the factor "It would be easy for me to develop a business idea.", which were rated lower by the German female chemistry students ($M = 2.2$) than by the other study participants, are striking. This indicates that German female chemistry students have difficulties in developing business ideas compared to the other groups considered. Research on self-assessments for the performance of tasks related to entrepreneurship shows the need for higher levels of education for identical assessments. This has been attributed to cultural perceptions of gender roles that make women less competent to perform tasks considered masculine, such as entrepreneurship Thébaud (2010).

Motives for Starting a Business

Table 8 contains the results from the survey for the motive on starting a business.

As Table 8 illustrates, all factors except "...to lead people." and "...to contribute to regional economic development." have at least one significant difference in the comparison groups applied. Significant differences between the genders of German participants are present in the factors "...the creation of jobs" and "...the difficulty of finding the right job. The factors "...the opportunity to realise my own ideas." were identified as the main inhibitors for the German male chemistry students. ($M = 5.0$), "...to create something on my own" ($M = 4.9$) and "...to work in a varied profession." ($M = 4.9$), while the main barriers of the German female participants were "...to work in a varied profession." ($M = 4.9$), "...the improvement of quality of life." ($M = 4.5$) and "...earn more money than through wage labour." ($M = 4.3$). According to the survey results, the main intentions for setting up a business among Polish students are "...the opportunity to be financially independent." for the male participants. ($M = 5.6$), "...my personal independence." ($M = 5.4$) and "...the building of personal wealth." ($M = 5.4$). While for the female participants the factors "...to create something on my own." ($M = 5.2$), "...the opportunity to be financially independent." ($M = 5.2$) and "...my personal independence." ($M = 4.9$) were the strongest inhibitors. These different ratings suggest different priorities between genders and countries. The evaluations by the female German study participants confirmed that women perceive opportunities differently in the factor "...the difficulty of finding the right job" (DeTienne, 2007).

Hypothesis 4: Hypothesis 4, males have a higher rating of motives than females, is confirmed as the male Polish students have higher ratings in 13 out of 17 factors

Barriers to Starting a Business

Table 9 contains the results for the ratings of male and female the chemistry students from GER and PL for the factors from the area of barriers to starting a business.

As Table 9 shows, all factors except "...the search for a business idea for a company that has not yet been realised." and "...a lack of ideas about which company to find." show significant differences in at least one of the applied comparison groups. Significant differences between the responses of men and women from GER, with higher ratings for the men, are shown by the factors "...excessive risk.", "...my own fear of failure." and "...the fiscal charges (taxes, court fees, etc.)." show. While the factors "...a lack of entrepreneurial competence.", "...the current economic situation.", "...a lack of knowledge in the business world.", "...a lack of knowledge of the market.", "...a lack of experience in management.", "... a lack of experience of accounting.", "...a lack of guidance." and "...a lack of support in setting up a business." show significant differences between the German participants with higher ratings by the German female chemistry students. The comparison of the responses of the Polish chemistry students revealed significant differences in the factors "...a lack of credit for newly established companies.", "...excessive risk.", "...a lack of guidance." and "...a lack of support from people around me.". Whereby only the factor "...a lack of guidance." was rated higher by the male participants in a comparison of responses from one country with significant differences. For the male chemistry students from GER, the main barriers to starting a business are "...a lack of initial capital." (M = 4.9), "... excessive risk." (M = 4.8) and "...the search for a business idea for a company that has not yet been realised." (M = 4.1). While for the female German participants the factors "...a lack of entrepreneurial competence." (M = 4.8), "...a lack of experience of accounting." (M = 4.6), "...a lack of initial capital." (M = 4.5), "...a lack of knowledge of the market." (M = 4.5) and "...a lack of ideas about which company to find." (M = 4.5) received the highest ratings. For the Polish male chemistry students, the factors "...a lack of knowledge of the market." (M = 5.0), "...a lack of initial capital." (M = 4.9) and "...a lack of guidance." (M = 4.6) were the highest rated barriers to starting a business. The Polish female participants rated the factors "...the current economic situation." (M = 5.3), "...the fiscal charges (taxes, court fees, etc.)." (M = 5.1) and "...a lack of credit for newly established companies." (M = 4.8) were rated the highest. As described in the literature, the results for starting a business among chemistry students from Germany and Poland show different characteristics depending on the group under consideration (Walther, et al., 2023). The strongest barriers can be summarised under capital, risk, entrepreneurship knowledge and business knowledge.

Hypothesis 5, women have higher barrier scores than men, is confirmed as women have higher scores on 12 factors among German students and 14 factors among Polish students. These results are confirmed in the significant differences where 10 out of 14 are due to higher female ratings.

DISCUSSION

The results clearly show that students, regardless of their gender, are not or only partially informed about the existing start-up support of their respective educational institutions. We conclude this from students' low to medium ratings for "start-up knowledge" and "perceived

educational support" (PES) or "perceived university support" (PSU) in both countries. We therefore recommend the establishment of at least one compulsory course on entrepreneurship and the support available from the respective institutions. By committing to this course, the quota of women can be increased and the described imbalance can be reduced (Baron, Markman, & Hirza, 2001). Within these courses, attention should be paid to breaking down established negative gender stereotypes in the social environment of women entrepreneurs that persist in their lives as business owners (Baron, Markman, & Hirza, 2001). These stereotypes can have a distorting effect on the concept of entrepreneurship in relation to gender (Nilsson, 1997); (Delmar & Holmquist, 2004).

The results also show that female chemistry students in both countries are undecided about their future career options. In addition, the subjective norm factors show that prevailing prejudices and stereotypes have an impact on female chemistry students in PL. This could be improved through appropriate events or workshops on behalf of the respective institutions.

The factors of the subjective norm can have a promoting or inhibiting effect on the founding behaviour of the students (Ajzen, 1985). Due to the questioning in the direction of founding and the resulting moderate answers of the Polish students with significant differences, this effect requires further evaluation in order to be able to make a statement about the effect strength and direction.

Polish students, regardless of their gender, show a high willingness to start a business and at the same time see obstacles to starting their own business related to the current economic situation. This suggests that the intention to start a business might be primarily driven by the poor economic situation rather than by innovation. The significantly higher propensity to start a business among Polish males with a ratio of 2.1 compared to the 2022 TEA rate ratio between the sexes of 1.42 % highlights the significant influence of the current economic situation due to the Ukraine war and the post-Covid period. However, this assumption needs further investigation regarding the background and intentions of chemistry students. For GER, the propensity to start a business in the gender ratio came to a similar result with 2.6 % compared to 1.58.

Future evaluations should clarify how strong the influence of the various factors is on the chemistry students' intentions to start a business.

In order to identify further support possibilities and differences between the two countries, the analysis of further subgroups with regard to demographic factors is planned.

The present study provides a first overview of gender-specific differences in chemistry students in GER and PL and their willingness to start their own business. However, since this is not a representative study but a random sample, only tendencies can be identified. We therefore recommend a representative study for future research.

The results among female and male chemistry students in GER and PL confirm our hypothesis that women are more influenced by the subjective norm and rate barriers higher. The most effective way to promote entrepreneurship among chemistry students in both countries, in our opinion, is to raise students' awareness of the opportunities that lie in starting a chemical business and to break down barriers through teaching, possibly by experienced role models.

APPENDIX

Table 1 RESULTS ANOVA COMPARISON ON THE FACTORS OF FOUNDATION KNOWLEDGE											
Question / Factors	Country	Gender	n	mean	Median	GER				PL	
						male		female		male	
						z	p	z	p	z	p
To what extent do you know about the tasks involved in setting up a business?	GER	male	239	3.1	4						
		female	252	2.2	2	3.814	0.001				
	PL	male	88	2.6	2.5	-0.397	1.000	-3.181	0.009		
		female	219	3.1	3	0.183	1.000	-3.543	0.002	0.528	1.000
To what extent can you distinguish between a "good" and a "bad" start-upidea?	GER	male	239	3.9	4						
		female	252	2.9	3	2.615	0.540				
	PL	male	88	3.4	3	1.365	1.000	-0.532	1.000		
		female	219	3.0	3	3.200	0.008	0.685	1.000	1.024	1.000
Do you know of any funding organisations thatcan help you with your start-up?	GER	male	239	3.7	4						
		female	252	3.2	3	2.697	0.042				
	PL	male	88	2.8	3	-0.341	1.000	-2.310	0.125		
		female	219	2.9	3	1.059	1.000	-1.563	0.708	1.122	1.000

Table 2 RESULTS ANOVA COMPARISON ON THE FACTORS OF PERCEIVED EDUCATIONAL SUPPORT (PES) / PERCEIVEDSUPPORT OF THE UNIVERSITY (PSU)													
Question / Factors	Country	Gender	„I don't	„I don't	n	mean	median	GER				PL	
								male		female		male	
								z	p	z	p	z	p
My college/university offerslectures on the topic of start-up/entrepreneurship.	GER	male	91	38.1	14.8	4.5	5						
		female	103	40.9	14.9	4.1	5	1.217	1.000				
	PL	male	34	38.6	54	2.0	1	2.844	0.027	1.957	0.302		
		female	77	35.2	14.2	3.1	3	4.329	<0.001	3.132	0.010	0.353	1.000
My college/university	GER	male	97	40.6	14.2	4.6	5						
		female	108	42.9	14.4	3.8	3	2.082	0.224				

offers projects on the topic of start-up/entrepreneurship.	PL	male	34	38.6	54	2.5	2	4.486	<0.001	2.952	0.019		
		female	97	44.3	122	3.1	3	6.383	<0.001	4.402	<0.001	0.432	1.000
My college/university hosts conferences/workshops on startup/entrepreneurship.	GER	male	95	39.7	144	4.7	5						
		female	105	41.7	147	4.0	5	1.116	1.000				
	PL	male	29	33.0	59	1.7	1.5	4.306	<0.001	3.470	0.003		
		female	91	41.6	128	3.3	3	5.369	<0.001	4.313	<0.001	-0.085	1.000
My college/university puts students interested in starting a business in touch with each other.	GER	male	105	43.9	134	4.3	5						
		female	106	42.1	146	3.8	4	0.206	1.000				
	PL	male	45	51.1	43	1.7	1	3.881	0.001	3.778	0.001		
		female	111	50.7	108	2.3	3	5.826	<0.001	5.741	<0.001	0.406	1.000
		male	132	55.2	107	4.6	5						
		female	170	67.5	82	4.0	4	2.489	0.077				
		male	55	62.5	33	2.0	1	6.589	<0.001	4.592	<0.001		
		female	139	63.5	80	2.9	2	8.193	<0.001	5.381	<0.001	-0.489	1.000
		male	56	23.4	183	3.9	4						
		female	69	27.4	183	3.5	3	0.110	1.000				
		male	14	15.9	74	2.9	2	-0.863	1.000	-0.947	1.000		
		female	37	16.9	182	3.1	3	0.41	1.000	0.300	1.000	1.174	1.000
		male	63	26.4	176	2.9	3						
		female	77	30.6	175	2.9	2	-0.158	1.000				
		male	18	20.5	70	2.6	1.5	-1.704	0.530	-1.584	0.680		
		female	39	17.8	180	2.5	2	-0.345	1.000	-0.186	1.000	1.450	0.882
		male	65	27.2	174	3.9	4						
		female	74	29.4	178	3.2	3	2.037	0.250				

	male	11	12.5	77	3.2	3	- 1.97 5	0.290	- 3.574	0.002		
	female	39	17.8	18 0	3.0	3	1.74 1	0.490	- 0.304	1.000	3.344	0.005
	male	55	23.0	18 4	4.0	5						
	female	61	24.2	19 1	2.7	2	2.06 2	0.235				
	male	23	26.1	65	3.2	3	- 1.53 2	0.753	- 3.023	0.015		
	female	79	36.1	14 0	3.3	3	0.25 2	1.000	- 1.661	0.581	1.661	0.580
	male	151	63.2	88	3.7	4						
	female	180	71.4	72	3.0	3	1.39 5	0.977				
	male	51	58.0	37	2.8	2	1.60 5	0.651	0.459	1.000		
	female	124	56.6	95	2.9	3	3.04 9	0.014	1468	0.852	0.705	1.000

Table 3 RESULTS ANOVA COMPARISON ON THE FACTORS OF SUBJECTIVE NORM											
Question / Factors	Country	Gender	n	mean	median	GER				PL	
						male		female		male	
						z	p	z	p	z	p
People I care about expect me to start a business after Igraduate.	GER	male	239	1.3	1						
		female	252	1.5	1	<0.001	1.000				
	PL	male	88	2.9	2.5	- 5.654	<0.001	- 6.007	<0.001		
		female	219	2.3	2	- 4.945	<0.001	- 5.427	<0.001	1.921	0.328
		male	239	1.7	1						
		female	252	1.9	1	1.568	0.702				
		male	88	3.2	3	- 3.683	0.001	- 4.852	<0.001		
		female	219	2.4	2	- 0.284	1.000	- 1.819	0.413	3.429	0.004

Table 4
RESULTS ANOVA COMPARISON ON THE FACTORS OF
PERCEIVED CAREER OPTIONS

Question / Factors	Country	Gender	„I don't know“ n	„I don't know“ %	n	mean	median	GE R				P L	
								male		female		male	
								z	p	z	p	z	p
The choice between the different career options is so complicated that I can't decide.	GER	male	9	3.8	230	3.5	4						
		female	7	2.8	245	3.9	4	- 1.395	0.978				
	PL	male	1	1.1	87	4.1	4	- 2.649	0.048	- 1.645	0.599		
		female	13	5.9	206	3.7	4	- 3.219	0.008	- 0.191	0.336	0.193	1.000
The more I try to find out about different career options, the more confused I get.	GER	male	9	3.8	230	2.9	3						
		female	9	3.6	243	3.2	4	- 3.467	0.003				
	PL	male	4	4.5	84	3.3	3.5	- 4.543	<0.001	- 2.056	0.238		
		female	10	4.6	209	3.4	4	- 9.020	<0.001	- 5.757	<0.001	- 2.189	0.172
I give a lot of thought to choosing the right career.	GER	male	1	0.4	238	4.9	6						
		female	4	1.6	248	4.1	4	- 2.082	0.224				
	PL	male	2	2.3	86	5.4	6	- 2.625	0.052	- 1.129	1.000		
		female	0	0.0	219	5.2	6	- 4.611	<0.001	- 2.619	0.053	- 0.789	1.000
I'm not afraid of overlooking a career option.	GER	male	7	2.9	232	3.4	3						
		female	7	2.8	245	3.9	4	2.358	0.110				
	PL	male	5	5.7	83	3.9	4.5	- 1.838	0.397	- 3.551	0.002		
		female	21	9.6	198	4.0	4	1.950	0.307	- 0.286	1.000	3.240	0.007
I keep getting different opinions about my career choice from important people in my	GER	male	8	3.3	231	3.8	4						
		female	15	6.0	237	3.9	4	0.036	1.000				
	PL	male	2	2.3	86	4.3	4	- 2.210	0.163	- 2.244	0.149		
		female	5	2.3	214	4.0	4	- 0.995	1.000	- 1.038	1.000	1.447	0.887

life.													
I can imagine that being an entrepreneur would give me great satisfaction.	GER	male	24	10.0	215	4.1	4						
		female	31	12.3	221	3.4	4	4.212	<0.001				
	PL	male	10	11.4	78	4.7	4.5	- 3.475	0.003	- 6.552	<0.001		
		female	30	13.7	189	4.0	4	- 1.101	1.000	- 5.180	<0.001	2.598	0.056

Table 5
RESULTS ANOVA COMPARISON ON ENTREPRENEURIAL INTENTIONS

Question / Factors	Country	Gender	n	mean	median	GER				PL	
						male		female		male	
						z	p	z	p	z	p
Entrepreneurial intentions	GER	male	239	2.3	2						
		female	252	2.1	2	1.696	0.540				
	PL	male	88	3.1	3	- 4.329	<0.001	- 5.596	<0.001		
		female	219	2.7	2	- 2.425	<0.001	- 4.112	<0.001	2.480	<0.001

Table 6
RESULTS ANOVA COMPARISON ON THE FACTORS OF PERCEIVED BEHAVIOURAL CONTROL

Question / Factors	Country	Gender	„I don't know“ %	n	mean	median	GER				PL	
							male		female		male	
							z	p	z	p	z	p
My life is determined by my own actions.	GER	male	0	0.0	239	5.1	5					
		female	3	1.2	249	4.7	5	- 0.420	1.000			
	PL	male	1	1.1	87	5.0	5	- 0.218	1.000	0.086	1.000	
		female	5	2.3	214	4.7	5	2.451	0.085	2.883	0.024	2.029
		male	0	0.0	239	2.5	2					
		female	3	1.2	249	2.9	3	0.066	1.000			
		male	1	1.1	87	3.3	3.5	- 2.567	0.061	- 2.629	0.051	
		female	6	2.7	213	3.0	3	- 3.214	0.008	- 3.310	0.006	0.146

male	0	0.0	239	4.4	4						
female	3	1.2	249	4.0	4	- 0.037	1.000				
male	0	0.0	88	4.8	5	- 0.895	1.000	- 0.873	1.000		
female	1	0.5	218	4.2	4	0.041	1.000	0.078	1.000	0.914	1.000
male	4	1.7	235	2.5	2						
female	2	0.8	250	2.5	3	1.573	0.694				
male	1	1.1	87	2.3	2	2.346	0.114	1.217	1.000		
female	4	1.8	215	2.7	3	3.693	0.001	2.210	0.163	0.425	1.000
male	3	1.3	236	2.1	2						
female	1	0.4	251	2.2	2	2.121	0.203				
male	1	1.1	87	2.2	2	- 0.232	1.000	- 1.780	0.451		
female	6	2.7	213	1.9	1	0.223	1.000	- 1.839	0.396	0.394	1.000
male	2	0.8	237	4.4	4						
female	2	0.8	250	3.9	4	0.379	1.000				
male	1	1.1	87	5.1	5	- 2.426	0.092	- 2.719	0.039		
female	9	4.1	210	4.4	5	- 2.309	0.126	- 2.705	0.041	0.669	1.000
male	11	4.6	228	4.9	5						
female	4	1.6	248	4.4	5	2.036	0.250				
male	5	5.7	83	5.0	5	4.678	0.000	3.256	0.007		
female	8	3.7	211	3.9	4	7.869	0.000	6.032	<0.001	1.174	1.000
male	5	2.1	234	3.0	4						
female	12	4.8	240	3.7	4	- 0.681	1.000				
male	3	3.4	85	3.2	3.5	2.123	0.203	2.625	0.052		
female	11	5.0	208	2.9	3	- 0.255	1.000	0.404	1.000	- 2.277	0.137
male	1	0.4	238	4.9	5						
female	4	1.6	248	4.6	4	- 2.537	0.067				
male	5	5.7	83	5.0	5	- 1.927	0.324	- 0.122	1.000		
female	7	3.2	212	4.9	5	- 4.672	<0.001	- 2.256	0.144	- 1.510	0.786

Table 7 RESULTS ANOVA COMPARISON ON THE FACTORS OF SELF-ASSESSMENT FOR THE FOUNDATIONS													
Question / Factors	Country	Gender	„I don’t know“ %	n	mean	median	GE R				PL		
							male		female		male		
							z	p	z	p	z	p	
Starting a business after my studies is for me, possible.	GER	male	28	11.7	211	3.7	4						
		female	43	17.1	209	3.5	4	3.380	0.004				
	PL	male	7	8.0	81	3.5	3.5	- 2.604	0.055	- 5.121	<0.001		
		female	27	12.3	192	4.5	5	- 0.357	1.000	- 3.655	0.002	2.301	0.128
It would be easy for me to develop a business idea.	GER	male	17	7.1	222	3.5	3						
		female	26	10.3	226	2.2	2	3.074	0.013				
	PL	male	10	11.4	78	3.2	3.5	- 1.390	0.987	- 3.605	0.002		
		female	15	6.8	204	3.9	4	- 2.090	0.220	- 5.107	<0.001	- 0.148	1.000
I know all about the practical details required to start a business.	GER	male	7	2.9	232	2.5	2						
		female	11	4.4	241	2.1	2	4.117	<0.001				
	PL	male	3	3.4	85	2.5	2.5	- 1.622	0.629	- 4.632	<0.001		
		female	11	5.0	208	2.4	2	0.575	1.000	- 3.421	0.004	2.024	0.258

Table 8 RESULTS ANOVA COMPARISON ON THE FACTORS OF MOTIVES FOR STARTING A BUSINESS													
Question / Factors	Country	Gender	„I don’t	„I don’t know“ %	n	mean	median	G E R				P L	
								male		female		male	
								z	p	z	p	z	p
...the opportunity to	GER	male	12	5.0	227	5.0	5						
		fema	5	2.2	24	4.5	5	-	1.000				

realizemy own ideas.		le		0	7	2		1.120					
	PL	male	2	2.3	86	5.2	5	- 1.552	0.724	- 0.746	1.000		
		fema le	5	2.3	214	4.8	5	- 3.366	0.005	- 2.332	0.118	- 0.973	1.000
...to create something on myown.	GER	male	6	2.5	233	4.9	5						
		fema le	6	2.4	246	4.2	4	- 1.348	1.000				
	PL	male	1	1.1	87	5.3	5	- 1.988	0.281	- 1.015	1.000		
		fema le	3	1.4	216	5.2	6	- 3.811	0.001	- 2.538	0.067	- 0.867	1.000
...my personal independence.	GER	male	9	3.8	230	4.4	5						
		fema le	6	2.4	246	4.2	4	- 0.297	1.000				
	PL	male	2	2.3	86	5.4	6	- 4.502	<0.001	- 4.326	<0.001		
		fema le	4	1.8	215	4.9	6	- 6.250	<0.001	- 6.059	<0.001	- 0.187	1.000
...to be at the head of an organisation.	GER	male	9	3.8	230	3.9	4						
		fema le	6	2.4	246	4.1	4	0.048	1.000				
	PL	male	0	0.0	88	5.0	5	- 2.673	0.045	- 2.731	0.038		
		fema le	8	3.7	211	4.3	5	- 4.329	<0.001	- 4.441	<0.001	- 0.612	1.000
...the opportunity to be financially independent.	GER	male	10	4.2	229	4.2	5						
		fema le	5	2.0	247	4.2	5	1.238	1.000				
	PL	male	1	1.1	87	5.6	6	- 4.747	<0.001	- 5.706	<0.001		
		fema le	3	1.4	216	5.2	6	- 6.768	<0.001	- 8.110	<0.001	- 0.347	1.000
... the improvement of quality of life.	GER	male	15	6.3	224	3.5	4						
		fema le	12	4.8	240	4.5	5	1.038	1.000				
	PL	male	3	3.4	85	5.3	6	- 6.167	<0.001	- 6.989	<0.001		
		fema le	4	1.8	215	4.7	5	- 6.843	<0.001	- 7.985	<0.001	1.033	1.000
		male	11	4.6	228	3.4	4						

...the creation of jobs.	GER	female	8	3.2	244	3. 9	4	- 3.321	0.005				
		male	2	2.3	86	4. 9	5	- 2.162	0.184	0.257	1.000		
	PL	female	4	1.8	215	4. 4	5	- 5.136	<0.001	- 1.949	0.307	- 1.682	0.555
...to lead people.	GER	male	10	4.2	229	3. 9	4						
		female	5	2.0	247	3. 5	3	0.434	1.000				
	PL	male	3	3.4	85	4. 5	5	- 0.513	1.000	- 0.835	1.000		
		female	9	4.1	210	3. 9	4	- 0.680	1.000	- 1.116	1.000	0.002	1.000
...earn more money than through wage labor.	GER	male	10	4.2	229	3. 7	4						
		female	14	5.6	238	4. 3	4	1.06	1.000				
	PL	male	2	2.3	86	4. 8	5.5	- 4.553	<0.001	- 5.357	<0.001		
		female	7	3.2	212	4. 8	5	- 5.978	<0.001	- 7.073	<0.001	0.047	1.000
...to work in a varied profession.	GER	male	8	3.3	231	4. 9	5						
		female	10	4.0	242	4. 9	5	- 2.243	0.149				
	PL	male	6	6.8	82	4. 4	4.5	1.225	1.000	2.847	0.270		
		female	13	5.9	206	4. 6	5	1.528	0.760	3.720	0.001	-0.085	1.000
...the building of personal wealth.	GER	male	10	4.2	229	4. 1	4						
		female	7	2.8	245	3. 8	4	1.229	1.000				
	PL	male	2	2.3	86	5. 4	6	- 2.690	0.043	- 3.615	0.002		
		female	4	1.8	215	4. 6	5	- 2.924	0.021	- 4.179	<0.001	0.490	1.000
...to have more free time.	GER	male	13	5.4	226	3. 1	3						
		female	10	4.0	242	2. 8	3	- 1.180	1.000				
	PL	male	2	2.3	86	4. 1	4.5	- 4.508	<0.001	- 3.680	0.001		
		female	7	3.2	212	3. 4	3	- 4.784	<0.001	- 3.701	0.001	0.890	1.000
...attainment of high social status.	GER	male	14	5.9	225	3. 4	3						
		female	8	3.2	244	4. 1	4	- 0.307	1.000				
	PL	male	3	3.4	85	4. 4	4.5	-	0.001	- 3.619	0.002		

						5		3.803					
		female	4	1.8	215	3.9	4	- 5.253	<0.001	- 5.035	<0.001	- 0.131	1.000
...the difficulty of finding the right job.	GER	male	25	10.5	214	2.7	3						
		female	26	10.3	226	3.5	4	- 3.719	0.001				
	PL	male	3	3.4	85	2.8	2	- 5.665	<0.001	- 2.920	0.021		
		female	10	4.6	209	3.6	4	- 8.909	<0.001	- 5.332	<0.001	- 1.089	1.000
...the continuation of a family tradition.	GER	male	25	10.5	214	2.7	2						
		female	26	10.3	226	2.9	2.5	- 0.867	1.000				
	PL	male	3	3.4	85	3.2	2.5	- 1.643	0.603	- 1.022	1.000		
		female	10	4.6	209	2.5	2	- 4.624	<0.001	- 3.824	0.001	- 1.783	0.447
...to contribute to the economy.	GER	male	12	5.0	227	3.7	4						
		female	14	5.6	238	3.3	3	0.628	1.000				
	PL	male	5	5.7	83	4.4	5	- 1.433	0.911	- 1.909	0.338		
		female	7	3.2	212	3.4	3	- 2.494	0.076	- 3.142	0.010	- 0.458	1.000
...to contribute to regional economic development.	GER	male	12	5.0	227	3.7	4						
		female	14	5.6	238	3.9	4	- 0.590	1.000				
	PL	male	1	1.1	87	3.7	3.5	0.113	1.000	0.547	1.000		
		female	10	4.6	209	3.3	3	- 1.637	0.609	- 1.086	1.000	- 1.336	1.000

Table 9 RESULTS ANOVA COMPARISON ON THE FACTORS OF BARRIERS TO STARTING A BUSINESS													
Question / Factors	Country	Gender	„I don't know“ n	„I don't know“ %	n	mean	median	GER				PL	
								male		female		male	
								z	p	z	p	z	p
...a lack of credit for newly	GER	male	99	41.4	140	3.9	4						
		female	100	39.7	152	3.2	3	- 0.867	1.000				
	PL	male	21	23.	67	3.7	4	- 0.339	1.000	0.349	1.000		

establishe d companies				9									
		femal e	47	21. 5	172	4.8	5	- 4.889	<0.001	- 4.098	<0.00 1	- 3.523	0.003
...the applicable state laws (rules and regulation s).	GE R	male	78	32. 6	161	3.8	4						
		femal e	10 4	41. 3	148	3.5	4	- 0.201	1.000				
	PL	male	17	19. 3	71	4.4	5	- 3.528	0.003	- 3.323	0.005		
		femal e	44	20. 1	175	4.7	5	- 5.629	<0.001	- 5.299	<0.00 1	- 0.797	1.000
		male	26	10.9	21 3	4. 1	4						
		female	33	13.1	21 9	4. 4	5	- 0.255	1.000				
		male	12	13.6	76	4. 2	5	- 0.829	1.000	- 0.648	1.000		
		female	25	11.4	19 4	4. 0	4	- 0.244	1.000	0.003	1.000	0.640	1.000
		male	18	7.5	22 1	4. 8	5						
		female	26	10.3	22 6	4. 3	5	- 3.651	0.002				
		male	7	8.0	81	3. 8	4	0.242	1.000	2.910	0.022		
		female	14	6.4	20 5	4. 4	5	- 4.985	<0.00 1	- 1.431	0.914	- 3.923	0.001
		male	24	10.0	21 5	4. 9	5						
		female	28	11.1	22 4	4. 5	5	- 2.327	0.120				
		male	8	9.1	80	4. 9	5	- 2.586	0.058	- 0.894	1.000		
		female	14	6.4	20 5	4. 7	5	- 5.950	<0.00 1	- 3.711	0.001	- 1.837	0.397
		male	24	10.0	21 5	3. 5	4						
		female	29	11.5	22 3	4. 8	5	- 2.716	0.040				
		male	9	10.2	79	3. 9	4	- 2.186	0.173	- 0.214	1.000		
		female	13	5.9	20 6	4. 4	5	- 5.223	<0.00 1	- 2.583	0.059	1.674	0.565
		male	36	15.1	20 3	3. 5	3						
		female	49	19.4	20 3	4. 3	4	- 3.270	0.006				
		male	8	9.1	80	4. 5	5	- 6.065	<0.00 1	- 3.605	0.020		
		female	10	4.6	20 9	5. 3	6	- 10.04	<0.00 1	- 6.747	<0.001	- 1.437	0.904

						2						
male	16	6.7	22 3	4. 0	5							
female	13	5.2	23 9	3. 9	4	- 4.314	<0.00 1					
male	6	6.8	82	3. 3	3.5	- 1.119	1.000	2.009	0.267			
female	9	4.1	21 0	4. 1	4	- 4.457	<0.00 1	- 0.285	1.000	- 2.182	0.175	
male	55	23.0	18 4	3. 6	4							
female	64	25.4	18 8	3. 5	3	- 2.993	0.017					
male	9	10.2	79	4. 3	4.5	- 5.021	<0.00 1	- 2.722	0.039			
female	13	5.9	20 6	5. 1	6	- 9.434	<0.00 1	- 6.411	<0.001	-2.128	0.200	
male	11	4.6	22 8	3. 9	4							
female	18	7.1	23 4	4. 4	4	- 3.804	0.001					
male	9	10.2	79	4. 1	4.5	- 0.279	1.000	2.441	0.098			
female	10	4.6	20 9	4. 3	4	- 3.217	0.008	0.483	1.000	- 2.057	0.238	
male	14	5.9	22 5	3. 5	4							
female	19	7.5	23 3	4. 5	5	- 4.768	<0.00 1					
male	7	8.0	81	5. 0	5	- 3.709	0.001	- 0.271	1.000			
female	9	4.1	21 0	4. 4	4	- 5.142	<0.00 1	- 0.502	1.000	- 0.097	1.000	
male	20	8.4	21 9	3. 9	4							
female	25	9.9	22 7	4. 5	5	- 1.929	0.322					
male	11	12.5	77	4. 3	5	- 1.203	1.000	0.177	1.000			
female	9	4.1	21 0	3. 7	4	- 1.588	0.673	0.306	1.000	0.045	1.000	
male	15	6.3	22 4	3. 4	4							
female	15	6.0	23 7	4. 0	4	- 3.567	0.002					
male	7	8.0	81	3. 3	3.5	- 0.177	1.000	2.405	0.097			
female	10	4.6	20 9	4. 0	4	- 2.698	0.042	0.768	1.000	- 1.808	0.424	
male	19	7.9	22 0	3. 9	4							

female	14	5.6	23 8	4. 6	5	- 2.819	0.029				
male	9	10.2	79	3. 8	4.5	- 1.434	0.909	0.582	1.000		
female	10	4.6	20 9	4. 1	4	- 2.069	0.232	0.674	1.000	0.088	1.000
male	36	15.1	20 3	3. 3	3						
female	31	12.3	22 1	3. 9	4	- 3.560	0.020				
male	9	10.2	79	4. 6	5	- 1.183	1.000	1.443	0.894		
female	15	6.8	20 4	3. 9	4	- 5.705	<0.00 1	- 2.260	0.143	- 3.084	0.012
male	45	18.8	19 4	3. 1	3						
female	39	15.5	21 3	4. 2	4	- 2.787	0.032				
male	6	6.8	82	4. 4	4.5	- 1.204	1.000	0.908	1.000		
female	15	6.8	20 4	4. 0	4	- 4.455	<0.00 1	- 1.737	0.495	- 2.204	0.165
male	31	13.0	20 8	4. 0	4						
female	26	10.3	22 6	3. 9	4	0.141	1.000				
male	8	9.1	80	4. 4	5	- 2.299	0.129	- 2.429	0.091		
female	14	6.4	20 5	4. 6	5	- 4.175	<0.00 1	- 4.401	<0.001	- 0.822	1.000
male	29	12.1	21 0	3. 6	3						
female	33	13.1	21 9	3. 9	4	- 0.564	1.000				
male	7	8.0	81	2. 8	2.5	0.123	1.000	0.542	1.000		
female	13	5.9	20 6	4. 0	4	- 2.652	0.048	- 2.118	0.205	- 2.105	0.212
male	29	12.1	21 0	2. 6	2						
female	34	13.5	21 8	2. 9	3	0.773	1.000				
male	6	6.8	82	3. 0	2.5	0.443	1.000	1.022	1.000		
female	14	6.4	20 5	3. 4	4	- 5.301	<0.00 1	- 4.582	<0.001	- 4.425	<0.001

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