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From:	General Secretariat of the Council
To:	Delegations
Subject:	Gender segregation in education, training and the labour market Report by EIGE

Delegations will find attached a report entitled "Gender segregation in education, training and the labour market" prepared by the European Institute for Gender Equality (EIGE) at the request of the Estonian Presidency[1].

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[1] Report on the review of the implementation of the Beijing Platform for Action, with particular reference to critical areas of concern "B: Education and training of women", "L: the Girl Child", "K: Women and the Environment" and "F: Women and the Economy".

Gender segregation in education, training and the labour market

Review of the implementation of the Beijing Platform for Action in the EU Member States

Eureopean Institute for Gender Equality (EIGE)

2017

Contents

Country abbreviations

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom
EU-28	28 EU Member States

Executive summary

Gender segregation is a deeply entrenched feature of education systems and occupations across the EU. It refers to the concentration of one gender in certain fields of education or occupations (horizontal segregation) or the concentration of one gender in certain grades, levels of responsibility or positions (vertical segregation). Though today women work in all occupations that formerly were 'all-men', their share within some occupations is still minor, for example, as construction workers, engineers or ICT professionals. On the other hand, a number of jobs are commonly dominated by women, namely pre-primary education, nursing, personal care and domestic work. Gender segregation narrows life choices, education and employment options, leads to unequal pay, further reinforces gender stereotypes, and limits access to certain jobs while also perpetuating unequal gender power relations in the public and private spheres.

Gender segregation has detrimental effects on women's and men's chances in the labour market and in society in general. A continuous increase in women's labour market participation over the last decades has largely been due to women entering "traditional female jobs" rather than a more even distribution of women and men across sectors and occupations. In the presence of gendered barriers, numerous sectors such as engineering and ICT fail to attract or retain women workers, despite the immense growth prospects and a shortage of specialists. Numerous barriers also restrict men's occupational choices, including lower pay across the sectors where women's employment is concentrated and prejudices about men's supposedly lower need for work–life balance or their aptitude to work in sectors of education or care. Gender segregation is one of the reasons behind skills shortages and surpluses and thus has large, though often still unaccounted for, effects on numerous policy initiatives, including those to stimulate economic growth and to reduce long-term unemployment. In the fast-changing and digitalising world of work, where every talent counts, this undermines the realisation of the EU's full innovative and economic potential.

By committing to the Beijing Platform for Action (BPfA), policymakers long ago recognised the need to 'eliminate occupational segregation, especially by promoting the equal participation of women in highly skilled jobs and senior management positions, and through other measures, such as counselling and placement, that stimulate their on-the-job career development and upward mobility in the labour market, and by stimulating the diversification of occupational choices by both women and men; encourage women to take up non-traditional jobs, especially in science and technology, and encourage men to seek employment in the social sector' (United Nations, 1995). A wide range of EU and national initiatives are being pursued to tackle gender segregation. This includes the Strategic Framework for Education and Training 2020 (ET 2020), the Europe 2020 Strategy for jobs and smart, sustainable and inclusive growth, the EU's Strategic Engagement for Gender Equality 2016–2019 (which identifies equal economic independence for women and men as a priority area), and the recent European Pillar of Social Rights, which intends to secure social rights more effectively for fair and well-functioning labour markets.

This report focuses on the fields of education and training and the occupations that are highly gender segregated (dominated by one gender). In particular, the focus is on the fields of science, technology, engineering and mathematics (STEM) and education, health and welfare (EHW). The analysis refers to education/training in tertiary education at ISCED Levels 5–8 (from short-cycle tertiary education to doctoral or an equivalent level of education) and to vocational education and training at ISCED Levels 35 and 45 (upper secondary and post-secondary non-tertiary vocational education).

Within STEM, the most men-dominated fields of education are ICT and engineering on the one hand, and manufacturing and construction on the other, with women representing 17 % and 19 % of the respective educational cohorts. Among the EHW study fields, gender segregation is more clearly pronounced in education than within the health and welfare fields, with men representing 19 % and 21 % of the cohorts respectively. Over the last decade (2004–2015), women's share among STEM graduates in the EU has fallen from 23 % to 22 %. No progress in increasing men's share in the EHW study field has also been achieved, with the share staying around 21 % at EU level during the same period (2004–2015). Among the highly diverse STEM fields, the share of women graduates notably declined in ICT (in 20 Member States), whereas few significant changes were noted in the study fields of engineering, manufacturing and construction (the largest STEM discipline). The fields of natural sciences, mathematics and statistics have sustained its gender-balanced distribution of graduates.

Gender segregation is much stronger in vocational than in tertiary education in almost all EU countries. Overall, only 13 % of EU graduates from STEM vocational education are women, whereas 32 % graduate from STEM tertiary education. Five countries (EE, IT, PL, PT, RO) have a gender-balanced proportion of STEM graduates in tertiary education, but no country has achieved gender balance in vocational education. Over the last decade, a declining interest in STEM studies was observed among all students, but in particular among women in vocational education. In EHW studies, no country has yet achieved a gender-balance among students either at the tertiary or vocational education level: men represent 16 % of EHW graduates in vocational education and 23 % of EHW graduates in tertiary education. The data show an increase in women's and men's interest in EHW studies at the vocational education level.

The chances of employment for women graduating from men-dominated fields of education are significantly lower compared to those of men. In 2014, the employment rate of EU women STEM graduates at tertiary level was 76 %. This is more than 10 percentage points lower than the employment rate of men with the same qualification and three percentage points lower than the average employment rate of women with tertiary education. Furthermore, in contrast to the overall increase in women's employment in the EU, the employment rate of women STEM graduates decreased between 2004 and 2014. Additionally, there has been a notable increase in inactivity rates among women STEM graduates who studied at vocational level. Across the EU, the employment rate of men graduates in EHW was above the general employment rate of men and also higher than that of all men with tertiary education.

In the transition from education to work, gender plays a prominent role in 'funnelling' young men and women into gendered rather than 'gender-atypical' jobs. The chances of finding a job matching their educational profile are higher for women EHW graduates than for women STEM graduates, and the opposite holds true for men graduates in these fields. Among tertiary STEM graduates, only one third of women work in STEM occupations, compared to one in two men. Among vocational education graduates, the gap is even greater, with only 10 % of women but 41 % of men working in STEM occupations. Among those moving away from STEM, 21 % of women at the tertiary education level work as teaching professionals, and 20 % of women with vocational STEM education work in sales. The chances of finding a job to match one's educational profile are more equitable in the EHW field, with about half of women and men from any educational level able to find work in EHW occupations.

Gender segregation in STEM and EHW occupations is persistently high and has not improved in the last decade. In fact, the share of men in EHW occupations decreased from 30 % in 2004 to 26 % in 2014 at the EU level. This is partially due to the retirement of men, who make up about 40 % of the EHW workforce aged 60–64, whereas there are far fewer men (23 %) among the youngest cohorts. The share of women in STEM occupations increased marginally from 13 % in 2004 to 14 % in 2014. No differences are observed in the share of women across the age cohorts of STEM workforce.

Gender segregation varies significantly across countries and across STEM and EHW related occupations. There is thus a vast scope for improvement. Building and related trades, electrical and electronic trades, metal, machinery and related trades and ICT are almost exclusively men-dominated occupations, whereas personal care work is a women-dominated occupation. The gender balance among science and engineering professionals is observed in one country only (LV). Stationary plant and machine operator work is a predominantly men-dominated occupation in some countries, and one with a very high proportion of women employees in other countries. A gender-balanced distribution of employees has been reached among (associate) health professionals in a few countries; however, men are underrepresented in the teaching profession across all Member States.

Gender segregation is viewed as one of the main factors underlying the gender pay gap across the sectors. Circularly, the gender pay gap also hampers the reduction of gender segregation. Differences in pay levels across sectors can not only motivate women to take up employment in men-dominated occupations, but can also discourage men from entering women-dominated occupations. Among those already working in the sectors under study, the unadjusted gender pay gap is found to be lower within STEM than in EHW sectors, though there are large country and sub-sector differences. For example, in manufacturing and ICT men earned more than women in all EU Member States, whereas in waste management and remediation activities or construction, women were observed to have higher average pay than men in some Member States.

Following the request of the Estonian Presidency of the Council of the EU (2017), the present report explores the progress made between 2004 and 2015 in breaking gender segregation in education, training and the labour market in the EU. The analysis is based on existing and proposed new Beijing indicators on gender segregation in education, transition from education to employment, and occupational segregation. The report draws on a number of varied data sources, including Unesco-OECD-Eurostat (UOE), the European Labour Force Survey (LFS), Eurofound's European Working Conditions Survey (EWCS) and Cedefop's European Skills and Jobs Survey (ESJS).

Introduction

Today, women make up the majority of tertiary students in almost all EU Member States. They also constitute from a third to half of graduates within upper secondary vocational programmes across the EU. In the last decades, women's participation in education has greatly increased, providing them with more opportunities in the labour market. There is an encouraging trend towards gender equality in employment. Yet in spite of this, women's and men's engagement in certain occupations is still limited. Horizontal and vertical gender segregation prevails as a significant feature of the labour market. Horizontal segregation refers to the concentration of women or men in different sectors and occupations while vertical segregation refers to the concentration of women or men in different grades, levels of responsibility or positions (see EIGE's Gender Equality Glossary and Thesaurus). Although gender segregation is often framed in terms of its negative effects on women's opportunities, it has detrimental effects for men too.

Gender segregation determines, among other things, women's and men's status, prestige, working conditions, work environments, experiences and earnings (Charles & Grusky, 2004; Kreimer, 2004; Reskin & Bielby, 2005; Steinmetz, 2012; Burchell, Hardy, Rubery, & Smith, 2014;), and hence maintains and recreates gender hierarchy in society (Kreimer, 2004). However, segregation is not always considered an exclusively negative phenomenon. For instance, higher segregation is also associated with higher employment rates among women. It can act as a protector of women's employment, for example via women's concentration in the public service, which provides higher job security (Burchell et al., 2014).

The segregated labour market restricts the career choices of women and men, and affects the value (both in ideological and economic terms) attached to their contribution (Sparreboom, 2014). In addition, gender segregation has economic effects as it is an important factor of labour market inefficiency and rigidity (Steinmetz, 2012; Sparreboom, 2014). For example, STEM (science, technology, engineering and mathematics) is one of the fastest-growing sectors in the EU. Analysis by Cedefop (2014) shows that demand for STEM professionals and associate professionals is expected to grow by 8 % between 2014 and 2025, while the average growth forecast for all occupations is 3 %. There is an evidence of skills shortage in this sector in spite of high unemployment rates in many Member States. The proportion of students choosing STEM is not increasing at EU level and vast underrepresentation of women in this sector persists (European Parliament, 2015a). On the other hand, the increasing reliance of the state and families on private markets to carry out both care and non-care domestic services will lead to increasing demands for workers in health, education and social welfare sectors (EHW), which have a vast underrepresentation of men.

Gender segregation hinders the full use of resources and slows down the adjustment to changes in the labour market. EIGE's recent study on the economic benefits of gender equality in the EU shows that improving gender equality and closing the gender gap in STEM education can significantly boost the potential productive capacity and improve the long-term competitiveness of the EU economy (EIGE, 2017a). The study shows that closing gender gaps in STEM education would have a positive impact on employment, with total EU employment foreseen to rise from 850,000 to 1,200,000 jobs by 2050. This would imply an increase in EU GDP per capita from 0.7 % to 0.9 % by 2030 and from 2.2 % to 3 % by 2050. Gender segregation in education, training and the labour market has been addressed by a number of EU policies. The European Commission's Strategic Engagement for Gender Equality 2016–2020 seeks to promote gender equality in all levels and types of education, including in relation to gendered subject choices and careers, in line with the priorities set out in the Education and Training 2020 (ET 2020) framework. This is seen as one of the key actions to reduce potential gender gaps in income and poverty among women. The close link between education and the labour market is also addressed in the European Pact for Gender Equality 2011–2020, which aims to 'eliminate gender stereotypes and promote gender equality at all levels of education and training, as well as in working life, in order to reduce gender segregation in the labour market' (Council of the European Union, 2011). The recently proposed European Pillar of Social Rights recognises that there is vast untapped potential in the EU in terms of participation in employment and in terms of productivity, which impedes growth and social cohesion. The European Pillar of Social Rights reconfirms the EU's commitment to foster gender equality in all areas, including participation in the labour market, conditions of employment, and skills.

The EU's commitment to the Beijing Platform for Action (BPfA) also marks an important step in recognising the need to advance gender equality in education, training and economy. The BPfA seeks to eliminate occupational segregation, especially by promoting equal participation of women in highly skilled jobs and senior management positions and by stimulating the diversification of occupational choices by both women and men (United Nations, 1995). A number of BPfA indicators on segregation in education, training and the labour market have been proposed by the German (2007), Slovenian (2008) and Belgium (2010) Presidencies, which were endorsed by the Council of the European Union.

Following the request of the Estonian Presidency of the Council of the EU (2017), this report explores progress in overcoming educational and occupational gender segregation in the EU. It focuses on highly gender segregated study and employment fields, such as science, technology, engineering and mathematics or education, health and welfare. The research seeks to reveal which factors support or hinder segregation in education and the labour market, and what policies are addressing these issues at EU and Member State levels. The report analyses the trends and cross-country differences in women's and men's subject choices in education and training, transition from education to the labour market and employment conditions in gender-segregated fields, including pay gaps. The analysis shall support the monitoring of the implementation of the BPfA in the EU.

Chapter 1 provides a brief conceptualisation of gender segregation and its impact on gender equality. It also presents indicators on segregation developed within the framework of the BPfA in the EU and defines the scope of the report. Chapter 2 provides an overview of the EU policy framework addressing gender segregation in education, training and the labour market. Chapter 3 presents data analysis on progress in overcoming segregation in education and training in the EU; occupational pathways of graduates in highly gender-segregated fields of education; and trends in occupational segregation over time across countries and in different age cohorts. The gender pay gap in gender-segregated sectors is an important aspect of the analysis. The factors feeding into gender segregation are discussed in Chapter 4. The analysis is based on existing and new proposed indicators on gender segregation in education, transition from education to employment and occupational segregation. A list of new indicators is presented in Chapter 5 and Annex V.

1. Defining gender segregation in education, training and the labour market

1.1 What gender segregation means

Gender segregation is a deeply entrenched feature of education systems and occupations across the EU. It manifests itself in women's and men's different patterns of participation in the labour market, public and political life, unpaid domestic work and caring, and in young women's and men's educational choices. As such, it refers to the concentration of one gender in certain fields of education or occupations, which narrows down life choices, education and employment options, leads to unequal pay, further reinforces gender stereotypes, and limits access to certain jobs while also perpetuating unequal gender power relations in the public and private spheres. Gender segregation has detrimental effects on both women's and men's chances in the labour market and society in general.

Throughout the last decades, women have made tremendous inroads into higher education and the labour market, which marks a notable advancement towards gender equality. A parallel development of gender-divided labour markets, however, highlights the need for further progress. Since women's entry into the formal employment sector, a series of occupations have been tacitly denoted as 'fit for women' or 'fit for men'. Though women are working in all occupations that formerly were 'men-only', their share within some occupations is still minor, e.g. as construction workers, agricultural operators, machinery mechanics, etc. Professions in healthcare, law and human resources are examples of higher-level occupations in which women's presence has greatly increased. A number of jobs are still commonly considered as 'women-only', e.g. pre-primary education, nursing or midwifery, secretarial and personal care work, domestic and related help, etc. Men's engagement in these sectors is very limited. Against this background, gender-segregated education systems and workplaces remain a major issue in moving towards more inclusive and innovative societies.

The understanding of the gender segregation phenomenon has evolved largely due to a number of positive developments in the last decades (Tinklin et al, 2005). Gender equality legislation has been enforced, men's and in particular women's participation in education has increased and educational levels have advanced, physical attributes have diminished in importance as a proxy for labour force productivity, and attitudes towards labour market participation as well as towards family roles (i.e. equal sharing of childcare) have changed. In parallel, the way gender segregation in education, training and the labour market is conceptualised and approached by researchers and policymakers has also changed. For example, gender segregation in education was initially explained in terms of boys' and girls' aptitudes for certain subjects and the lower academic performance of girls (Eccles, et al., 1990). Since the 1990s, more comprehensive explanations occurred, with causal links being made to a sense of belonging, to what remained highly vigorous stereotypes on gender roles, to gendered notions of certain fields (Kanny, Sax, & Riggers-Pieh, 2014), and to related cultural values (Yazilitas, Saharso, de Vries, & Svensson, 2016), etc.

Various types of gender segregation coexist. Most often gender segregation is viewed in terms of vertical (also referred to as hierarchical) and horizontal divides. Horizontal segregation occurs when women and men study different disciplines or work in different sectors or types of occupations. It is understood as the under- or overrepresentation of women or men in study fields, occupations or sectors. This contrasts with vertical segregation, which occurs as a result of women and men undertaking education at different levels or being underrepresented in the jobs located at the top of a hierarchy of 'desirable' attributes such as income and prestige (see EIGE's Gender Equality Glossary and Thesaurus). With some relevant exceptions, the focus of this report is on horizontal gender segregation in education, training and the labour market.

The degree of gender segregation varies across study and occupational fields. The theoretical equality benchmark would imply equal numbers of women and men in relevant participation statistics (or no gender gap). In practical terms, a certain gender gap is accepted. As noted by Burchell, Hardy, Rubery, and Smith (2014), 'gender-neutral' or 'mixed' occupations are those where the proportions of women and men are between 40 % and 60 %. In parallel, occupations are considered to be dominated by one gender if more than 60 % of the employees in that occupation are of one gender. Other benchmarks are also used in international practice, with the UN, for example, referring to the range of 45 % to 55 % as gender-equal participation in study or employment.

In addition to horizontal and vertical gender segregation as overarching concepts, a number of more specific manifestations of gender segregation are recognised, such as the glass ceiling, the leaky pipeline, the sticky floor, implicit bias or the gender pay gap.

The 'glass ceiling' refers to artificial impediments and invisible barriers that act against women's access to top decision-making and managerial positions in an organisation, whether public or private and in whatever domain. The term 'glass' is used because these impediments are apparently invisible and are usually linked to the maintenance of the status quo in organisations, as opposed to transparent and equal career advancement opportunities for women and men within organisations (see EIGE's Gender Equality Glossary and Thesaurus).

The phenomenon known as the 'leaky pipeline' results in an overwhelmingly men-dominated environment at the highest hierarchical levels, as women progressively abandon the chosen fields of work, not least due to a lack of progression in their careers (see, for example, EIGE, 2016a). In contrast, the 'sticky floor' is used as a metaphor to point to a discriminatory employment pattern that keeps workers, mainly women, in the lower ranks of the job scale, with low mobility and invisible barriers to career advancement (see EIGE's Gender Equality Glossary and Thesaurus). 'Implicit bias' refers to a lack of awareness of how the surrounding environment and processes can be discriminatory, even if the very best intentions on fairness and equality are in place. For example, women can be significantly disadvantaged by a gendered concept of 'merit', especially one that values a full-time, uninterrupted career trajectory or research success.

The gender pay gap could be viewed as a monetary "facade" of gender segregation (Evans, 2002). It reinforces the trend that women and men continue to work in different jobs and sectors and within those in lower valued and lower paid occupations and positons (such as health, education, and public administration). The problem of the gender pay gap persists due to differences in the labour market participation of men and women. Reasons include (but are not limited to) vertical and horizontal segregation, under-valuation of women's work, and an uneven distribution of caring responsibilities. As summarized by the Council Conclusions (2010), the causes underlying the gender pay gap are numerous and complex, reflecting discrimination on the grounds of gender as well as inequalities linked to education and the labour market, such as horizontal and vertical segregation in employment and in education and vocational training (see Council of the European Union, 2010).

Women's and men's concentration in different occupations, positions and sectors makes the comparison between women and men workers difficult if not impossible, and allows differences in remuneration between so-called women's and men's occupations to be easily maintained (Kreimer, 2004). Overall, the gender pay gap at the individual level and the gender pay gap across highly segregated workplaces reinforces gendered segregation processes in the labour market. On the one hand, it could be argued that higher wage prospects could motivate women to take up employment in men-dominated occupations. On the other hand, it could act as an important hindering factor for men's motivation to move into and remain in occupations dominated by women (i.e. Rolfe, 2005).

Gender segregation forms can change over time, with new forms emerging or being identified. For example, evidence suggests that women have lower access to core and innovative technical roles if they work in science and technology-related sectors. As a result, women are found to be more underrepresented in technology patenting than they are even in the technology workforce as a whole (Ashcraft, McLain, & Eger, 2016). Similarly, emerging research suggests women have fewer challenging and rewarding work experiences than men, which negatively influences women's career progression (De Pater et al., 2010). Impacts of the uneven allocation of tasks relevant to advancing in an organisation between women and men (Babcock et al., 2017) also go hand in hand with pay differentials, especially in terms of bonuses paid to reward extra efforts or to recognise challenging tasks or work under intense circumstances. In parallel, the gender bonus gap is found to be among the largest pay gaps across different remuneration sources, especially if working in sales and financial services' jobs - both in terms of the share of women and men receiving them and in terms of the generosity of bonuses (Morgan McKinley, 2016).

Even small imbalances add up to major disadvantages over time. It has been demonstrated with computer simulations that a tiny bias in favour of promoting men throughout career progression would lead to top-level positions dominated by men (Martell, Lane, & Emrich, 1996). Similarly, in real life, numerous explicit and implicit gender barriers result in strongly gender-segregated education and employment, with due pay differentials.

1.2 Why segregation matters

Gender segregation in education and the labour market creates and perpetuates gender inequalities in and beyond the labour market. It narrows women's and men's education and employment choices by maintaining and reinforcing stereotypes, limiting women's access to a number of (higher-level) jobs, and feeding into the undervaluation of women's work and associated skills and competences. It also relates to both women's and men's ability to better balance work and private life. Despite *de jure* gender neutral policy support, segregation in the labour market implies that men are likely to be working in better-paid and private sector jobs, and in organisational cultures that are less "sympathetic to leave for care reasons" (Lewis, 2009). This discourages men to take needed time off and for women to participate in quality employment.

Gender segregation leads to a higher poverty rate and lower economic independence among women. Gender segregation implies that women are in the majority in sectors that are generally characterised by low pay (i.e. Smith, 2010), few options for upskilling and often informal working arrangements. According to EIGE's research on gender, skills and precarious work in the EU (2017b), 27 % of women in comparison to 15 % of men are either very low paid, work very few hours per week or have low job security. In addition, in many families with children, men work full-time, whereas women work part-time (Lewis, 2009). This affects both the current and the future gender gap in earnings (i.e. pensions) and results in women's lower economic independence throughout the life course. It also means that unless real progress in reducing gender segregation is made, no significant poverty reduction in the EU can be achieved. The link between gender segregation and poverty reduction must be better accounted for in the design and obejctives of relevant policy initiatives, including the EU 2020 targets.

Gender segregation also acts as a barrier to increasing women's labour market participation. Given the overall lower earnings and career prospects of women, they face higher pressure than men, who are still often viewed as primary earners, to fully or partially withdraw from the labour market, in order to fulfill caring duties. With 80 % of all caregivers being women (European Parliament, 2016), labour market participation of women is affected by numerous challenges of combining work and care responsibilities. Overall, increasing labour market participation among women tends to go hand in hand with widespread gender segregation in the labour market, as the major share of jobs occupied by women are in specific (care) sectors and tend to be lower-remunerated. Thus, the underlying causal factors of gender segregation in principle remain intact even when women's labour market participation increases.

Gender segregation is increasingly recognised as an important factor of labour market inefficiency and rigidity. Segregation excludes a substantial share of the labour force from accessing numerous occupations; therefore, human resources are wasted and reacting to changes in the labour market (e.g. labour and skill shortages) takes longer (Bettio & Verashchagina, 2009b; Steinmetz, 2012b). Recent evidence by Cedefop (2016) shows that the top five occupations across the EU with critical shortages and a mismatch of skills are highly gender segregated: ICT professionals; medical doctors; STEM professionals; nurses and midwifes; and teachers. At the other extreme, extensive skills surpluses are recognised in a number of other highly gender-segregated occupations, including workers in building and related trades, manufacturing and transport workers, or plant and machine operators. The challenges posed by unmet or surplus skills within these occupations are highly important to national economies and their strategic development sectors, as well as for overall education and training of the labour force. Gender segregation partially underlies those skills shortages and surpluses and thus has large, though still often unaccounted for, effects for numerous policy initiatives, including those relating to economic growth, reducing long-term unemployment and the upskilling of the population.

Gender segregation not only impacts labour market efficiency but also inhibits inclusive and innovative economic growth. The Digital Single Market initiative of the EU, for example, aims at improving productivity and economic growth through the wide diffusion and adoption of ICT (European Commission, 2016a). High shortages of ICT and STEM professionals already exist and are forecast to worsen in the future. The EU urgently needs human capital in fast-growing areas, such as STEM, where all talent counts and high skills shortages exist (see The Royal Society of Edinburgh, 2012). It is also increasingly recognised that, in addition to bridging the supply gap in the e-skilled workforce, e-leadership skills – which are necessary to initiate and guide ICT-related innovation at all levels of enterprise – are particularly lacking and will take years to develop (European Commission, 2015a). Horizontal and vertical gender segregation acts as a profound barrier in responding to these challenges. As a European Commission (2012) report notes, 'the low numbers of women in decision-making positions throughout the science and technology system is a waste of talent that European economies cannot afford'. On the other hand, EIGE's study on the economic benefits of gender equality (2017a) shows that reducing gender segregation in STEM education alone could lead to an additional 1.2 million jobs in the EU. These jobs are estimated to occur mostly in the long term, however, as employment is likely to be affected only after new women STEM graduates choose to work in the STEM fields. In parallel, higher productivity associated with these STEM jobs is likely to result in higher wages for newly graduated women – affecting the gender pay gap as well as income and living standards of women, men, children and their extended families (European Parliament, 2015a).

A higher participation rate of women in science and technology-related areas would bring greater opportunities for more sustainable science and growth of the sustainable and 'green' economy. For example, the energy and transport sectors, which determine climate change policies to a great extent, are among the sectors still predominantly occupied by men. As shown by EIGE's research (EIGE, 2012), more gender-balanced participation in the latter sectors is expected to improve the overall responsiveness of climate change policies to the multifaceted needs of society. Furthermore, as observed by the OECD (2014), horizontal and vertical segregation in areas such as STEM implies that women are practically excluded from various sustainable economy developments, including upcoming 'green' employment opportunities. As with climate change policies, gender segregation is a factor that impedes the faster and more balanced development of the 'green' economy.

Gender segregation needs to be better understood in order to find the most suitable pathways to tackle the issue. In the historical context of men's dominance in the formal labour market, women-dominated sectors are still viewed as a stepping stone for women's entry into the labour market. Over several decades, up to the present, increased women's employment rates go hand in hand with increased gender segregation. The occurrence and societal acceptance of 'jobs for women' enabled and protected women's overall participation in the labour market. One example is the ongoing high concentration of women in the public service sector, which has a higher job security and is associated with a more predictable working environment – something that is in high demand in fostering work–family balance (Burchell et al., 2014, p. 29). Although it is important to recognise that our societies have partially achieved gender equality ([2]), gender-segregated workplaces should be tackled with due care so as to address many women's low opportunities in the labour market.

A better understanding of gender segregation, as well as its effects and underlying causes, could enable societies to more quickly tap into the necessary diversity of skills. According to Cedefop (2016), a reduction observed in the number of STEM graduates is partially due to the low attractiveness of the study area, especially to women. The growing demand for STEM professionals, on the other hand, goes hand in hand with an increasing need not only for technological skills, but also for highly developed 'soft' skills such as foreign languages, management, communication, problem-solving or project management. Recognising the vital need for diversity in the STEM sector, in May 2017 the EU Commission called for closer collaboration across different education sectors and business/public sector employers in order to promote and modernise the STEM curriculum through more multidisciplinary programmes and a greater focus on science, technology, engineering, (arts) and maths (STE(A)M) (European Commission, 2017a). Here, the evolution from STEM to STE(A)M reflects recognition of the important interaction between STEM and the arts as a driving force to boost innovation and creativity within the STEM sectors.

It should also be recognised that the impacts of gender segregation, and thus the ways to go about tackling them, are highly country-specific. For example, empirical evidence demonstrates that women's working hours depend very much on the specific country's family policies: women work more when there are easily available childcare places and less if family allowances are high (Schlenker, 2015). This points to ample space for diverse public policy tools (i.e. social security, labour market and economic tools) to tackle stereotypical views on gender roles and gender segregation simultaneously.

1.3 Beijing Platform for Action: Challenges in monitoring gender segregation

Four indicators under the Beijing Platform of Action currently measure progress in reducing gender segregation in education and training across the EU, as agreed by different Council Conclusions (Table 1).

[2] The results of the Gender Equality Index 2017, which assesses gender inequalities in domains such as work, money, knowledge, time, power and health since 2005 show that the EU takes a snail's pace towards gender equality. See Internet: http://eige.europa.eu/gender-statistics/gender-equality-index

In 2007 the German Presidency chose to work on the education and training of women and proposed a set of indicators, including two indicators on subject choices in tertiary education (see Council of the European Union, 2007). The indicator on the proportion of women and men graduates across all graduates in mathematics, the sciences and technical disciplines (tertiary education) assesses the gender ratios in fields of studies considered as key areas for realising the Lisbon Strategy for Growth and Jobs. It thus serves to evaluate progress towards reducing the unequal representation of women and men in mathematics, science and technology.

The indicator on the proportion of women and men ISCED 5A graduates across all ISCED 5A graduates, and the proportion of women and men PhD graduates across all PhD graduates by broad field of study and total number, both examine the gender ratios among highly qualified graduates as they reach the point of admission to advanced research programmes or entry into employment, specifically research & development. Gender equality at the advanced research level is seen as one of the prerequisites for an innovative and competitive R&D environment in the EU.

In 2008 the Slovenian Presidency proposed an indicator to monitor gender imbalances in educational achievements under the area of *the Girl Child* (see Council of the European Union, 2008). Two sub-indicators examine the performance of 15-year-old students in mathematics and science and the proportion of girl students in tertiary education in the fields of science, mathematics and computing and in teacher training and education science. The indicator aims to assess the potential impact of policies and measures to encourage both girls and boys to explore non-traditional educational paths and thus to use their talents and potential to the full, thereby also contributing to the achievement of the goals of the Lisbon Strategy for Growth and Jobs.

Finally, in 2012, during the Danish Presidency, Council Conclusions were adopted recognising that gender as well as social and employment issues need to be integrated into efforts to combat climate change. An indicator was proposed on the proportion of women tertiary graduates across all graduates in the natural sciences and technologies at the EU and Member State level. The indicator measures ratios of women and men among tertiary graduates in the natural sciences and technologies who complete graduate/postgraduate (ISCED 5) as well as advanced research studies/PhDs (ISCED 6) (EIGE, 2012). As such, it aims to monitor current and future gender-balanced capacity in terms of decision-making, qualifications and competitiveness in the field of climate change mitigation policy.

Table 1. Current BPfA indicators on gender segregation by level of education

<table>
<tr><th></th><th></th><th>Upper secondary (general & vocational)</th><th>Post-secondary (general & vocational)</th><th>Tertiary: short-cycle (general & vocational)</th><th>Tertiary: bachelor, master, doctoral or equivalent education (academic & professional)</th></tr>
<tr><td rowspan="2">Area B: Education and training of women (2007)</td><td></td><td></td><td></td><td colspan="2">Proportion of female graduates and male graduates of all graduates in mathematics, the sciences and technical disciplines (tertiary education)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Proportion of female/male ISCED 5a-graduates of all ISCED 5a-graduates and proportion of female/male PhD graduates of all PhD graduates by broad field of study and total</td></tr>
<tr><td>Area K: Women and the Environment (2012)</td><td></td><td></td><td></td><td colspan="2">Proportion of women and men among tertiary graduates of all graduates (ISCED levels 5 and 6) in natural sciences and technologies at the EU and Member State level</td></tr>
<tr><td>Area L: The Girl Child (2008)</td><td></td><td>15-year-old girls and boys: performance in mathematics & science</td><td></td><td colspan="2">Proportion of girl students in tertiary education in the field of science, mathematics and computing and in the field of teacher training and education science</td></tr>
</table>

Note: The ISCED 1997 classification is used in the current definition of the BPfA indicators; the description of levels within the table is based on the currently applied ISCED 2011 classification.
Source: Council Conclusions 2007, 2008, 2012.

Despite the many benefits of the existing indicators, a number of challenges exist in terms of measurement. None of the aforementioned indicators cover gender segregation within post-secondary (non-tertiary) education, which plays a major role in preparing both for labour market participation (vocational education) and entry into tertiary education (see Table 1). The current measurements also contain some inconsistencies. For example, an indicator on the proportion of women/men by a broad field of study (2007) does not take into account tertiary short-cycle education, whereas similar indicators introduced in 2008 include all tertiary education forms. Furthermore, current indicators assess gender imbalances either among graduates or among enrolled students, though the estimation of progressive dropout during the course of studies is cumbersome due to specifics of data sources.

None of the indicators under the Beijing Platform for Action currently enable monitoring of occupational gender segregation. One indicator in the area of Women and the Economy, however, traces progress in closing the gender pay gap in relation to gender segregation in the labour market, endorsed by the Council in its Conclusions (2010) on gender pay gap ([3]). Recognising (horizontal and vertical) gender segregation as the underlying major factor of pay differences across sectors, two sub-indicators of the latter indicator measure average gross hourly wages of women and men workers in the five industry sectors (and in the five professional categories) with the highest numbers of women workers and the highest numbers of men workers. In addition, the third sub-indicator of gender segregation is dedicated to monitoring the pay gap in management professional categories.

The new indicators on educational and occupational gender segregation proposed by EIGE are presented in Chapter 5 and Annex V.

1.4 Focus of this report

This report focuses on the fields of education, training and occupations, which are highly gender segregated (dominated by one gender). Particular focus is placed on the fields of science, technology, engineering and mathematics (STEM) and on education, health and welfare (EHW). The analysis refers to education and training in tertiary education studies at the level of ISCED 5–8 (from short-cycle tertiary education to doctoral or an equivalent level of education) and to vocational education and training at ISCED 35–45 levels (upper secondary and post-secondary non-tertiary vocational education). Graduates from upper- and post- secondary vocational education and training are important providers of EHW and in particular STEM skills (Cedefop, 2014). Close to 60 % of STEM students across the selected ISCED levels graduated from the vocational education level (2013–2015) at the EU level, whereas approximately one third (34 %) of EHW students graduated from the vocational education level. Where relevant, the current BPfA indicators are used to present the current situation and major trends.

Three study fields make up the STEM sector in this analysis: natural science, mathematics and statistics; engineering, manufacturing and construction; and information and communication technologies (ICT)[4]. Women represent almost one fourth of all tertiary graduates in the field of engineering, manufacturing and construction and even fewer of them – about one fifth of all graduates – in ICT. These two study fields mark the highest overrepresentation of men across all study areas. In natural sciences, mathematics and statistics, 57 % of graduates are women.

[3] Internet: http://register.consilium.europa.eu/doc/srv?l=EN&f=ST 18121 2010 INIT
[4] On the basis of ISCED-F 2013 classification, STEM consists of various narrower study fields, such as biology and biochemistry, environmental sciences, chemistry, physics, mathematics, statistics, chemical engineering and processes, electricity and energy, mechanics and metal trades, mining and extraction, textiles, database and network design and administration architecture or software and applications development and analysis.

Two study fields make up the EHW sector: education, and health and welfare. They have the highest concentration of women across all study fields[5]. Only 18 % of graduates in the field of education were men at the EU level in 2015. A somewhat higher share of graduates (24 %) were men in the field of health and welfare. Overall, the degrees of gender segregation point to major differences across the fields of education at the EU level. However, significant country variations are also noted (see Table 2 indicating the minimum and maximum percentages of women and men in various fields of study across the EU).

Table 2. BPfA: Proportion of female/male ISCED 5A graduates of all ISCED 5A graduates (2015)

	Men	EU min	EU max	Women	EU max	EU min
Education	**18%**	**4%**	**35%**	**82%**	**96%**	**65%**
Health and welfare	**24%**	**11%**	**42%**	**76%**	**89%**	**58%**
Arts and humanities	32%	21%	46%	68%	79%	54%
Social sciences, journalism and information	32%	22%	47%	68%	78%	53%
Business, administration and law	40%	27%	53%	60%	73%	47%
Natural sciences, mathematics and statistics	**43%**	**20%**	**56%**	**57%**	**80%**	**44%**
Agriculture, forestry, fisheries and veterinary	44%	19%	60%	56%	81%	40%
Services	50%	21%	69%	50%	79%	31%
Engineering, manufacturing and construction	**72%**	**59%**	**85%**	**28%**	**41%**	**15%**
Information and Communication Technologies	**79%**	**61%**	**92%**	**21%**	**39%**	**8%**

Note: Shaded cells refer to gender-segregated education fields at the EU level; bold text refers to education fields covered under the areas of STEM and EHW; indicator at the EU level refers to an unweighted average; within calculations, data for EL refer to 2014 instead of 2015 across all study fields, data for MT refer to 2014 and no data are available for LU in agriculture, forestry, fisheries and veterinary science; no data are available on services for FR, HR, LU, UK.
Source: Eurostat [educ_uoe_grad02].

Education and ICT fields are exclusively gender segregated both at EU level and across all Member States, with no country yet achieving a gender-equal share of graduates. More varied country situations are observed in other fields of study, with at least one country having gender balance in the field of engineering, manufacturing and construction, and one country achieving it in the field of health and welfare.

[5] On the basis of ISCED-F 2013 classification, EHW consists of various narrower study fields, such as education science, training for pre-school teachers, teacher training with subject specialisation, dental studies, medicine, nursing and midwifery, medical diagnostic and treatment technology, pharmacy, care of elderly and of disabled adults, childcare and youth services or social work and counselling.

An equivalent focus on STEM and EHW is applied for gender segregation analysis within the labour market. Here, the methodology proposed by Burchell et al. (2014) is taken as the starting point and the level of analysis is set at the occupational level. This approach enables a relatively detailed analysis of the gender segregation phenomenon, not only exploring the outcomes within the labour market but also tracing it back to related education and training choices. A more detailed look at the occupational level also enables the identification of situations and factors which might be lost when using more aggregated measures (Burchell et al., 2014). Finally, a specific and detailed focus on the selected fields with a high degree of gender segregation enables a more detailed analysis of the current situation across the Member States, as well as trends over time, identification of the underlying causal factors and a mapping of more targeted policy responses. For the purposes of this analysis and in line with a selection of educational levels, eight core STEM occupations and four EHW occupations are identified (Table 3; see Annex I for detailed descriptions of the occupations).

Table 3. Proportion of women and men in STEM and EHW occupations (2013–2014)

		Men	**EU min**	**EU max**	**Wo-men**	**EU min**	**EU max**
STEM	Science and engineering professionals	75%	56%	80%	25%	20%	44%
	ICT professionals	84%	68%	92%	16%	8%	32%
	Science and engineering associate professionals	84%	71%	91%	16%	9%	29%
	ICT technicians	82%	65%	91%	18%	9%	35%
	Building and related trades workers	97%	94%	100%	3%	0%	6%
	Metal, machinery and related trades workers	96%	93%	100%	4%	0%	7%
	Electrical and Electronic Trades Workers	96%	89%	100%	4%	0%	11%
	Stationary Plant and Machine Operators	67%	37%	82%	33%	18%	63%
EHW	Health professionals	30%	11%	55%	70%	45%	89%
	Teaching professionals	31%	15%	38%	69%	62%	85%
	Health associate professionals	20%	6%	48%	80%	52%	94%
	Personal care workers	10%	2%	19%	90%	81%	98%

Note: Data refer to an average across the period 2013–2014 due to limited sample size; indicator at the EU level is calculated on the (weighted) individual-level data; no data available on MT; two-digit ISCO-08 classifications used to define occupations: 21, 25, 31, 35, 71, 72, 74, 81 [STEM]; 22, 23, 32, 53 [EHW].
Source: EU-LFS, calculations based on 2013–2014 microdata.

All STEM and EHW occupations as listed above are highly gender segregated at the EU level, though at varied degrees, across occupations and across the Member States. Building, metal and machinery, electrical and electronic as well as related occupations are almost exclusively dominated by men. A very high concentration of men is also observed among ICT workers (professionals and technicians). Among science and engineering professionals, a somewhat higher ratio of women is noted among the professionals category. Similarly, all EHW occupations are dominated by women workers, with particularly low shares of men observed among health associate professionals and in particular among personal care workers.

In addition to the focus on STEM and EHW study fields and occupations, the report also enables the identification of transition pathways from education to the labour market across a number of other occupations and with a focus on the 20 most common EU occupations given the high variety of professional specialisations (Burchell et al., 2014). It should be noted that three occupations within the STEM sector, namely ICT professionals and technicians, electrical and electronic trades workers, and stationary plant and machine operators, do not belong to the 'top 20' classification, whereas all listed EHW occupations are included. In 2014, three quarters of all employed ([6]) people worked in the 20 most common EU occupations. Only five occupations were gender balanced, with the highest degrees of gender segregation observed in STEM and EHW occupations.

Table 4. Share of women and men across the 20 most common EU occupations (2014), %

	Men	Women
Building and related trades workers	**96.9**	**3.1**
Metal, machinery and related trades workers	**96.1**	**3.9**
Drivers and mobile plant operators	95.4	4.6
Science and engineering associate professionals	**84.1**	**15.9**
Science and engineering professionals	**74.5**	**25.5**
Labourers in mining, construction, manufacturing and transport	72.9	27.1
Market-oriented skilled agricultural workers	68.8	31.2
Business and administration professionals	52.0	48.1
Numerical and material recording clerk	44.0	56.0
Legal, social and cultural professionals	43.8	56.2
Business and administration associate professionals	43.1	56.9
Personal services workers	41.3	58.7
Sales workers	33.0	67.0
Teaching professionals	**30.6**	**69.4**
Health professionals	**29.3**	**70.7**
Customer services clerks	28.6	71.4
Health associate professionals	**19.9**	**80.1**
General and keyboard clerks	18.3	81.7
Cleaners and helpers	15.5	84.5
Personal care workers	**10.5**	**89.5**

Note: Shaded cells refer to gender-segregated occupations at the EU level; bold text refers to 'top 20' occupations covered under the areas of STEM and EHW; no data are available on Malta; indicator at the EU level is calculated on the (weighted) individual-level data.
Source: EU-LFS, calculations based on 2014 microdata.

[6] Not for all employed people, information on occupation is recorded in the EU-LFS survey data.

The report draws on various data sources. UNESCO-OECD-Eurostat on education is used to assess gender segregation in education. Various labour market aspects are analysed on the basis of European Labour Force Survey (LFS) 2004-2014, with a reference to the population aged 15-64 years. In addition, labour market analysis is also based on Eurofound's 2015 European Working Conditions Survey (i.e. reference to employed people aged 15 and older, except for BG, ES, the UK – aged 16 and older) and Cedefop's 2014 European Skills and Jobs Survey (i.e. reference population group is aged 24-65).

Finally, it should be noted that the focus of this report is on formal and contractual employment, whereas numerous other types of work are not covered by the report, despite their important links to gender segregation. As shown by research evidence (OECD, 2012; EIGE, 2016b; EIGE, 2017b), women are overrepresented in part-time, informal, precarious and unpaid work, but underrepresented in self-employment and entrepreneurship – with due cross-generational consequences (i.e. recreation of stereotypes) as well as corresponding degree of ability to enter more secured and prestigious workplaces or have access to upskilling. In the world of work, which in the future is likely to be characterised by a need for higher levels of skills, as well as by digitalisation and automation (Thyssen, 2017), this brings social and economic challenges in addition to those already discussed (in relation to gender segregation in education, training and the (formal) labour market).

2. Policy context

Gender segregation in education, training and the labour market is a complex issue involving a mixture of economic and socio-cultural factors and policies. It cuts across different policy domains and concerns many groups of stakeholders. While competence for the content and organisation of education and training systems lies with the Member States, a wide range of European initiatives have been pursued to tackle gender segregation.

2.1. Combating gender segregation in education and training policy

The **Education and Training 2020** (ET 2020) strategic framework for European cooperation in education and training is the main instrument for the exchange of information and experience on issues common to the education and training systems of the Member States (Lisbon Treaty, Art. 165 and 166). It provides a forum for exchanges of good practices, mutual learning, advice and support for policy reforms in Member States. In the **2015 Joint Report** of the Council and the Commission on progress in the implementation of ET 2020 (see European Commission, 2015c), the Commission and the Member States set new priorities for 2020 that include tackling the gender gap in education and promoting more gender-balanced choices in education (see European Commission website). The gender equality dimension is integrated in the relevant European funding programmes, in particular Erasmus+ and the EU funding programme for education, training, youth and sport.

In the **Paris Declaration** of March 2015 on promoting citizenship and the common values of freedom, tolerance and non-discrimination through education, EU Education Ministers and the European Commissioner for Education agreed to strengthen their actions in education with a view to promoting gender equality, among other issues. In this context, promoting gender equality is embedded within a wider framework of fundamental values, tolerance and citizenship. These two policy-steering documents provide a new mandate to the Commission for action in the area of education and training.

The Commission supports the Member States in delivering on the Paris Declaration and on the implementation of the provisions of the 2015 Joint Report. As part of the ET 2020 strategic framework and in order to implement the Open Method of Coordination in education and training, cooperation between the Commission and Member States is organised in the form of working groups (2016–2018). These will identify and analyse pertinent examples of policies within the EU so as to draw common principles and factors for challenges or success that are transferable to other Member States. The Working Group on Promoting Citizenship and the Common Values of Freedom, Tolerance and Non-Discrimination through Education and the Working Group on the Modernisation of Higher Education will deal, inter alia, with social inclusion and gender gaps in education.

2.2. Combating gender segregation in employment

The European Union has regulatory power in the area of employment policy. It has issued a number of legal acts that have implications for combating segregation.

At policy level, **the Europe 2020** strategy is the EU's main strategic document for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy. The strategy sets out the headline targets for education, research & innovation, and employment. The EU 2020 sets a target of 75 % employment for women and men aged 20–64. This implies reinforcing education and training for women, particularly in sectors where they are underrepresented. Another objective of the Europe 2020 strategy is to ensure that at least 40 % of 30–34-year-olds complete tertiary-level education.

Gender segregation in employment is a major factor hindering the stimulation of more competitive, sustainable and inclusive growth. For example, the evidence of persisting skills shortages in STEM fields in spite of high unemployment levels in many Member States shows that there is a vast pool of untapped potential, as well as a waste of resources and investment in human capital. A sufficient labour supply in STEM, one of the fastest-growing sectors in the EU, is an essential precondition for implementing the European Agenda for Growth and Jobs (European Parliament, 2015a). STEM skills are of particular strategic relevance for the Jobs, Growth and Investment Package (infrastructure, notably broadband and energy networks, as well as transport infrastructure in industrial centres; education, research & innovation; renewable energy and energy efficiency) (see European Commission, 2014).

The most recent initiative of **the European Pillar of Social Rights** is intended to secure social rights more effectively for fair and well-functioning labour markets and welfare systems. It is recognised that, to a large extent, the social challenges Europe is facing today are a result of relatively modest growth, which is rooted in untapped potential in terms of participation in employment and productivity (European Commission, 2017c). Equal opportunities and access to the labour market are one of the three focus areas of the European Pillar of Social Rights, with gender equality as one of the key principles. The pillar reconfirms the EU commitment to foster gender equality in all areas, including participation in the labour market, terms and conditions of employment, career progression and equal pay for work of equal value. Gender equality is also considered in other areas of the pillar, focusing on fair working conditions and social protection and inclusion.

The European Commission's Strategic Engagement for Gender Equality 2016–2019 seeks to increase women's labour market participation and the equal economic independence of women and men, as well as to reduce gender gaps in pay, earnings and pensions and thus fight poverty among women. Actions planned within these priority areas include:

- the introduction of further measures to improve the gender balance in economic sectors and occupations; use of the Grand Coalition for Digital Jobs to support measures enhancing women's and girls' digital skills; promoting women's employment in the ICT sector; and raising awareness on educational and vocational training choices;
- the promotion of gender equality in all levels and types of education, including in relation to gendered study subject choices and careers, using existing policy cooperation tools and funding instruments as appropriate, in line with the priorities set out in the Education and Training 2020 (ET 2020) framework.

The close link between education and the labour market is also addressed in the **European Pact for Gender Equality 2011–2020**, which aims to 'eliminate gender stereotypes and promote gender equality at all levels of education and training, as well as in working life, in order to reduce gender segregation in the labour market' (Council of the European Union, 2011).

The Council, in its recent Conclusions on 'Enhancing the skills of women and men in the EU labour market' (January, 2017), stresses the importance of combating horizontal occupational segregation by gender along with measures promoting the recognition and status of sectors dominated by women. The conclusions encourage girls, boys, women and men from all backgrounds to choose educational fields and occupations in accordance with their abilities and skills, not based on gender stereotypes, in particular by promoting women's and girls' access to STEM educational fields and occupations and by encouraging men and boys to study and work in fields such as social services, childcare and long-term care (Council of the European Union, 2017).

The Council Conclusions on 'Women and the economy: Economic independence from the perspective of part-time work and self-employment' recognise the importance of developing gender-sensitive education and career counselling, including by means of training, promoting a gender balance among relevant staff, and undertaking media campaigns encouraging and enabling girls and boys/women and men to choose educational paths and occupations in accordance with their abilities and skills. The Council calls on Member States to tackle occupational and sectoral segregation in employment including by means of positive action measures, awareness-raising measures and measures to support family-friendly approaches and gender equality in organisations, as well as by considering the removal of disincentives in tax-and-benefit systems that discourage women's participation is the labour market (Council of the European Union, 2014).

A need for active, evidence-guided intervention has been confirmed by the European Parliament Resolution of September 2015 on empowering women and girls through education in the EU. Gender stereotypes and sexism are recognised as the greatest obstacles to achieving gender equality, as they affect the self-image and decisions made by girls and boys. Member States are called to fight these stereotypes through informal and formal education, and by encouraging girls and boys to take equal interest in all subjects.

The Rights, Equality and Citizenship Programme 2014–2020 (with a budget of EUR 439 million) supports training activities, mutual learning, cooperation activities, the exchange of good practices, peer reviews, development of ICT tools, awareness-raising and dissemination activities. It supports main actors (key European NGOs and networks, Member State authorities implementing Union law) as well as analytical activities to promote non-discrimination, equality and gender mainstreaming and to combat all forms of intolerance. In May 2016, a call for projects was launched to promote good practices on gender roles and overcome gender stereotypes in education, training and in the workplace; eight projects were supported (European Commission, 2016b). The EU has funded numerous projects in the field of women in science, and more recently, structural change (e.g. genSET on gender action plans in science, and GENDERA on best practices) (European Commission, 2012).

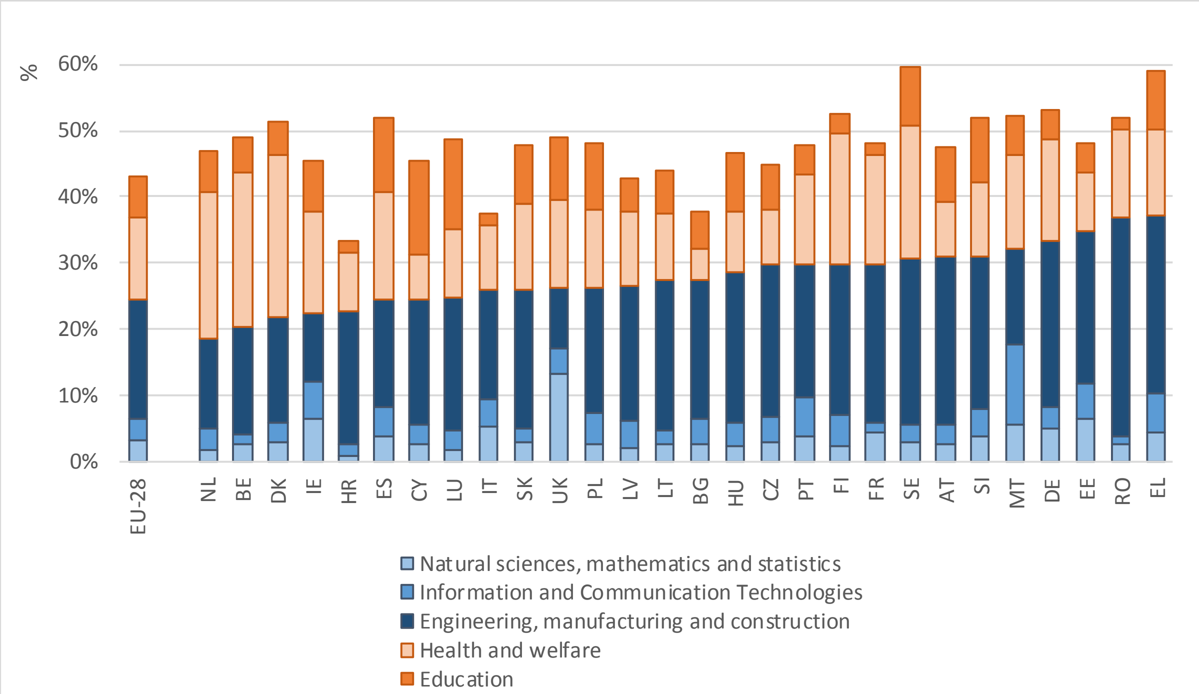
3. Gender segregation in education and training

3.1. Gender segregation in education: Across study fields and time

Today, almost half of EU students graduate in two highly gender-segregated fields – 24 % in science, technology, engineering and mathematics (STEM) and 19 % in education, health and welfare (EHW). Engineering, manufacturing and construction (with 18 % of all STEM graduates) is the largest STEM study field. Health and welfare is the largest field within EHW, with 13 % of all graduates. Natural sciences, mathematics and statistics as well as ICT each represent about 3 % of all graduates, whereas 6 % of graduates at the EU level studied in the field of education.

Large differences across the Member States exist regarding the proportion of graduates in STEM and EHW (Fig. 1). For example, in Sweden nearly 30 % of all students graduate in EHW, and 30 % in STEM. In Romania, a large proportion of students choose STEM, in particular engineering, manufacturing and construction (33 %) and only 15 % graduate in EHW. In Malta, about the same share of students graduate from ICT (12 %) and from engineering, manufacturing and construction (14 %), whereas in the UK natural sciences, mathematics and statistics attract the highest share of students within STEM (13 %).

Figure 1. Proportion of STEM and EHW graduates within total number of graduates, by field of education (%), (2013–2015)



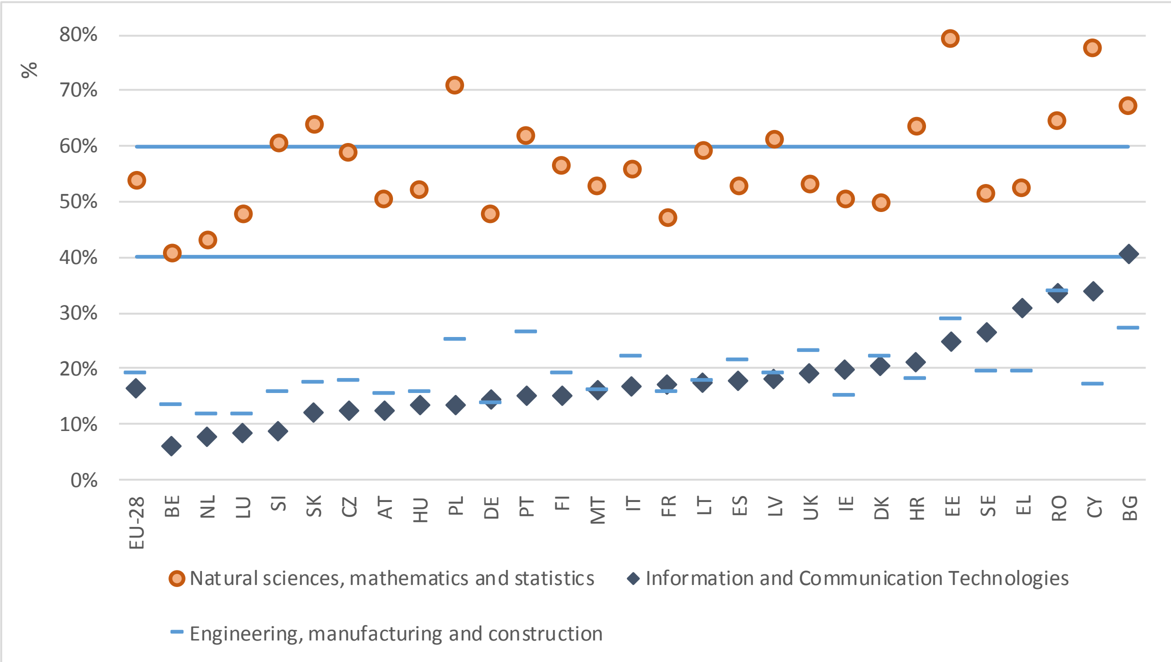
Note: Data refer to tertiary education (ISCED 5–8) and VET (ISCED 35 & 45). STEM include F05 - Natural sciences, mathematics and statistics, F06 - Information and Communication Technologies, and F07 - Engineering, manufacturing and construction. EHW include F01 – Education and F09 - Health and welfare. Here and further on regarding 2013-2015 data on education [educ_uoe_grad02], the following data limitations apply : **BE:** ISCED 35 2015 n.a. (2013/2014 average used); **BG, EE, LT, RO, SK, FI**: ISCED 5 n.a.; **CZ, SI:** ISCED 5 n.a.; **IE**: ISCED 35 & 45 n.a.; **EL**: 2015 n.a. (2013/2014 average used), ISCED 45 n.a.; **ES**: for ISCED 8: F05, F06 for 2013 and 2014 n.a. (2015 used), ISCED 45 for 2013 and 2014 n.a.; **FR**: for ISCED 5, 6, 7: F05 and F07, 2013 and 2014 n.a. (2015 used); **HR**: ISCED 35: 2013 and 2014 n.a. (2015 used), ISCED 45 n.a.; **IT**: only 2015 (ISCED E45 n.a.); **DK, LV, HU, AT**: F09 for 2013 and 2014 n.a. (2015 used); **NL**: for ISCED 8: F07 n.a. for 2014 and 2015 (2013 used), for ISCED 8: F01 and F09 n.a. for 2015 (2013/2014 average used), for ISCED 8 F05/F06 n.a ; **PL**: for ISCED 5 F05, F06, F07 n.a., for ISCED 8: 2013 n.a. (2013/2014 average used), F05/F07 for 2014 n.a. (2015 used); **PT**: F09 2013 and 2014 n.a. (2015 used), ISCED 5 n.a.; **UK**: Only 2015 (ISCED 35 & 45 n.a.).
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02].

The share of women among STEM graduates in the EU (in both tertiary and vocational education) dropped from 23 % in 2004–2006 to 22 % in 2013–2015. The share of men graduates in EHW in the same periods remained the same: 21 % and 21 %.

Science, technology, engineering and mathematics (STEM)

Large variations in terms of gender segregation exist inside STEM. ICT, engineering, manufacturing and construction are the most men-dominated fields of education. Overall in the EU, women constitute 19 % of STEM graduates in engineering, manufacturing and construction, and 17 % in ICT (Fig. 2). Only in Bulgaria is the share of women in ICT high, at 41 %. However, as noted by Cedefop (2016), significant numbers of STEM graduates in Bulgaria opt for non-STEM jobs, a phenomenon that exists in other countries as well. The natural sciences, mathematics and statistics are rather gender-balanced fields at the EU level. A number of Member States (EE, CY, PL) have a particularly high concentration of women in this field.

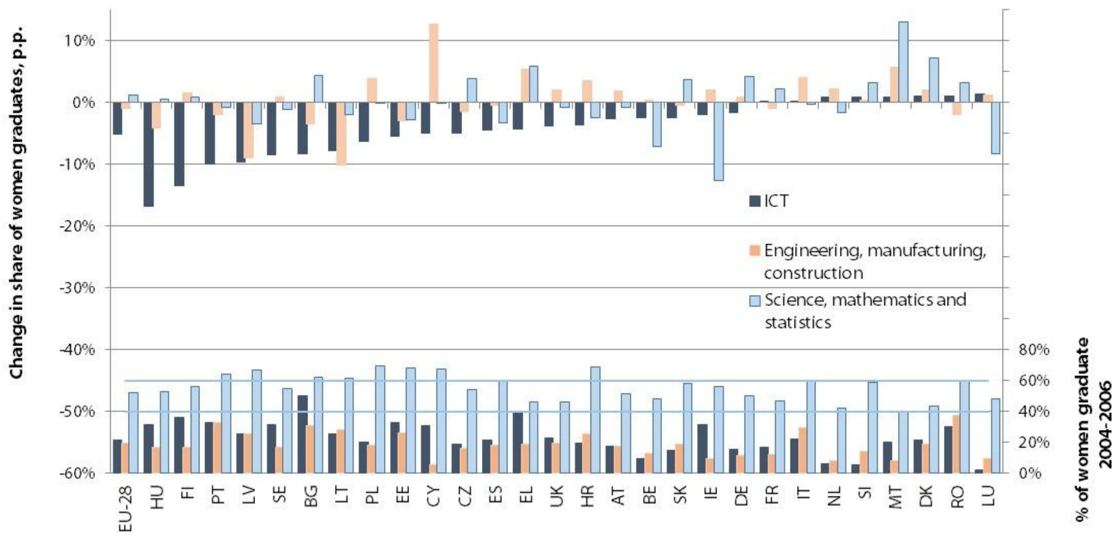
Figure 2. Proportion of women among STEM graduates, by field of education and country (%), (2013–2015)



Note: Refer to note of Figure 1.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02].

In ICT, the share of women graduates is notably declining. In the period 2004–2012 ([7]), gender segregation in ICT increased in 20 Member States, with a particularly large (over 10 p.p.) drop in the share of women in Hungary and Finland (Fig. 3, left-hand axis). Overall at the EU level, the share of women graduates in ICT decreased from 22% in 2004-2006 to 17% in 2010-2012.

Figure 3. Share of women graduates in STEM: Average share in 2004–2006 (%) and change from 2004-2006 to 2010-2012 (p.p.)



[7] Due to changes in ISCED classification, which affect coherent comparisons across time, two periods are analysed throughout this analysis: 2004 to 2012 and 2013 to 2015

Note: Data refer to tertiary education (ISCED1997 5–6) and VET (ISCED1997 3 & 4) ; STEM include EF4 - Sciences, mathematics and computing (minus computing), EF5 - Engineering, manufacturing and construction and EF48 Computing (for ICT). EHW include EF14 – Teacher training and education science and EF7 - Health and welfare. 2004 and 2012: data refer to average value during three-year periods (2004-2006 and 2010-2012 respectively) due to data reliability constraints. Here and further on regarding 2004-2012 data on education [educ_uoe_grad05], the following main data limitations apply : **BE:** EF14 for ISCED 3,4; ISCED 3,4 (2004) n.a.; **BG**: EF4; EF14 for ISCED 3,4; EF7 for ISCED 3 (2011, 2012) n.a.; **CZ**: EF14 for ISCED 4 (2004, 2005, 2006, 2010); EF7 for ISCED 4 (2012); EF4 for ISCED 3,4 n.a.; **DK**: ISCED 4; EF14; EF48 n.a.; **DE**: EF14 for ISCED 4 (2010, 2011, 2012) n.a.; **EE**: EF14; EF7 for ISCED 3 (2004, 2005, 2005, 2010); EF4 for ISCED 3,4 n.a.; **IE:** EF14; EF5 and EF7 for ISCED3; EF48 for ISCED 4 (2010, 2011, 2012) and for ISCED 5,6 (2010); EF4 for ISCED 3,4 n.a.; **EL**: EF7, EF14, EF48 for ISCED 5,6 (2006); ED3 (2006, 2010) n.a.; **ES**: ISCED 4; EF14; EF4 for ISCED 3 n.a.; **FR**: ISCED 5,6 (2004, 2010, 2012); EF4 and EF48 for ISCED 3; ISCED 3,4 (2004) n.a.; **HR**: ISCED 3,4; ISCED 5,6 (2011) n.a.; **IT**: ISCED 3, 4 n.a.; **CY**: ISCED 4 n.a.; ISCED 3 only EF5 available; **LV**: EF4 and EF14 for ISCED 3,4; EF7 for ISCED 3(2005, 2006), EF48 for ISCED 4 (2010,2011) n.a.; **LT**: EF4 and EF14 for ISCED 3,4; E48 for ISCED 3 n.a.; **LU**: EF14 for ISCED 3,4 (2012); ISCED 5,6 (2004, 2005, 2006, 2011) n.a.; ISCED 5,6 (2010, 2011, 2012) excluded from calculation to allow comparability; **HU**: EF14 for ISCED 3 (2011, 2012); EF4 for ISCED 3; EF48 for ISCED 3 (2010, 2011) n.a.; **MT**: 2004; EF48, EF5 and EF7 for ISCED 3,4 (2005); EF14 for ISCED 3,4; EF4 n.a.; **NL**: ISCED 4 (2004, 2005); EF4 and EF7 n.a.; **AT**: ISCED 3,4 (2004, 2005, 2006) n.a.; ISCED 3,4 (2010, 2011, 2012) excluded from calculation in order to allow comparability; **PL**: EF5 and EF7 for ISCED 3,4 (2012), EF14 for ISCED 3,4 (2010, 2011, 2012) n.a.; **PT**: ISCED 3,4 (2004, 2005, 2006) n.a.; ISCED 3,4 (2010, 2011, 2012) excluded from calculation to allow comparability; **RO**: ISCED 3, only EF5 available; E48 for ISCED 4 n.a.; **SI**: EF4 for ISCED 3,4; E48 for ISCED 4 (2004,2005, 2006); EF7 for ISCED 4 (2011, 2012) n.a.; **SK**: EF48 for ISCED 3,4 (2004 2005, 2006) excluded from calculation to allow comparability; EF48 for ISCED 3,4 (2010, 2011, 2012) n.a.; **FI**: EF4 for ISCED 3,4; EF14 for ISCED 3 (2011, 2012); EF14 for ISCED 4 (2004, 2005, 2006, 2010) n.a.; **SE**: EF14 for ISCED 3 (all years) and ISCED 4 (2004, 2005), EF4 for ISCED 4 n.a.; **UK**: ISCED 3 and 4 n.a.

Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_grad05].

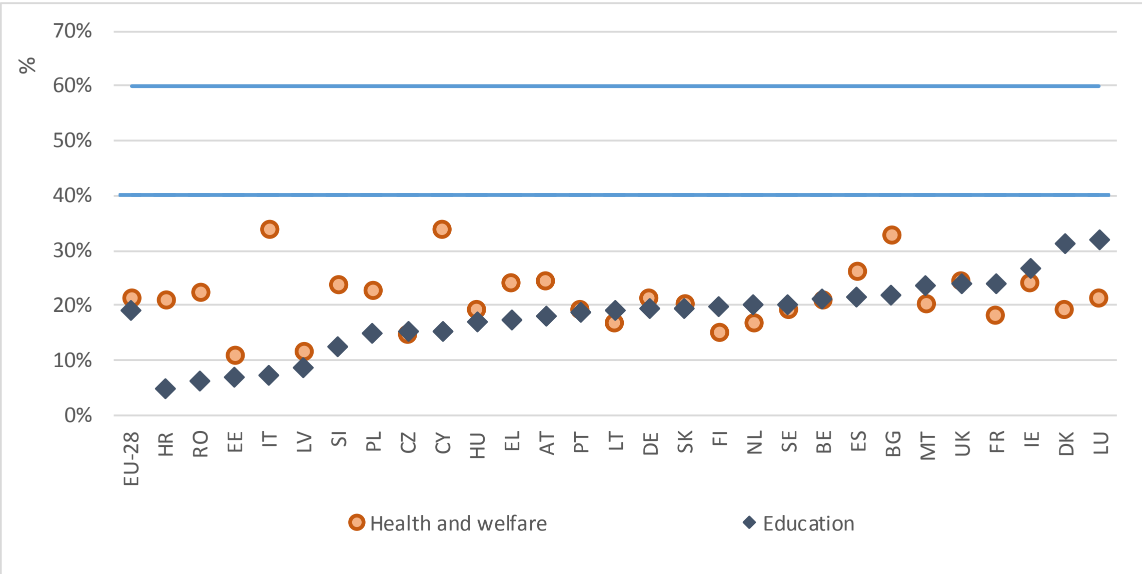
No progress was achieved in reducing gender segregation in engineering, manufacturing and construction during 2004-2012. In parallel to decreasing gender balance within the ICT field, a few countries, such as Hungary, Latvia and Lithuania, had also a substantial drop in the share of women graduates in engineering, manufacturing and construction. At the EU level, the share of women graduates in engineering, manufacturing and construction reduced from 19% in 2004-2006 to 18% in 2010-2012. Overall, this potentially points to a declining interest among women and possibly other worsening factors to aspire to careers in STEM fields in some countries.

Natural sciences, mathematics and statistics have sustained gender-balanced distribution of graduates or remained a women dominated study field during the last decade. The biggest increase in the share of women in these fields is observed in Denmark, Greece and Malta. In Bulgaria, Estonia, Croatia, Cyprus, Latvia, Poland and Portugalthe share of women in natural sciences, mathematics and statistics have remained consistently high since 2004.

Education, health and welfare (EHW)

Education, health and welfare studies are highly gender segregated both at EU level and across all Member States. On average in the EU, men constitute only 21 % of graduates in health and welfare and 19 % in education. A higher degree of gender segregation is found among graduates in education studies compared to the health and welfare, except for some countries (e.g. DK, FI, FR, IE, LU, MT, NL) (Figure 4).

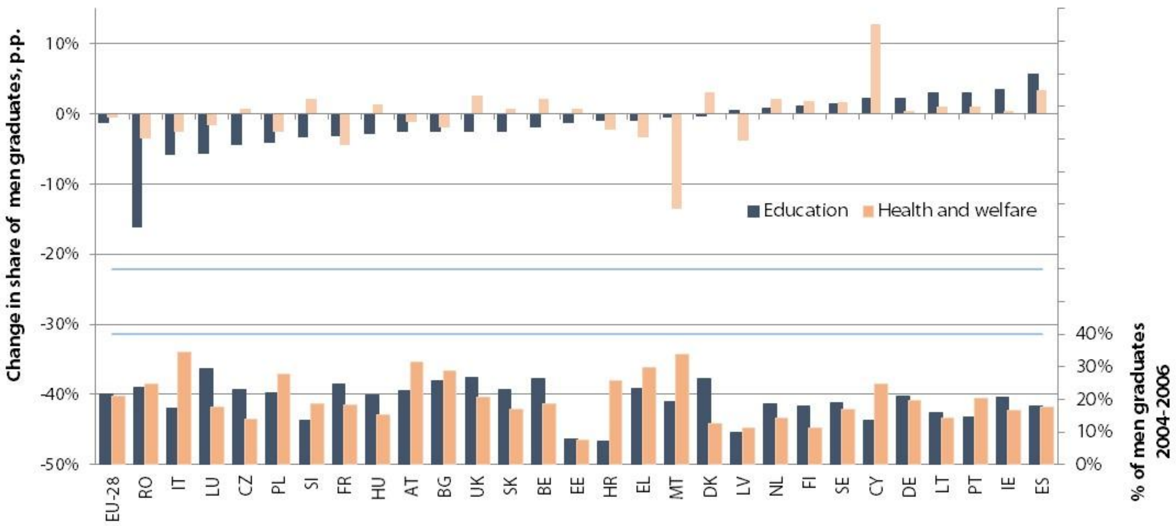
Figure 4. Proportion of men among EHW graduates, by field of education and country (%), (2013–2015)



Note: Refer to note of Figure 1.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02].

There was no progress in reducing gender segregation in EHW across most Member States during the period 2004–2012. In all but four EU countries (ES, IT, RO), no major changes (+/−5 p.p.) were observed in changing gender balance across EHW (Fig. 5). In ten countries (BG, HR, EL, FR, IT, LU, MT, AT, PL, RO), the level of gender segregation increased both in education studies and in health and welfare. A particularly large drop in the share of men graduates in the field of education is noted in Romania: from 24 % in 2004–2006 to 8 % in 2010–2012. As a result, Romania had the second lowest share of men graduates in education by 2013–2015 (Fig. 4). Similarly, in Malta the share of men graduates in the field of health and welfare dropped substantially, from 34 % to 20 %, during the same period.

Figure 5. Share of men graduates in EHW: Average share in 2004–2006 (%) and change from 2004-2006 to 2010-2012 (p.p.)



Note: Refer to note of Figure 3.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_grad05].

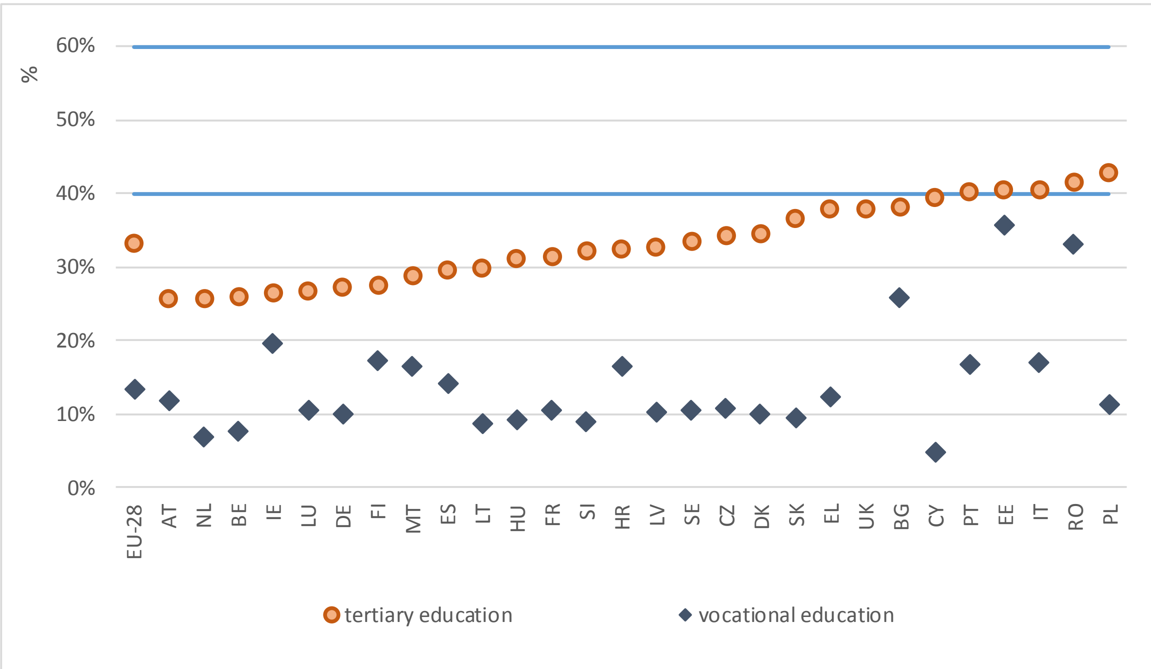
Gender segregation in both study fields of EHW reduced (over 2 p.p. regarding the share of men graduates) in only two countries: Cyprus and Spain. In Cyprus, the share of men graduates in health and welfare increased from 25 % in 2004–2006 (Figure 5) to 38 % by 2010-2012. The progress within the field education was much more modest, from 14 % to 16 % respectively. Though still far from achieving gender balance, Spain is among the countries with the highest share of men in EHW during the period 2013–2015. In the latter country, the share of men graduates in health and welfare increased from 18 % in 2004–2006 (Figure 5) to 21 % by 2010-2012, while the share of men graduates in education field increased from 18 % to 24 % respectively.

3.2. Comparing gender segregation in vocational and tertiary education

In the EU, women constitute about 13 % of graduates in STEM vocational education, whereas about 33 % - in STEM tertiary education. Gender segregation in STEM is much stronger in vocational than in tertiary education in all EU countries, with a smallest difference observed in Estonia (Fig. 6). Five countries (EE, IT, PL, PT, RO) have a gender-balanced proportion of STEM graduates in tertiary education, but no country has achieved gender balance in vocational education.

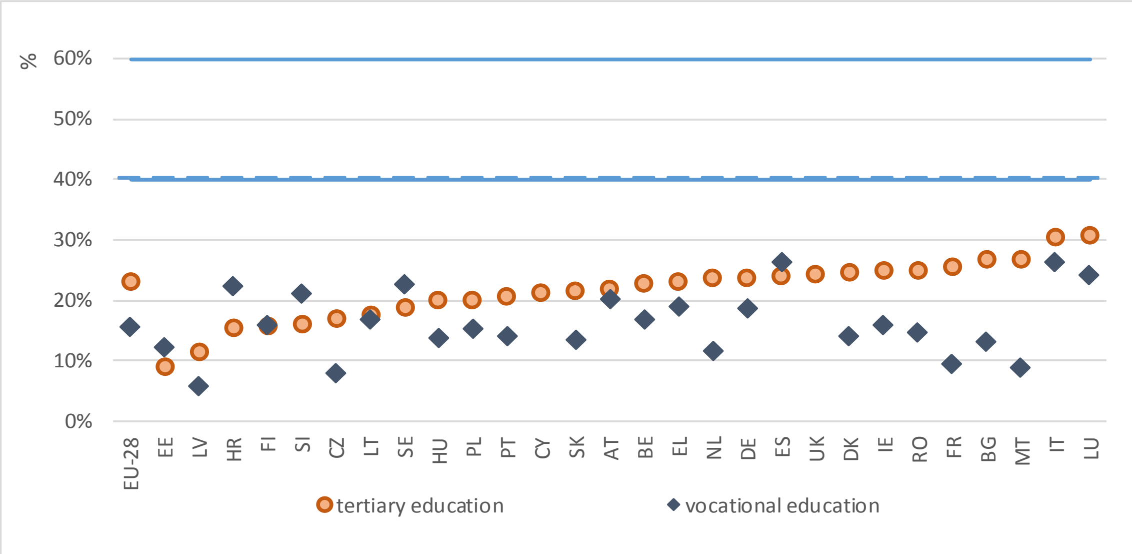
In the majority of EU countries, gender segregation in EHW is also stronger in vocational education compared to tertiary education (Fig. 7). In the EU, about 16 % of graduates in EHW vocational education are men and 23 % - in tertiary education. In six countries (EE, ES, HR, SI, FI, SE), the share of men graduates in EHW is higher in vocational education compared to tertiary education. Women dominate among EHW graduates in both types of education in all countries. Overall, larger country differences in tertiary education compared to vocational education, especially in STEM studies, show more diverse and progressive developments towards gender equality at the level of tertiary education.

Figure 6. Share of women graduates in STEM in tertiary education and VET (%), (2013–2015)



Note: Refer to note of Figure 1.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02].

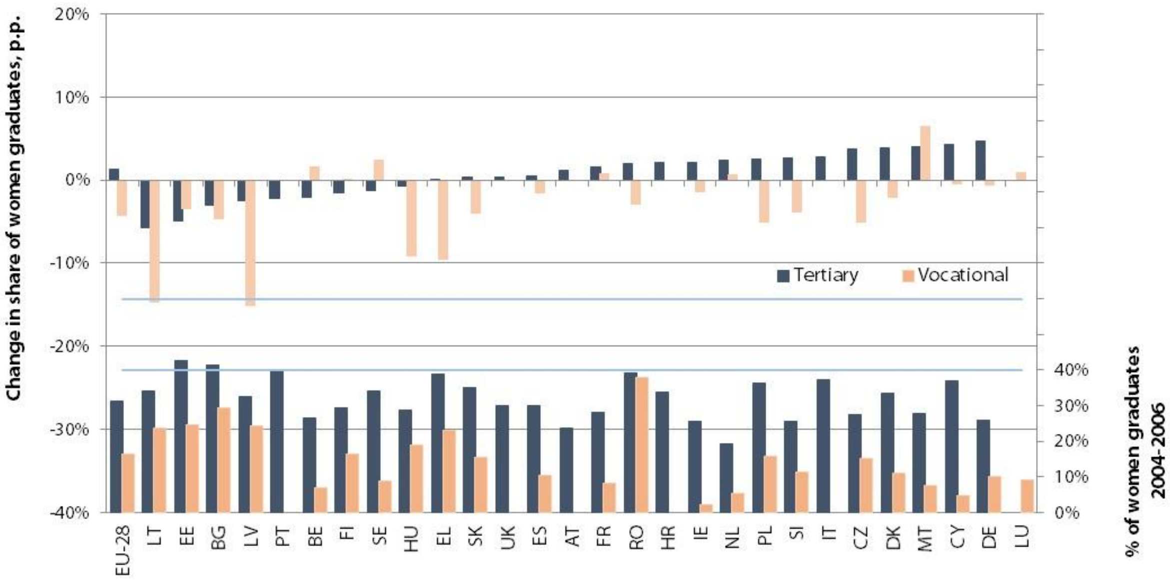
Figure 7. Share of men graduates in EHW in tertiary education and VET (%), (2013–2015)



Note: Refer to note of Figure 1.
Source: Eurostat, UOE data collection on education [educ_uoe_grad02].

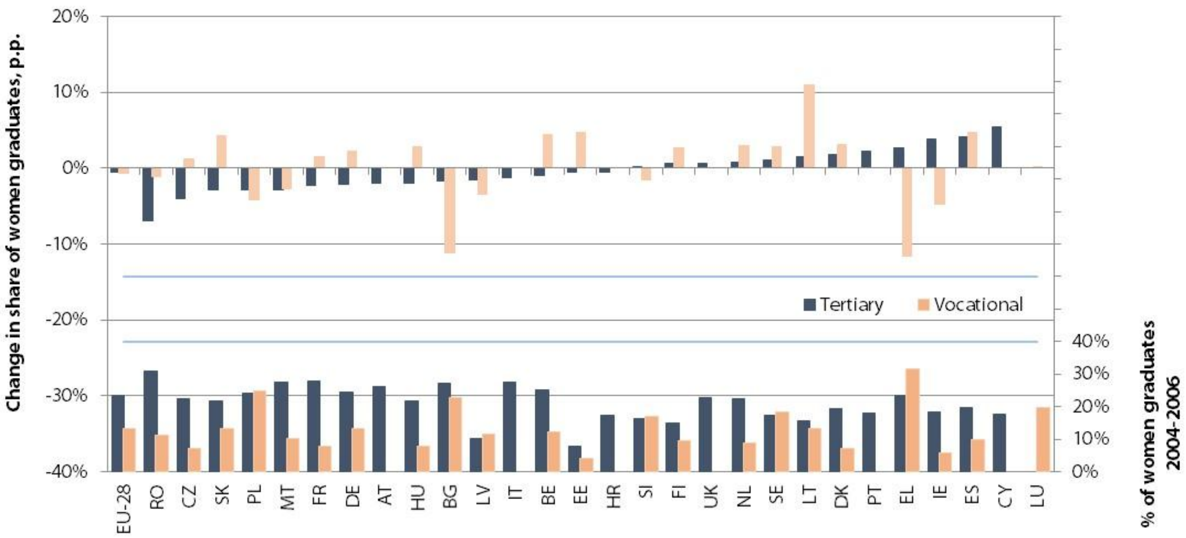
Gender segregation in STEM vocational training was reinforced by a substantial decrease in women's engagement in this sector during the last decade (Fig. 8) – both in absolute and relative numbers. At the EU level, the absolute number of women STEM graduates in vocational education dropped from close to 160 000 in 2004–2006 to around 120 000 in 2013–2015. With the exception of Malta, the share of women graduating from STEM vocational education decreased substantially in Greece, Hungary, Latvia and Lithuania, and remained stable in all other countries (+/−5 p.p.) during the period from 2004–2006 to 2010–2012. The declining numbers of total STEM graduates in vocational education across the EU points to an overall loss of interest in STEM studies among vocational graduates, and especially among women (see Annex II).

Figure 8. Share of women graduates in STEM: Average share in 2004–2006 (%) by educational level and change from 2004-2006 to 2010-2012 (p.p.)



Note: Refer to note of Figure 3.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_grad05].

Figure 9. Share of men graduates in EHW: Average share in 2004–2006 (%) by educational level and change from 2004-2006 to 2010-2012 (p.p.)



Note: Refer to note of Figure 3.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_grad05].

The share of men graduates in EHW vocational education increased over the last decade at EU level from 12 % in 20004-2006 to 16 % in 2013-2015. This corresponds also to an increase in terms of absolute numbers (Annex II). While around 30 000 men graduated from the EHW field in 2004, about 70 000 did so by 2015 at EU level. In parallel, the number of women increased from around 240 000 to 390 000. Changes across the countries were mainly marginal in terms of gender distribution. As shown by Figure 9, only in three countries a more substantial change at the vocational education level was observed during the period spanning 2004–2006 to 2010–2012 (negative change in Greece and Bulgaria; positive change in Lithuania).

In tertiary education, progress in improving the gender distribution of STEM graduates has stalled. As shown by Figure 8, in all countries the share of women graduating from STEM in tertiary education remained about the same (+/–5 p.p.). Across the EU, this marks a small increase in the share of women STEM tertiary graduates – from 31 % in 2004-2006 to about 32 % by 2015. In terms of absolute numbers, however, it points to a small reduction in women STEM graduates –from around 250 000 in 2004-2006 to about 240 000 by 2013-2015. In parallel, fewer men were engaged in tertiary STEM studies too, with a reduction across the EU from about 550 000 in 2004-2006 to about 530 000 in 2013-2015. Students' declining graduation from STEM subjects can thus be seen at both vocational and tertiary education levels, with a more pronounced disengagement of women from this field.

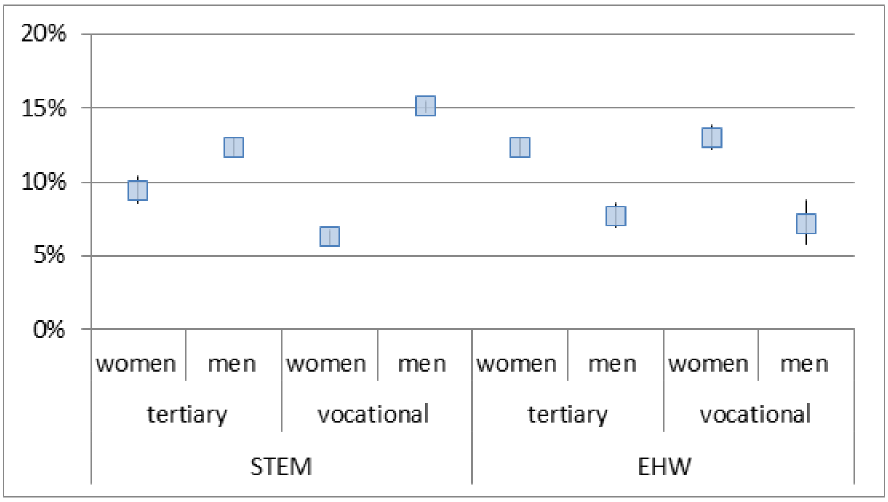
The share of men graduating from EHW at tertiary level remained about the same during the last decade, at a low level of 23 %. In contrast to an increasing number of graduates in EHW vocational education, the absolute number of graduates in EHW at tertiary level barely changed – from about 208 000 men graduates in EHW in 2004-2006 to 214 000 in 2013-2015. Thus, despite increasing numbers of vocational education graduates and unchanging numbers of tertiary EHW graduates, the gender distribution remained highly skewed within the entire EHW study field.

4. Transition from education to work

4.1. Getting the first job

Gender plays a prominent role in 'sorting out' young women and men into gendered rather than 'gender-atypical' jobs ([8]) (Smyth, 2005, p. 471). On average in the EU in 2009 ([9]), only about one tenth of STEM and EHW graduates obtained a first job matching their educational profile. Men STEM graduates, especially in vocational education and training (VET), had higher chances of getting a first job matching their educational qualification than women STEM graduates, whereas the opposite was true in the EHW (Figure 10).

Figure 10. Share of women and men in the EU with a first job matching educational profile (%), (2009)

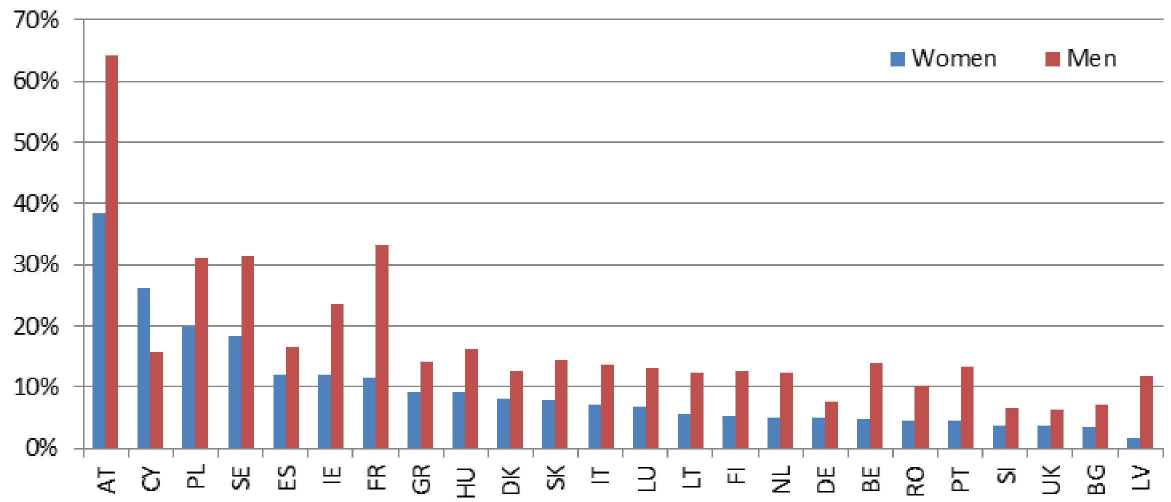


Note: EU average refers to weighted calculation at the individual level, with no data for Malta due to lack of comparable occupational data and no data for Croatia as it was not included in the 2009 ad hoc module; high-low lines indicate confidence intervals.
Source: EU-LFS, calculations based on 2009 microdata.

Vast differences exist across the Member States in terms of the match between educational profile and a first job. For example, the largest share of women in STEM whose first job corresponded to their field of education was found in Austria (38 %), the Czech Republic (26 %) and Poland (20 %). The mismatch was highest in Latvia (2 %), Bulgaria (3 %) and the UK (4 %). Overall, across all countries except for Cyprus, women had lower chances than men of finding a first job in line with their educational background in STEM. Within the EHW field (Fig. 16), 54 % of women in Austria and 50 % of men in France had a first job matching their education, whereas in most other countries lower match rates were observed, especially for men. Men had higher or about equal chances in comparison to women of finding a first job in line with their educational background in EHW in a few countries only, including France (50 %), Sweden (34 %), Romania (21 %), Hungary (14 %), Latvia (8 %) and Slovenia (5 %). Very low chances (less than 5 %) of getting a first job in the EHW field were observed in Bulgaria, the UK, the Netherlands and Germany for men, and in Slovenia for women (4 %).

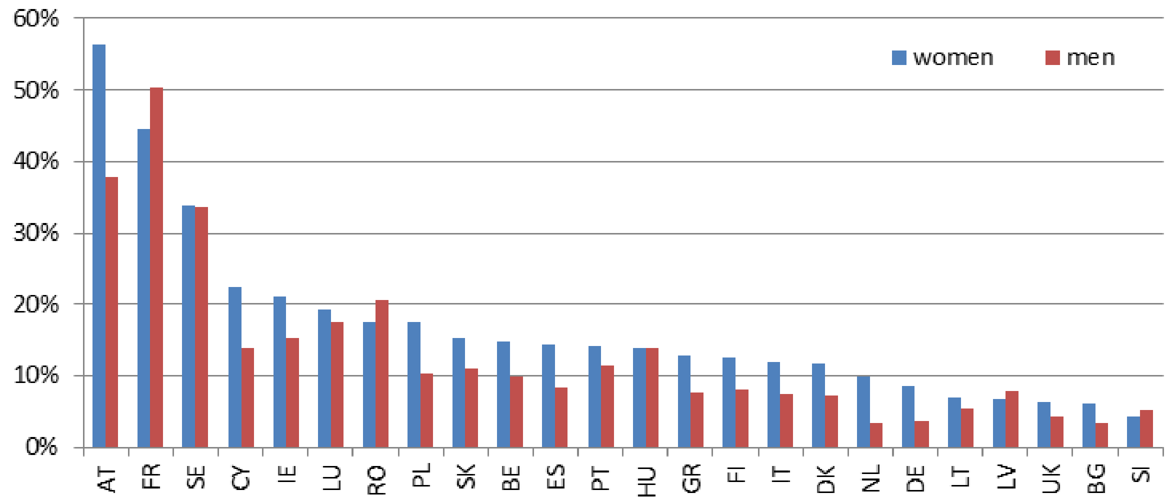
[8] Occupations considered to correspond to a STEM or EHW educational profile are listed in Table 3.
[9] The impact of the financial crisis within Europe at the time of the survey used in this analysis, i.e. data from 2009, should not be disregarded. Thus, the indicators presented here focus on illustrating gender gaps while moving from education to the labour market and across countries rather than on depicting actual and recent figures.

Figure 11. Share of women and men graduates in STEM (aged 15–35) with a first job corresponding to their field of education, by country (%), (2009)



Note: No data for Malta due to lack of comparable occupational data and no data for Croatia as it was not included in the 2009 ad hoc module; high-low lines indicate confidence intervals.
Source: EU-LFS, calculations based on 2009 microdata.

Figure 12. Share of women and men graduates of EHW education aged 15–35 with a first job corresponding to their field of education, by country (%), (2009)



Note: No data for Malta due to lack of comparable occupational data and no data for Croatia as it was not included in the 2009 ad hoc module; high-low lines indicate confidence intervals; EE excluded due to unreliable data.
Source: EU-LFS, calculations based on 2009 microdata.

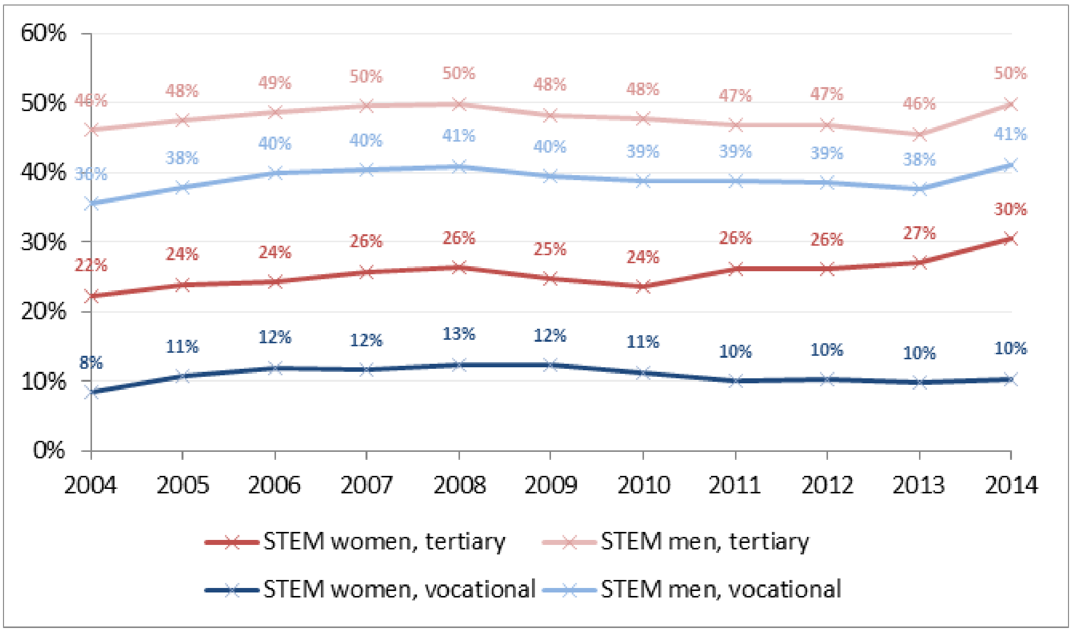
The evidence shows a higher mismatch between educational field and a first job in science, mathematics and computing than within the fields or social sciences, business and law (Montt, 2015). In 2012 an estimated field-of-study mismatch for graduates of science, mathematics and computing ranged from 42 % in Finland to 80 % in Ireland. This, on the one hand, reflects the difficulties of getting a job within the field of science, mathematics and computing and, on the other hand, the high transferability of science, mathematics and computing skills to other areas of work.

4.2. Occupational pathways

The share of STEM graduates with a job that matches their educational qualification increases with career progression. In 2014, one third (31 %) of women tertiary graduates in STEM and one in two men STEM graduates (50 %) worked in an occupation matching their educational qualification (see Fig. 17). Occupational pathways are much more different among women and men STEM graduates from vocational education: 41 % of men and only 10 % of women worked in the field corresponding to their STEM education. The 'leaky pipeline syndrome' in STEM is highly prevalent and women change their career paths from STEM to another field more often than men.

Over the last decade, women with vocational STEM education have been at the most disadvantage in the labour market in comparison to other STEM graduates. Between 2004 and 2014, the chances of working in the field corresponding to one's education increased by more than 8 percentage points for women with tertiary STEM education. This is the largest increase among STEM graduates. Similarly, the chances of finding a job to match their education also increased for men with tertiary and VET backgrounds, especially in and around 2014. In contrast, no such improvement over time is observed for women STEM graduates in VET (Fig. 13).

Figure 13. Women and men graduates in STEM tertiary education and in VET working in a corresponding field, EU-27* (%), (2004–2014)

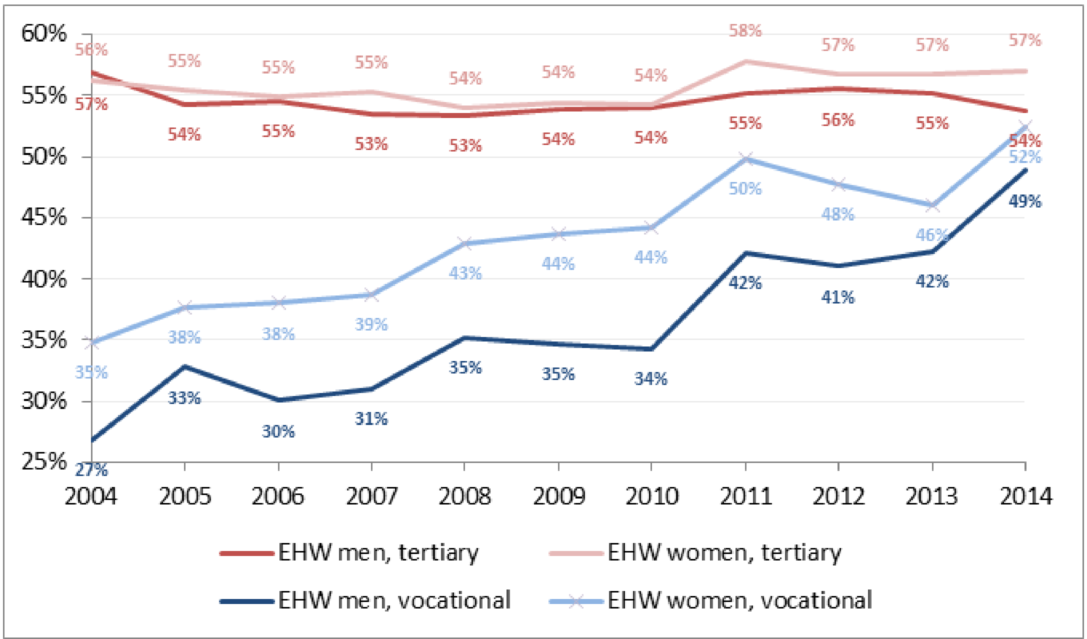


Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2004 to 2014 microdata.

EHW women and men graduates have about equal opportunities to find a job matching their qualification. Overall, their job finding chances are higher than those of STEM graduates, though men graduating from tertiary education in both STEM and EHW field have about equal chances in employment, whereas much larger gaps exist for women graduating from STEM and EHW study fields. Overall, the higher match between EHW field and employment than within STEM study fields and employment goes in line with research observations that very few and typically licensed professions such as doctors, teachers, lawyers or accountants have sufficiently close links between study fields and occupational profiles (Bettio and Verashchagina, 2009).

In 2014 more than half of men (57 %) and about the same share of women (56 %) among EHW tertiary-level graduates were working in fields corresponding to their education (Figure 14). Thereby, women's advantage in getting a first job in EHW, as noted with previous data (Fig. 12), disappears as their careers progress. For vocational education graduates, job-finding rates were only marginally lower: 49 % for men and 53 % for women. As Figure 14 shows, throughout the period 2004–2014, both women and men EHW graduates also improved their chances to find jobs matching their education. This particularly holds true for men with vocational EHW education: this group was most disadvantaged in 2004, but their labour market chances had considerably improved by 2014.

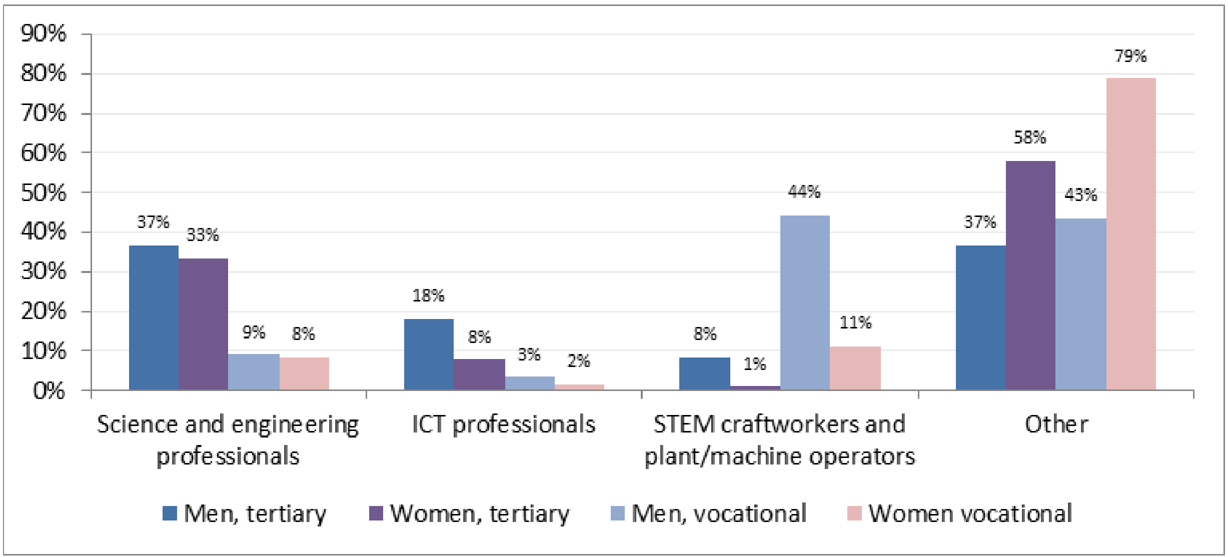
Figure 14. Women and men graduates in EHW tertiary education and in VET working in a corresponding field, EU-27* (%), (2004–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2004 to 2014 microdata.

About one third of women with tertiary STEM education work as science and engineering professionals and fewer than 10 % are ICT professionals. A similar share of men graduating from tertiary STEM education are observed in science and engineering jobs, but, in comparison to women, a much higher share of them (18 %) become ICT professionals. Much lower numbers of women than men work as STEM craftworkers and plant/machine operators. The latter occupation is particularly popular among men vocational education graduates. The majority (79 %) of women vocational education graduates move away from the STEM occupations (as shown by the employment of STEM graduates in 'other' occupations). Though not as pronounced, this pattern is also observed among women with tertiary STEM education (58 %). In contrast, about 40 % of men – both those with vocational education, and those with tertiary education – find jobs outside the STEM sector.

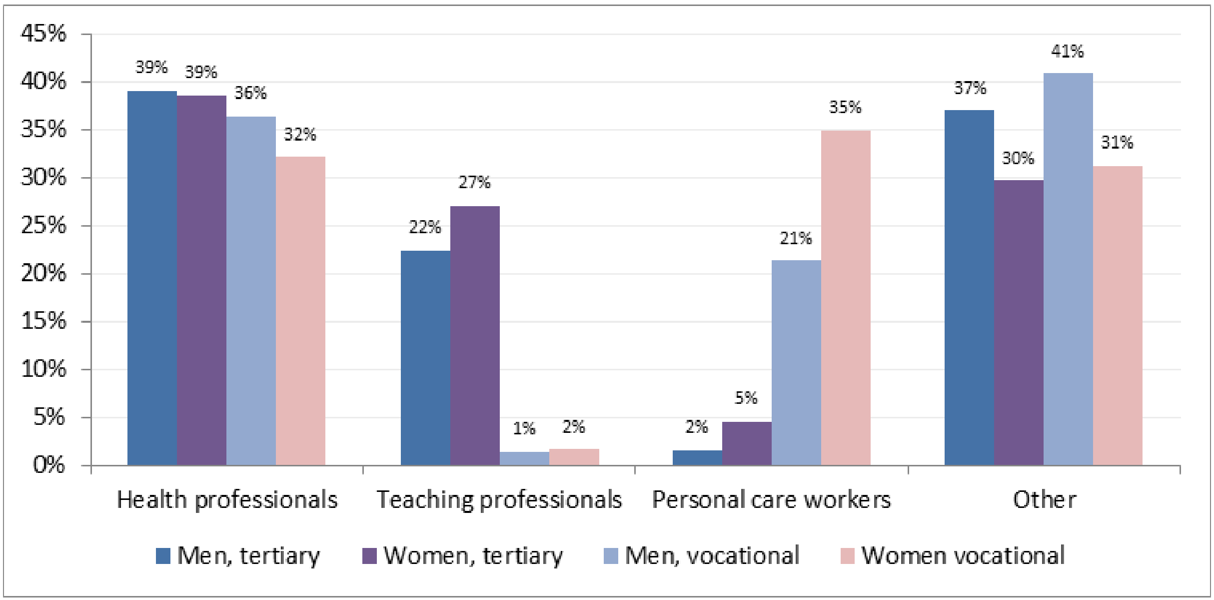
Figure 15. Occupations of women and men graduates in STEM, EU-27* (%), (2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2014 microdata.

The EHW professions face the opposite trend: the 'leaky pipeline' phenomenon is stronger for men than women EHW graduates. In contrast to STEM, far fewer women (about 30 %) chose to work in occupations other than those matching their EHW education. The share of men with EHW education making this choice was about 40 %, which is similar to the rate observed for men with STEM education. This is mainly due to fewer men than women choosing to work as teaching professionals and personal care workers, whereas about an equal share of men and women EHW graduates become health professionals. In 2014 the largest share of graduates in EHW worked as health professionals, with the biggest gender gap to the disadvantage of women observed among VET graduates. Every third woman from the vocational education level worked in personal care services, whereas one in five equivalent men graduates did so.

Figure 16. Occupations of women and men graduates in EHW, EU-27* (%), (2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2014 microdata.

Only a small share of women and men graduates in STEM work in gender-mixed occupations, such as business and administration professions. About one fifth (21 %) of women with tertiary education in STEM work as teaching professionals, while 20 % of women VET graduates in STEM work as sales workers (see Table 5). Men with tertiary education in STEM also work as administrative and commercial managers (13 %), whereas men with vocational education work as drivers and mobile plant operators. Vocational education STEM graduates, if they do not work in a corresponding field, tend to choose other highly gender-segregated occupations, whereas tertiary-level graduates have somewhat more mixed occupational pathways.

Table 5. Other most popular occupations among STEM graduates who do not work in STEM occupations, EU-27* (%), (2014)

	Tertiary		Vocational	
	Women	Men	Women	men
Teaching professionals	21 %	12 %		
Business and administration professionals	11 %	11 %		
Business and administration associate professionals	10 %	10 %	4 %	4 %
Production and specialised services managers	5 %	13 %		
Sales workers	7 %	4 %	20 %	7 %
Food processing, woodworking, garment and other craft and related trades workers			11 %	10 %
Personal services workers			10 %	
Drivers and mobile plant operators		3 %		15 %
Labourers in mining, construction, manufacturing and transport			4 %	10 %

Note: The three most popular occupations are in cells shaded in grey; empty cells imply the share of employed graduates is smaller than 2 %; no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2014 microdata.

EHW graduates working in fields not corresponding to their education face fewer occupational differences by gender in comparison to STEM graduates. The choice to work as legal, social, cultural and related associate professionals is almost equally prevalent among women and men, especially among vocational education graduates. Women with tertiary education in EHW, however, choose to work in the field of legal, social and cultural affairs more often than men. No gender differences are observed in the choice to work as business and administration associate professionals. Among sales workers, however, there are half as many men than women at both tertiary and vocational education levels. The most 'gender-stereotypical' occupations appear to be science and engineering professionals and cleaners and helpers. About 8 % of men with tertiary EHW education switch to the STEM sector and become science and engineering professionals. This occupational pathway is not common among women with EHW education. About 15 % of women with vocational EHW education and a small percentage (3 %) of women with tertiary EHW education work as cleaners and helpers. These jobs are not taken by men with EHW education, whether vocational or tertiary.

Table 6. Other most popular occupations among EHW graduates who do not work in EHW occupations, EU-27* (%), (2014)

	Tertiary		Vocational	
	Men	Women	Men	Women
Legal, social, cultural and related associate professionals	15 %	23 %	24 %	24 %
Legal, social and cultural professionals	12 %	17 %	3 %	
Science and engineering professionals	8 %			
Business and administration associate professionals	6 %	7 %	7 %	5 %
Sales workers	4 %	8 %	7 %	15 %
Cleaners and helpers		3 %		15 %

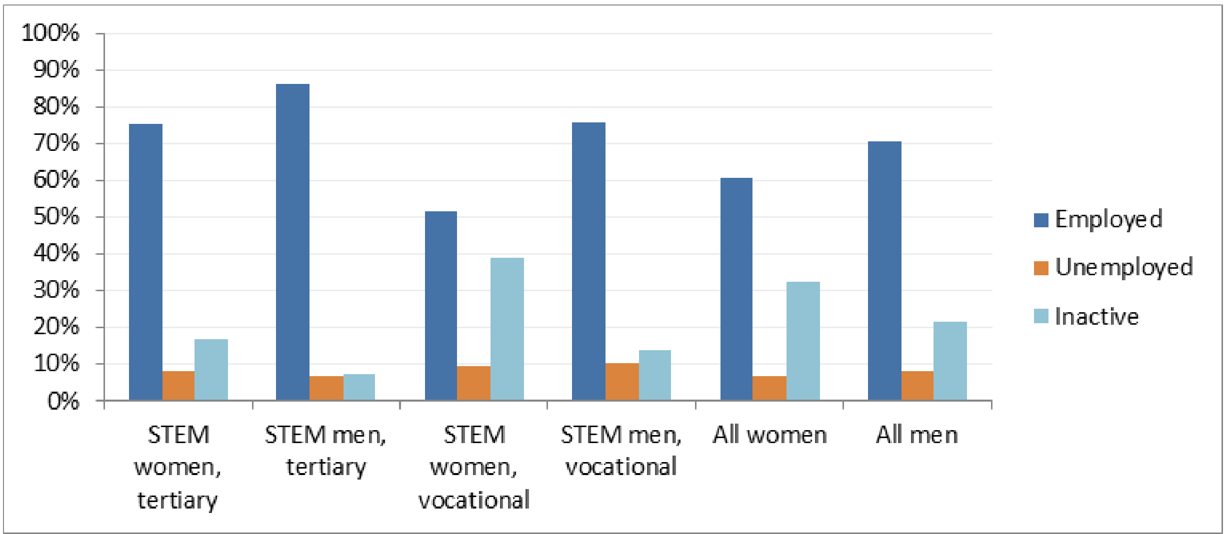
Note: The three most popular occupations are shaded in grey; empty cells imply the share of employed graduates is smaller than 2 %; no data for Malta due to lack of comparable occupational data.
Source: EU-LFS 2014.

4.3. Labour market performance of graduates

Existing research suggests that choosing to enter a gender-typical field raises the probability of obtaining employment (Smyth, 2005). Nevertheless, women (especially if second earners) in feminised occupations are also observed to have a higher probability of leaving the labour market, as women-dominated occupations yield lower monetary rewards and thus the costs of moving in and out of economic activity are relatively low (Guinea-Martin & Solera, 2013). The chances of employment for women graduating from men-dominated fields of education are found to be significantly lower compared to men in the same study fields, while the probability of unemployment is considerably higher (Smyth, 2005; Reimer & Steinmetz, 2009). In general, women in men-dominated fields of education have a higher tendency to withdraw from the labour force as their chances of labour force participation are lower compared to men (Smyth, 2005). Thereby, gender segregation is related to lower women's participation on the labour market. Analysis of this report (with a focus on STEM and EHW sectors) largely confirms these observations.

In 2014, the employment rate of women graduates of STEM tertiary education was 76 %, which is more than 10 percentage points lower than the employment rate of men with the same type of qualification and 3 percentage points lower than the average employment rate of women with tertiary education. In parallel, the unemployment rate of women with STEM tertiary education (8 %) is higher than the unemployment rate of all women with tertiary education (6 %), and even higher than the general unemployment rate among women (7 %). In addition, the employment rate of women with vocational STEM education (52 %) is lower than that of all women with vocational education (67 %), and also lower than the general employment rate of women (61 %). Moreover, over one third (39 %) of these women are economically inactive[10] (Fig. 17). In contrast to the overall increase in women's employment in the EU, the employment of women graduates in STEM decreased between 2004 and 2014 (see Fig. 18). In addition, whereas inactivity has decreased among women in general, it has increased by 4 percentage points among women vocational education graduates in STEM and did not change much for women tertiary education graduates in STEM. Inactivity of men graduates in STEM has decreased at a higher rate than observed among men in general.

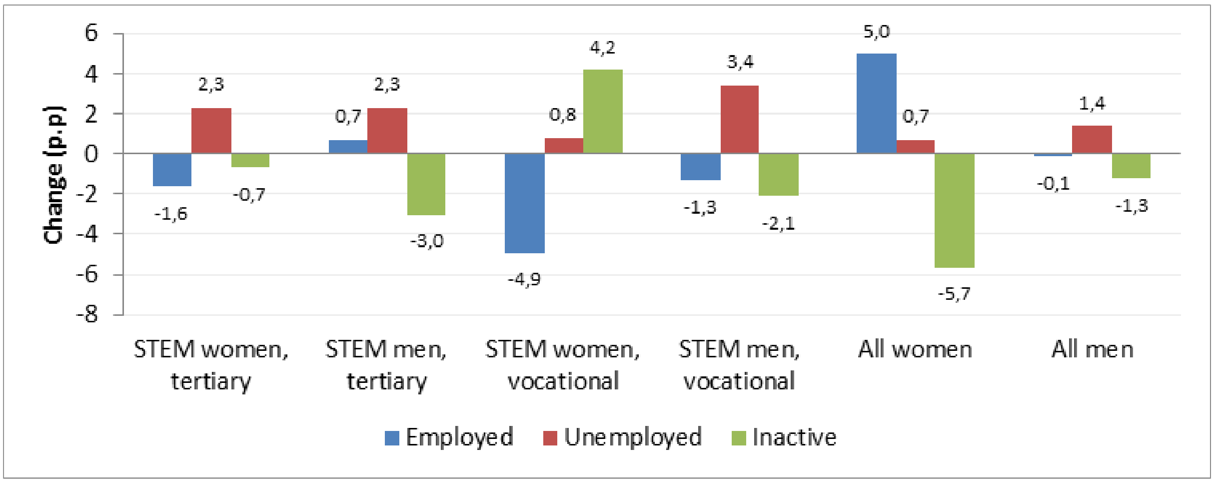
Figure 17. Labour market status of women and men STEM graduates, EU-27* (%), (2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2014 microdata.

[10] A person is economically inactive if not taking part in the labour force, i.e. neither employed nor unemployed.

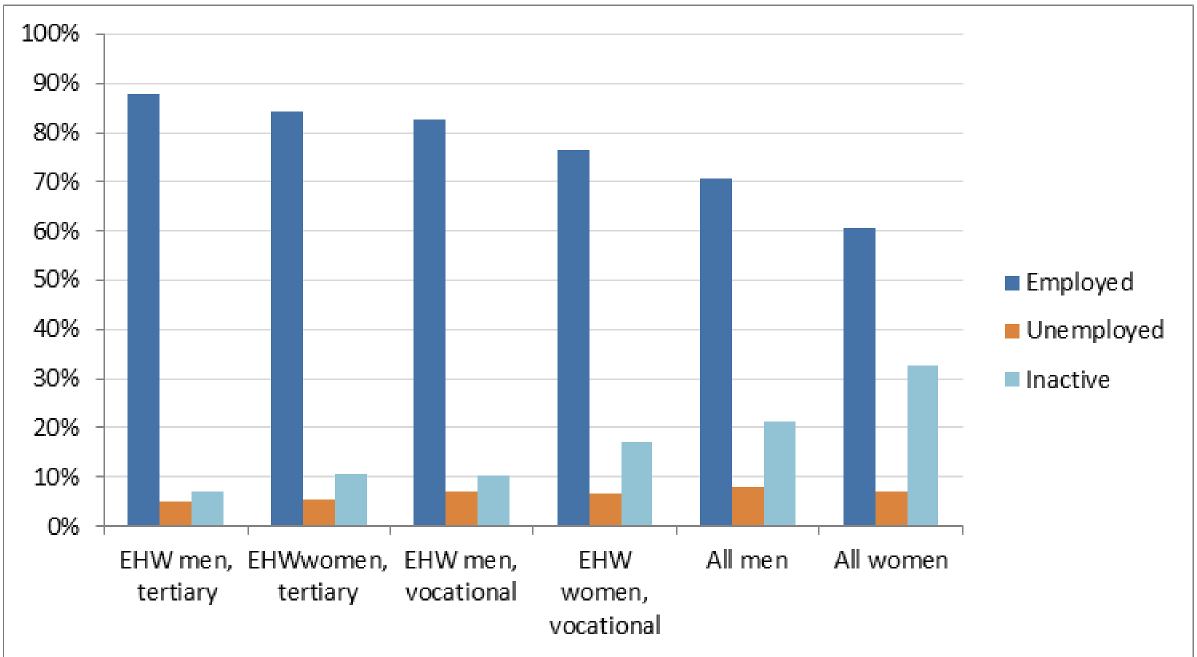
Figure 18. Change in labour market status of STEM graduates, EU-27* (%), (2004–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2004 and 2014 microdata.

Men graduates in EHW have somewhat higher chances in the labour market, compared to women in EHW and especially compared to men across the economy as a whole (Fig. 19). In 2014 the employment of men graduates in EHW across the EU surpassed the general employment rate of men and that of all men with tertiary education. In addition, their employment rate was higher than that of men working in the STEM sector. The employment rate of women, both of tertiary and vocational education graduates in EHW, was higher than that of women in general or of women working in STEM sectors. Women and men graduates in EHW are also observed to be less often in inactivity in comparison to the general inactivity rates of men and women.

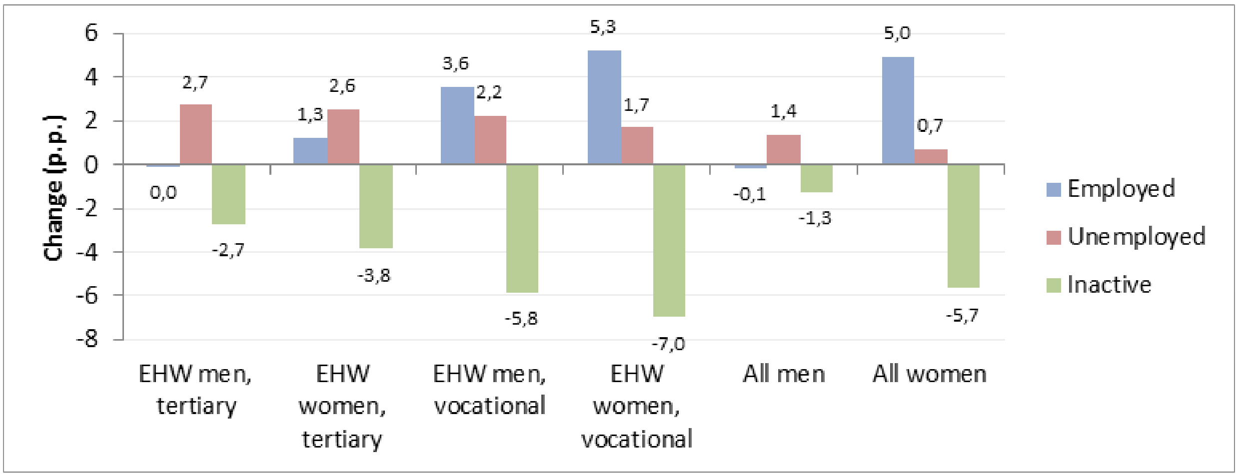
Figure 19. Labour market status of women and men EHW graduates, EU-27* (%), (2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2014 microdata.

Compared to the level of total employment growth in the EU, particularly strong growth was observed for EHW graduates. The employment rate of women with vocational EHW education grew by 5.3 p.p. between 2004 and 2014, representing a slightly better outcome (0.3 p.p.) than the growth in the general employment rate of women in the EU. The employment rate of men with vocational EHW education increased by 3.6 p.p., surpassing the growth in the general employment rate of men by 2.2 p.p. As a result of these positive trends and already high overall employment levels for those with tertiary education, in 2014 the employment rates of both women and men graduates in STEM and EHW fields were higher than the EU 2020 target employment rate of 75 %. In parallel, inactivity rates declined for all EHW graduates, but especially so for men graduating from vocational education compared to men across the economy as a whole (Fig. 20).

Figure 20. Change in labour market status of EHW graduates, EU-27* (%), (2004–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2004 and 2014 microdata.

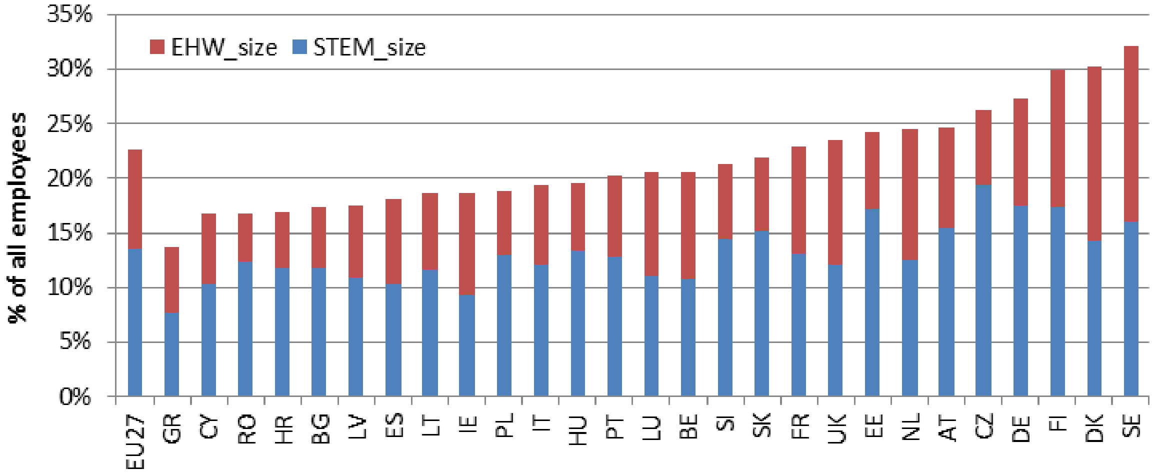
Existing research generally suggests that women and men are more likely to enter and stay in their gender dominated occupations and sectors (Smyth, 2005; Dämmrich, 2015). Changing careers and moving into a 'gender-typical' workplace is more prevalent among those whose first choice is to work within a 'gender-atypical' field. For women in men-dominated occupations, the reasons for leaving employment are often linked to encountering prejudices, institutionalised or informal barriers which are partly visible in established personnel practices, job descriptions, mobility ladders, and exclusion from informal men-dominated networks (Reimer & Steinmetz, 2009). Men in a women-dominated occupation might look at it as a temporary secure choice or as a platform to explore future alternatives (Watt & Richardson, 2008; Bieri Buschor, Berweger, Keck Frei, & Kappler, 2014). For example, a common route is for men to get promoted to higher positions that are seen as more "masculine" (i.e. head teachers). Eventually some return to men-dominated occupations, partially driven by an ambition to pursue a career in another field or what they view as in a more challenging career level (Warming, 2013) - hence partially complying with societal expectations and gender stereotypes (Hussein & Christensen, 2016). Overall, to retain women or men in gender atypical occupations and sectors is as important as attracting them to enter them. Nonetheless, much less focus in terms of policy initiatives is dedicated to retention (i.e. Warming, 2013).

5. Gender segregation in the labour market

5.1. Occupational segregation across countries, time and age cohorts

In the EU in 2013–2014, more than one fifth of all employees worked in eight STEM and four EHW occupations (Chapter 1.4, Table 3 for list of occupations), with about 13 % of all employees working in STEM and 8 % working in the EHW sector. Across the Member States, the lowest rate of employment in STEM and EHW occupations was noted in Greece (14 % of all employees), while the highest rate of employment was noted in Sweden (32 %).

Figure 21. Share of all employees working in STEM and EHW occupations (%), (2013–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2013–2014 microdata.

With a few exceptions, science and engineering (associate) professionals constitute the largest occupation type across the EU Member States, representing up to 6 % of all employment (DE) or up to 45 % of all STEM jobs (FR). In a few countries, occupations other than science and engineering dominate the STEM sector. In Bulgaria, the largest STEM occupation (with close to 25 % of all STEM employees) is that of stationary plant and machine operators. The largest STEM occupation in Greece and Romania is metal, machinery and related trades, representing respectively 23 % and 26 % of all STEM employment. In Cyprus, the largest STEM occupation is building and related trades, representing about 31 % of all STEM employees. ICT employs most STEM workers in the Netherlands (36 %).

In 17 Member States, teaching professionals constitute the largest EHW occupation category, again providing up to 6 % of all employment (DK) or up to 60 % of all EHW jobs (CY). In seven EU Member States (DE, IE, FR, HR, NL, AT, RO), health professionals and health associate professionals constitute the largest EHW occupation, representing up to 6 % of all employment (i.e. 61 % of all EHW employment) in Germany. In Finland, Sweden and the UK, the largest EHW occupation is personal care workers, representing up to 7 % of all employees (i.e. 46 % of all EHW employees) in Sweden.

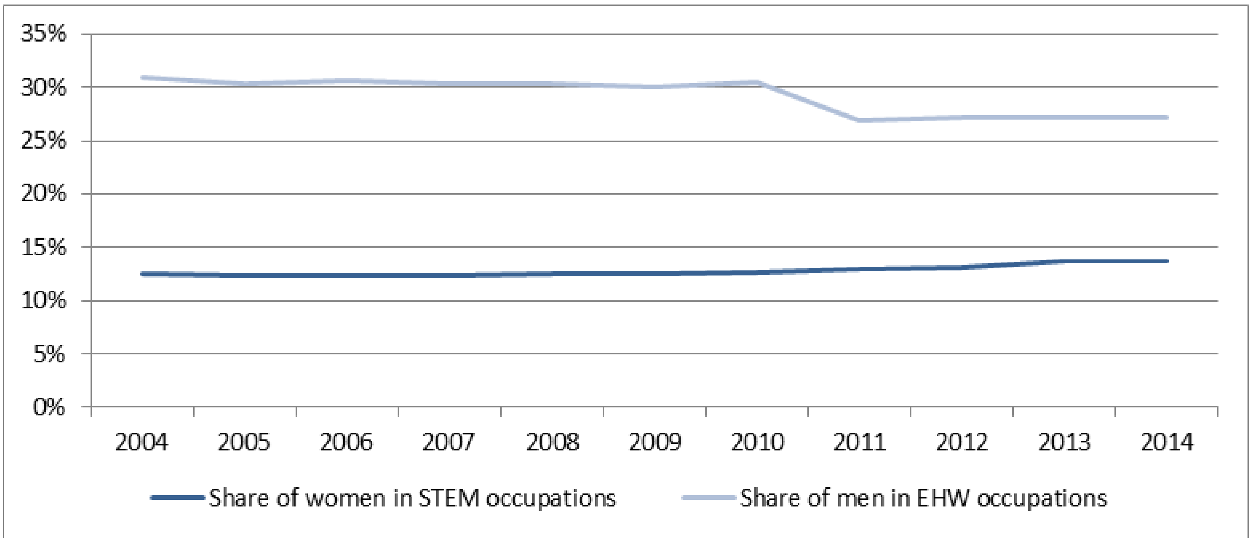
The most recent labour force forecasts show high labour demand and growth across the STEM and EHW sectors. According to forecasts up to 2025, ICT, architecture and engineering as well as research & development are sectors that will increase in almost all EU countries (Cedefop, 2015), with particularly high demand forecasted for business, administration and ICT (associate) professionals (EU Skills Panorama, 2014). The demand for teaching professionals is forecasted to remain very high as over one third of teachers are aged over 50, with reported shortages in 16 EU Member States (EU Skills Panorama, 2016). The health sector is already a major employer in the EU and expected to grow much faster than overall employment up to 2025. At the same time, technological advancements and changes in the delivery of healthcare services are leading to an occupational shift in job profiles, with greater focus on the need for related technological skills (EU Skills Panorama, 2014).

Gender segregation in STEM and EHW occupations is persistently high and has not improved in the last decade. In fact, the share of men in EHW occupations decreased from 30 % in 2004 to 26 % in 2014 at the EU level (Fig. 22). The share of women in STEM occupations increased marginally from 13 % in 2004 to 14 % in 2014.

Increasing gender segregation in EHW is partially related to the segregation pattern across the age cohorts and the lower interest in the EHW field among young men. As shown in Figure 23, almost 40 % of men employed in EHW occupations are aged 60 to 64. In the youngest age cohort (up to 30 years old), only 23 % of employees are men, showing that younger men are potentially not keen on working in EHW due to a lack of interest, society stereotypes and prejudices, discrimination or other factors. With the older and less gender-segregated cohorts about to retire, it is expected that gender segregation within the EHW field might increase further.

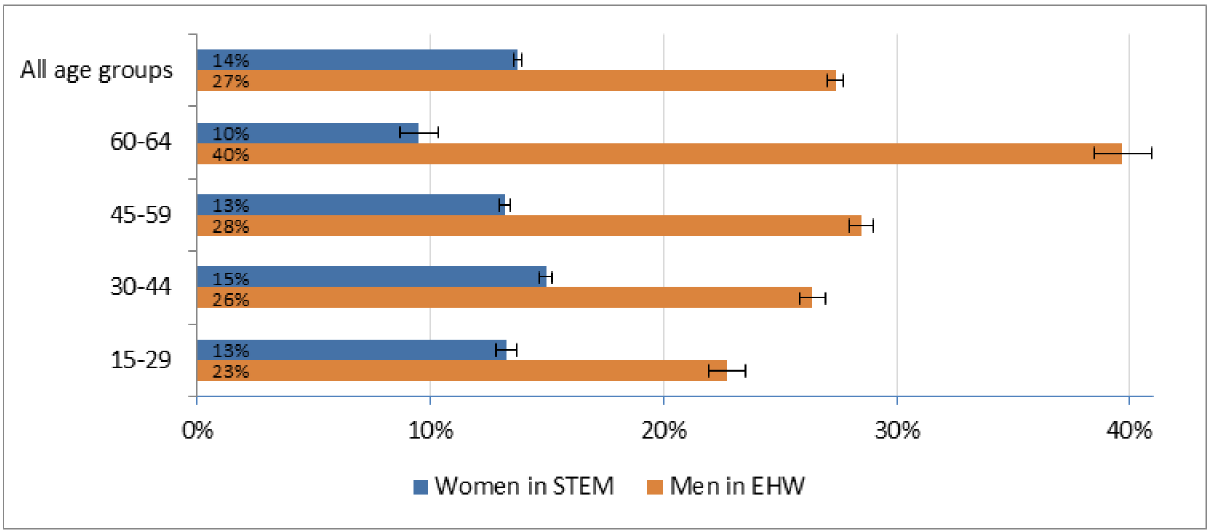
In STEM, gender segregation across the age cohorts displays a rather constant pattern. The smallest share of women is observed among the 60–64 years age group (10 %), but the share ranges from 13 % to 15 % across all other age groups. With the approaching retirement of the oldest STEM cohort, a small improvement in the gender balance of STEM occupations might occur.

Figure 22. Gender segregation in STEM (share of women) and EHW (share of men) occupations, EU-27 (%), (2004–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2004–2014 microdata.

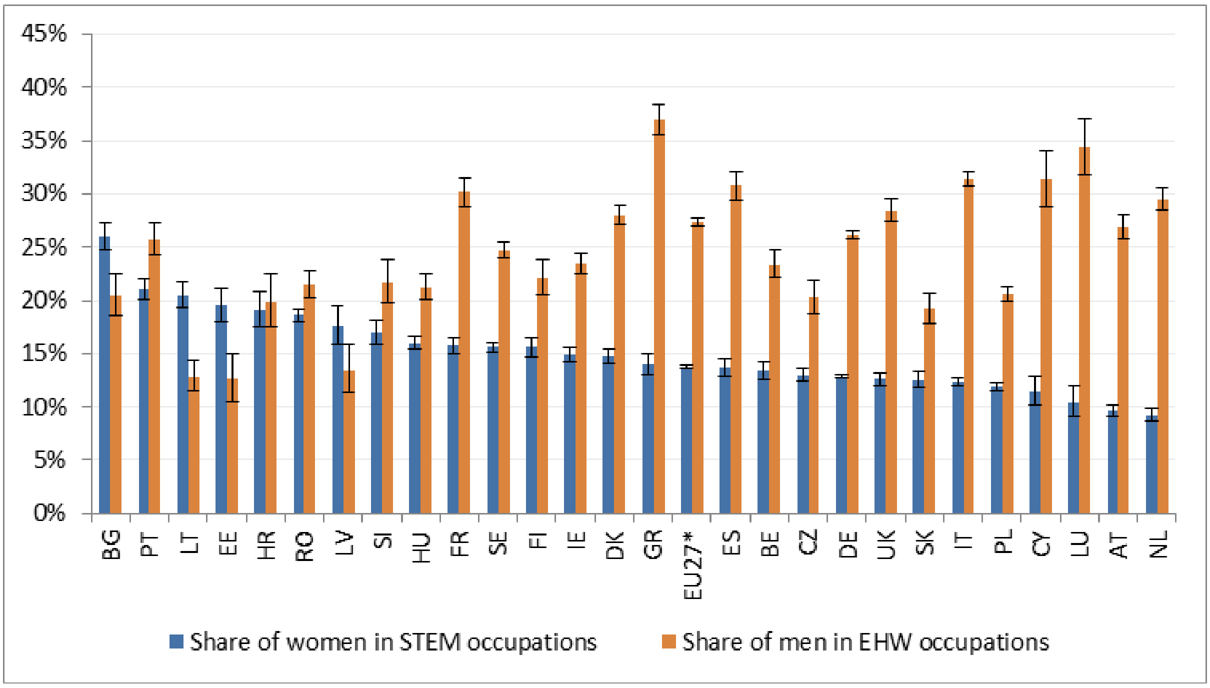
Figure 23. Gender segregation in STEM (share of women) and EHW (share of men) occupations, by age group, EU-27 (%), (2013–2014)



Note: *There are no data for Malta due to lack of comparable occupational data; the top ends of the bars ("error bars") indicate the confidence intervals around them.
Source: EU-LFS, calculations based on 2013–2014 microdata.

Large country differences in the extent of gender segregation exist in both STEM and EHW occupations. In 2013–2014 gender segregation in STEM occupations was lowest in Bulgaria (26 % share of women), Portugal (21 %) and Lithuania (21 %); it was highest in the Netherlands (9 %), Austria (10 %) and Luxembourg (10 %) (Fig. 24). Gender segregation in EHW occupations was lowest in Greece (37 % share of men), Luxembourg (34 %) and Italy (32 %); it was highest in the Baltic countries, with only a 13 % share of men in Lithuania, Latvia and Estonia.

Figure 24. Gender segregation in STEM (share of women) and EHW (share of men) occupations, by country* (%), (2013–2014)

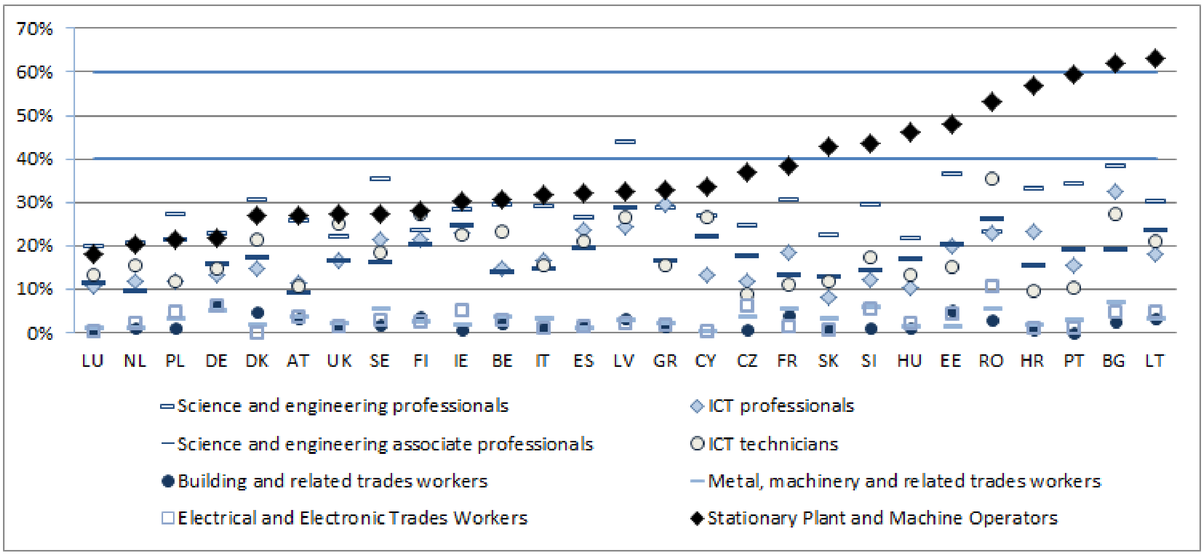


Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2013–2014 microdata.

There is variation between countries in terms of the degree of gender segregation in STEM occupations. For example, gender segregation among stationary plant and machine operators is the most varied, ranging from being predominantly men-dominated in Luxembourg to predominantly women-dominated in Lithuania and Bulgaria. The building and related trades, electrical and electronic trades as well as metal, machinery and related trades are almost exclusively men dominated across the EU. In the latter occupations there is little difference across the Member States in the degree of segregation, with the share of women reaching at best 6 % among building and related trade workers (DE), 7 % among metal, machinery and related trades workers (BG) and 11 % among electrical and electronic trade workers (RO). Large country diextent

The degree of gender segregation in some occupations within the STEM sector provides greater insight into the reasons behind some countries' success stories. For example, the high share of women in STEM occupations in Bulgaria is highly attributable to the composition of its STEM sector, where the largest occupation category (stationary plant and machine operators) is women-dominated (Fig. 25). Furthermore, the country has the highest share of women in the EU in a few other occupations, including science and engineering professionals and ICT professionals. Similarly, the high share of women within Portugal's STEM industry is due to the occupation of stationary plant and machine operators being gender balanced and also to the higher-than-EU-average scores among a number of the other largest STEM professions, such as science and engineering professionals.

Figure 25. Gender segregation across STEM (share of women) occupations, by country* (%), (2013–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2013–2014 microdata.

No major improvements are observed in the most men-dominated STEM occupations, such as workers in building and related trades, in recent years (2011–2014). A few pronounced national developments, both negative (BY, CY, NL) and positive (EE, EL, ES, FR, LV, LU, SI, FI), are noted across other STEM occupations (see Table 7). Overall, a decreasing share of women in ICT professions can be observed across the Members States, whereas an increasing share of women can be observed among stationary plant and machine operators. Nevertheless, trends across the EU are highly diverse and no notable improvements in gender segregation at the EU level have been observed for any of the STEM occupations since 2011.

Table 7. Change in share of women across selected STEM occupations, by country, (2011–2012 to 2013–2014)

	ICT professionals	ICT technicians	Stationary Plant and Machine Operators	Science & engineering professionals	Science & engineering associate professionals
Strong decrease (= <- 5 p.p.)		NL		CY	BG
Decrease (= <- 2 p.p.)	BE, EE, ES, HR, PL, RO, SK	CZ, EL, HU, IE, IT LT, PT, SK, UK	AT, EE	LT, RO	HU, LT, PT, SI, SK
Increase (> = 2 p.p.)	BG, CZ, FI, PT	BE, NL	BE, ES, IE, PT, RO, SK	CZ, PT, UK	CY, HR
Strong increase (> =5 p.p.)	EL, LV	EE, ES, FI, SI	EL, FR, LU	FR, LV	

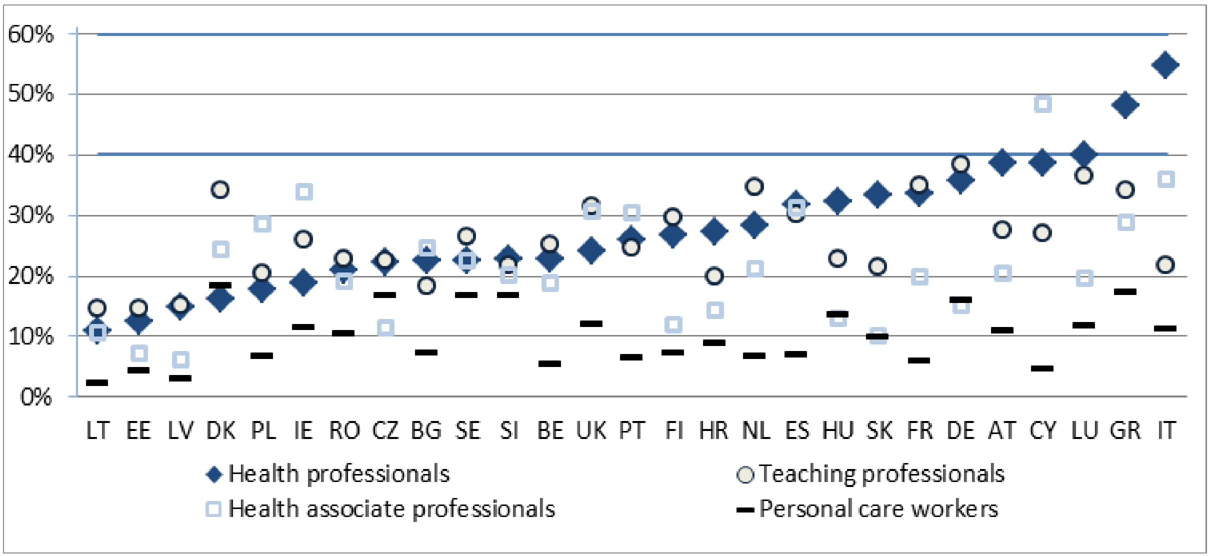
Note: Shaded cells highlight a higher number of countries with a certain change in a share of women for a selected occupation.
Source: EU-LFS, calculations based on 2011–2014 microdata.

Gender segregation also varies in EHW occupations across the Member States, though no EHW occupation is men dominated. A gender-balanced distribution of employees has been achieved among health professionals in Italy, Greece and Luxembourg, with the share of men being in the range of 40 % to 60 %. In addition, a roughly equal share of women and men is noted among health associate professionals in Cyprus. Among teaching professionals, the share of men is just under 40 % in Germany and Luxembourg. The highest segregation exists among personal care workers, with no country in the EU where men represent more than 20 % of this category. The large size of the latter occupation category in Sweden, Finland and the UK, combined with low shares of men (especially if compared to other occupations), is among the major factors determining the high overall degree of gender segregation in EHW in these countries.

Gender segregation varies greatly across the four EHW occupations and across countries, with the difference in share of men across the EHW occupations being very low in Slovenia and Sweden (i.e. fewer than 10 p.p. between the best and worst score), but very high in Italy (43 p.p.). In the three Baltic States (EE, LV, LT), a very low share of men is observed across all EHW occupations. In Romania and Spain, all EHW occupations apart from personal care work have about the same share of men, with around 20 % and 30 % for the two countries respectively.

Occupations requiring higher skills, such as health professionals, have a much higher share of men than an equivalent occupational profile requiring lower skills (i.e. health associate professionals), with a 10 percentage point difference at the EU level. For example, in Germany the share of men among health professionals is at 36 % among health professionals but at 15 % among health associate professionals. A similar difference is also noted in Luxembourg, Slovakia, Greece and Hungary. No difference, however, is observed in Lithuania and Sweden. In a few countries (BG, DK, CY, PL, PT, UK), a higher proportion of men work as health associate professionals than as health professionals.

Figure 26. Gender segregation across EHW (share of men) occupations, by country* (%), (2013–2014)



Note: *There are no data for Malta due to lack of comparable occupational data.
Source: EU-LFS, calculations based on 2013–2014 microdata.

Since 2011, the share of men health professionals has fallen in a number of Member States, especially Estonia, Slovakia and Belgium. The share of men among health associate professionals remained about stable in most of the Member States. Similarly, no major changes in gender segregation are observed among teaching professionals. Positive developments, however, are observed among personal care workers, with the share of men on the rise during the period 2011–2014 in at least six countries (HR, CY, LU, NL, SI, SE).

Table 8. Change in share of men across EHW occupations, by country, (2011–2012 to 2013–2014)

	Health professionals	Health associate professionals	Teaching professionals	Personal care workers
Strong decrease (= <- 5 p.p.)	BE, EE, SK	ES		FR
Decrease (= <- 2 p.p.)	DK, EL, FR, IT, NL, RO	PT, RO, SE	ES, FI, HR	
Increase (> = 2 p.p.)	BG, SI	CZ, EL, NL, UK	LV, SI	CY, HR, LU, NL, SE, SI
Strong increase (> =5 p.p.)		BG, CY		

Source: EU-LFS, calculations based on 2011–2014 microdata.

5.2. Gender pay gap in gender-segregated sectors

The gender pay gap remains remarkably resilient across all Member States, despite more than thirty years of equal pay legislation. It affects not only current earnings, but also lifetime earnings and pension entitlements (Smith, 2010). A number of influences account for the gender pay gap, including differences in educational levels, competences, access to promotion, number of working hours and career length, concentration of women into low value-added jobs, especially ones that lack union representation (Burchell et al., 2014).

Research shows that gender differences relating to the observable characteristics of employees (i.e. education and career length) explain just part of the pay gap (OECD, 2012). The proportion of the gap that cannot be explained by these characteristics is particularly high at the upper end of the wage distribution. This reflects the strong role of (vertical) gender segregation in the labour market and the accompanying glass-ceiling effect.

Although the impact of many of these factors varies across countries, gender segregation (in sectors and occupations) is recognised as an underlying factor for the gender pay gap across all EU countries. Recent research (Boll, Leppin, Rossen, & Wolf, 2016) based on data from 2010 concludes that for all countries, a significant part of the gender pay gap is due to the fact that women are over-represented in sectors with lower pay levels, such as education, health and social work. On the other hand, men dominate higher pay sectors, such as construction and chemical products, electric and transport equipment.

Research shows that earnings of both women and men are lower in women-dominated occupations. However, when it comes to the gender pay gap within those occupations, the results point to rather different outcomes across countries, with for example a stronger negative effect for men in Germany (Busch and Holst 2011). Overall, the average pay gap at the occupational level in the EU is fairly small as it masks large differences across countries and across/within occupations (European Commission, 2002).

The negative association between the share of women in an occupation and average wages in that occupation has frequently been interpreted as an expression of the devaluation of women's work (Reid, 1998; Tomaskovic-Devey, 2002; de Ruijter et al., 2003; England et al., 2007). As noted by England (2010, p.153): 'The devaluation of and underpayment of predominantly female occupations is an important institutional reality that provides incentives for both men and women to choose "male" over "female" occupations and the fields of study that lead to them. Biases in job evaluation practices, the degree of 'professionalisation' of occupations, the length of occupational ladders, the visibility of skills all emerge as important factors in sustaining gender segregation, although they do not exhaust the list. Existing research also notes that the lower wages in women-dominated occupations were supposedly settled in the past though still determine wages in these occupations (England et al., 2007). In recent years, mostly due to financial crisis, many jobs in the EU and especially jobs in the public sector (i.e. education sector) underwent significant budgetary cuts.

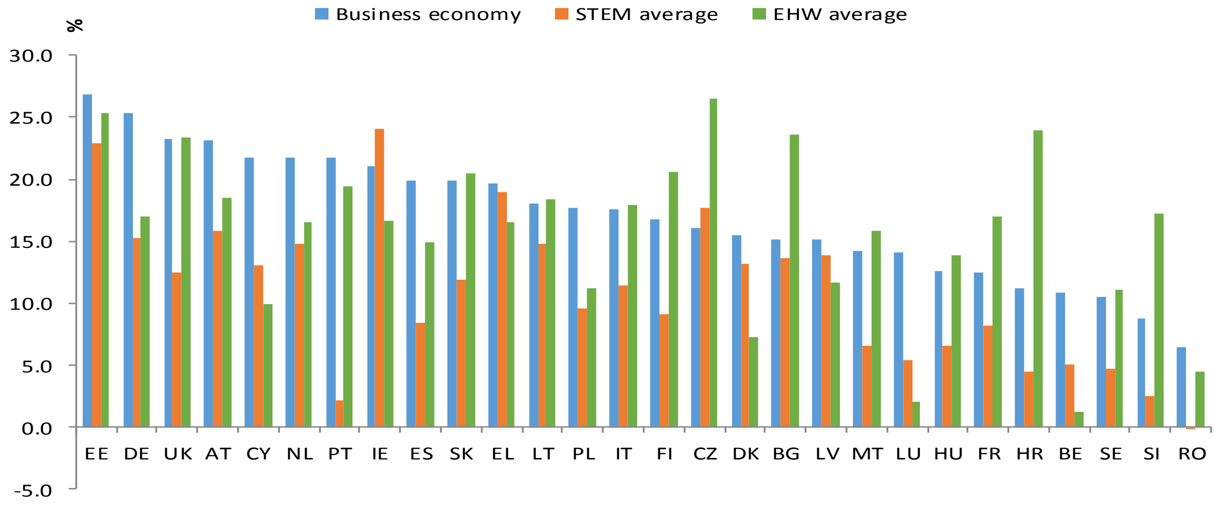
Paradoxically, even today gender segregation implies both discrimination and protection of women's earnings. A recent cross-national study by Jarman and Blackburn (2012) examines the interplay of differences in pay, social stratification and occupational segregation in 30 industrial countries. The authors note that "for over a century, researchers have linked occupational feminization to disadvantaged outcomes in terms of pay, prestige, power and attractiveness of the occupation concerned, both for the women entering the occupation, and also for the occupation as a whole." One crucial finding is, however, that while segregation is certainly related to discrimination against women, it is also the case that the "less they are in competition with men (higher overall segregation) the greater their attainment of senior positions" and the more likely they are to be in more desirable jobs with better social positioning. Moreover, occupational segregation and the gender gap in pay were found to be inversely related to a certain degree: "The position of women is more favourable where the overall segregation is higher - the lower the male advantage on pay and the greater the female advantage on stratification."

Over the last decade, there has been no clear trend towards the reduction of the gender pay gap (O'Reilly, Smith, Deakin and Burchell, 2015). In some countries where the gap has been traditionally rather low, such as Italy and Portugal, the gap increased after the economic crisis. As argued by Peruzzi (2015), this can be attributed to an expansion of women's employment in lower-wage sectors. This highlights the risk of increasing the rates of women employment at the cost of the expansion of low-quality employment.

Recent statistics show that the average gender pay gap was higher in the EHW sector compared to the STEM sector in almost all countries in 2015 (except DK, EL, IE, LU, BE, CY, LV). Belgium had a negative gender pay gap (pay levels were higher for women compared to men) among EHW subsectors in 2015 (-1 % in human health and social work). While in STEM only Estonia and Ireland exceeded the 20 % pay gap, this was the case for seven countries (BG, CZ, EE, HR, SK, FI, UK) in the EHW sector. The high gender pay gap in EHW was due to large gender pay biases in human health and social work activities in almost all countries (i.e. gender pay gap in the health sector was higher compared to education), except BE, IE, FR, LU and AT.

Further, it is noteworthy that in many STEM subsectors with particularly high concentrations of men, a negative gender pay gap was observed in several countries. For instance, in mining and quarrying (PT, RO, ES, BE), electricity, gas, steam and air conditioning supply (LU, SI), water supply, waste management and remediation activities (SI, PT, SK, HU, CY, LU, RO, SE, BE, UK) and construction (RO, SI, HU, PL, BG, PT, BE, FR, ES, LU) women earned more than men. Such a pattern could be attributed to the fact that the very few women working in those sectors might be occupying more senior positions. In manufacturing and ICT men earned more than women in all EU Member States.

Figure 27. Gender pay gap in unadjusted form, by country (%), (2015)



Note: Data refers to the unadjusted gender pay gap, which shows the difference between average gross hourly earnings of men paid employees and of women paid employees as a percentage of average gross hourly earnings of men paid employees; definition of economic sectors is based on NACE Rev. 2 classifications; Business economy: NACE B–N. STEM: mining and quarrying (NACE B), manufacturing (NACE C), electricity, gas, steam and air conditioning supply (NACE D), water supply, sewerage, waste management and remediation activities (NACE E), construction (NACE F) and information and communication (NACE J). EHW: education (NACE P); human health and social work activities (NACE Q); the following data limitations apply to : **IE, HR, IT, MT :** 2014 data used; **IE:** in STEM sector, data available only in construction (NACE F) and information and communication (NACE J) sectors.

Source: Eurostat, Structure of Earnings Survey methodology [earn_gr_gpgr2].

Differences in pay levels across sectors are difficult to estimate, not least due to high differentials in the education backgrounds and work patterns of employed women and men. Analysis of Eurofound EWCS data for 2015 shows that managers and professionals in men-dominated STEM sectors earn more than employees in the same positions in EHW sectors and that workers in elementary occupations in EHW earn much less than comparable occupations in men-dominated sectors (see Eurofound, 2016).

Throughout the last decade, national governments and social partners have initiated and adopted a wide range of measures to close the gender pay gap (e.g. Foubert, 2010 ; European Commission 2011; European Commission, 2013). These measures contain the development of strategies and actions including in the form of national legislation, social partners' agreements, equality plans, awareness-raising and other types of initiatives. For instance, many countries hold regular Equal Pay Days which include activities such as handing out information on the gender pay gap, organizing events, and holding meetings with government representatives. Some countries (PT and FR) introduced legal provisions relating to pay transparency or collective agreements and equal pay. In this regard specific tools have been developed (e.g. the online tool Logib in Germany and Luxembourg) to enable companies to analyse pay and staffing structures and to verify if equal pay exists. Other countries (e.g. Belgium) have introduced inquiry reports into the gender pay gap. Gender equality plans in companies and audits facilitate companies' progress reporting regarding gender equality and equal pay. In some cases there is a legislative requirement to carry out the plans (e.g. Sweden and Austria), while in others it is voluntary. Finally, several countries (e.g. Estonia, Finland and Lithuania) have introduced strategies on gender equality which include provisions to help close the gender pay gap.

Among the most recent EU examples of national policy initiatives to combat the pay gap is the mandatary gender pay gap reporting in Great Britain (April 2017), introduced for all public, private and voluntary sector employers with more than 250 employees. Employers in-scope of the regulations are required to publish data about the gender pay gap and gender bonus gap on their website and on a government online service by April 2018. Given the recent introduction date for these regulations, it is not yet possible to assess their effectiveness in reducing the gender pay gap. However, the high level of transparency in these regulations (any member of the public can access the data on the gender pay gap viewing service) sets a good example for further policy initiatives to address the gender pay gap across the EU.

6. Segregation-influencing factors

There is no single factor that can unilaterally explain the emergence, prevalence and re-creation of segregation in education and the labour market (Bettio & Verashchagina, 2009). The factors spread across various levels: the individual level (i.e. personal achievements and motivation), the organisational level (i.e. teaching practices, curriculum, organisational gender culture), and the societal (or country) level.

Overall, segregation in education and segregation in the labour market are strongly coupled. In order to understand segregation in the labour market, one needs to understand educational gender segregation and what influences the educational differences of girls and boys during their school years. Thus, the positioning of an individual in the labour market is the result of long-term developments over the course of their life (Hillmert, 2015).

Gender stereotypes

The influence of stereotypes and the dominant expectations in society in causing and recreating segregation in education as well as the labour market is well documented (Reskin & Bielby, 2005; Bettio & Verashchagina, 2009). Stereotypes are prescriptions of appropriate behaviour that apply to different spheres of life, including study and employment choices (Reskin & Bielby, 2005). According to prominent approaches to the social construction of gender, people are held accountable for acting in accordance with the prescribed gender roles and stereotypes in any given society (Allegrini, Pellegrini, & Segafredo, 2015) ([11]).

Stereotypes can have both a direct and indirect impact on gender segregation; they impact the choice of study fields or occupations that women and men take by driving interest towards specific subjects that are deemed 'appropriate' (Reskin & Bielby, 2005; Burchell et al., 2014; Henriksen, Dillon, & Ryder, 2014). People's choices can therefore be interpreted as a sign of what the culture accepts and enforces as appropriate gender behaviour in relation to a specific field of study or occupation.

[11] See Candace West and Don H. Zimmerman (1987), 'Doing Gender'. *Gender & Society*, Vol. 1, No 2, pp. 125–151 and Judith Butler (1990). *Gender Trouble: Feminism and the Subversion of Identity* for an in-depth discussion of the ways and reasons why gender is constructed and upheld in social interaction.

For example, participation in STEM is traditionally associated with various stereotypically masculine identity traits and roles (Charles & Bradley, 2009; Morgan et al., 2013; Charles, Harr, Cech, & Hendley, 2014; Gabay-Egozi et al., 2014; Henriksen et al., 2014; Legewie & DiPrete, 2014). This is enforced by the long-lasting historical and cultural idea that science is male-gendered, an idea that remains persistent in the discipline (Allegrini et al., 2015; Ulriksen, Madsen, & Holmegaard, 2015). This stereotypical association stems from the association of men with objectivity and rationality, while irrationality and emotionality are purportedly women's attributes. Similar associations could be made with fields and professions associated with caring and educating, which are traditionally deemed feminine.

Current research (van der Vleuten et al., 2016) suggests that a more traditional gender ideology leads to gender-stereotypical educational choices among adolescent boys, but not among girls. Gender expectations appear to affect what boys prefer to do at present and what they find important in the future. The dominant association of science as masculine makes it particularly challenging for girls to see STEM as a potential career choice and, on the other hand, may equip boys with easily available and pre-established roles in science and technology (Henriksen et al., 2014). The same applies to the EHW field, which might be seen as a potential career choice first and foremost for girls, particularly in relation to the roles of caring and educating. Overall, these results support the idea that gender expectations are stricter for boys than girls and that cross-gendered pathways are currently more acceptable for girls than for boys (van der Vleuten et al., 2016).

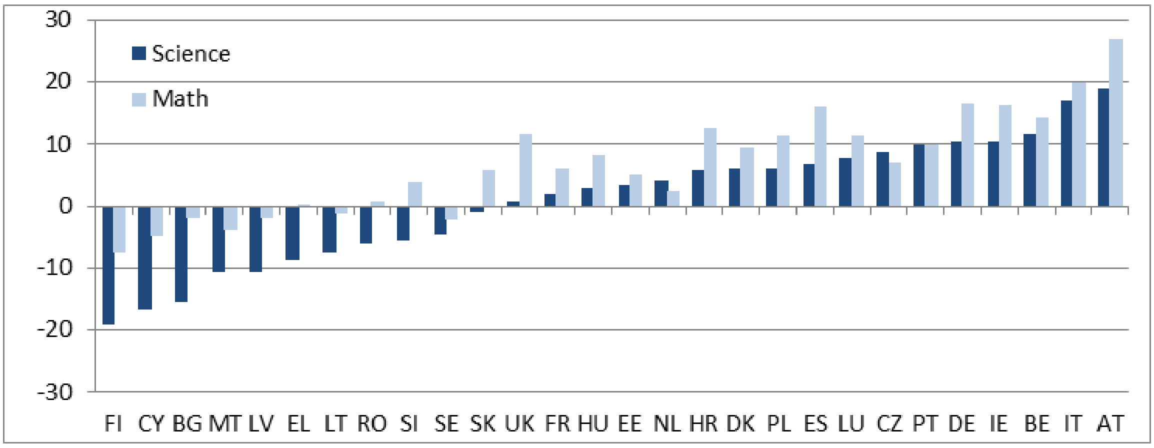
Stereotypes can also make it challenging for individuals to remain in their chosen career pathway. Students who differ from what is considered normal within their field experience more challenges in being academically and socially accepted as well as in developing an identity of belonging to the discipline (Ulriksen et al., 2015 based on university students; Solomon, Radovic, & Black, 2016). Likewise, in the labour market deviation from the 'norm' is not tolerated. For example, though it comes with monetary penalties, women working part-time is typically viewed as an enabling factor in terms of work and family balance. The equivalent choice among men, however, is often met with strong resistance as it deviates even further from the "norm".

Furthermore, stereotypes can drive recruitment and employment practices (see, for instance, Bettio & Verashchagina, 2009; Burchell et al., 2014). They also shape country-level policies or institutional frameworks such as policies supporting the combination of work and family life, which in turn have an impact on gender segregation in education systems and labour markets.

Individual-level factors

Positive STEM experiences and development of 'STEM identities' start from a very early age, with stereotypes being formed before the children enter formal education (e.g. in providing caring toys for girls and exploring toys for boys), through family relations (e.g. a strong bond with fathers increases women's likelihood to enter STEM studies) or media impacts (e.g. media concerns of predatory men to have a higher likelihood to become primary teachers). The school years also have a very important role to play in maintaining students' interest and creating context that is perceived as relevant (Jensen & Henriksen, 2015). OECD PISA (Programme for International Student Assessment) data reveal that gender gaps in mathematics and science are narrowing, although significant variation exists across the Member States. At the age of 15, girls outperform boys both in science and in mathematics in seven Member States (BG, CY, LV, LT, MT, FI, SE). In the majority of countries boys have higher achievement in both subjects. Though referring to individual achievements, these data confirm that large country differences exist in preparing boys and girls for their future studies and jobs (for example, the specificities of approaches to career counselling vary).

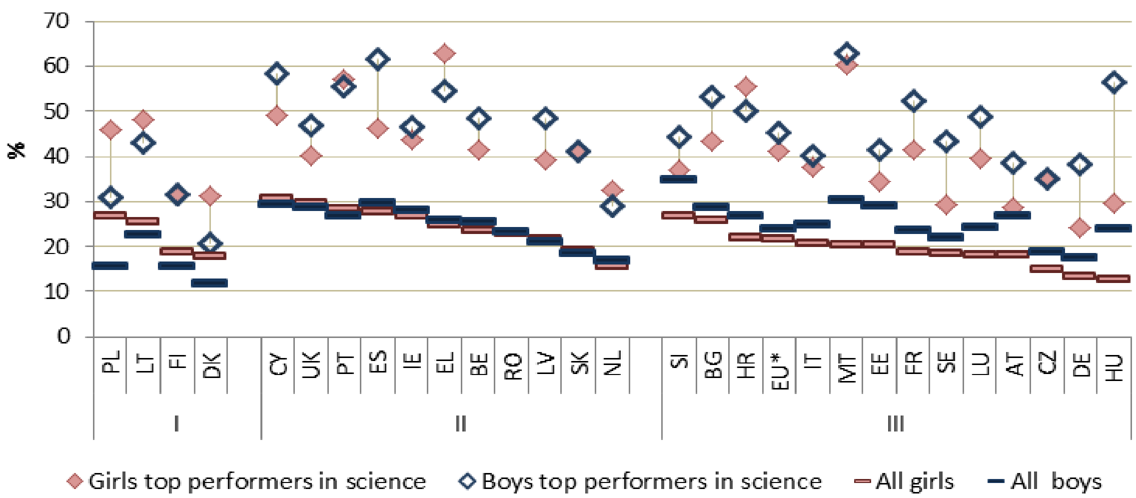
Figure 28. Gender difference in 15-year-olds' mean achievement in science and maths, by country (p.p.), (2015)



Note: Positive gap indicates that boys have the advantage; negative gap indicates that girls have the advantage.
Source: OECD, Programme for International Student Assessment (PISA), Internet: http://www.oecd.org/pisa/data/

Achievements in science and mathematics do not necessarily lay the ground for future careers. Science-related occupations are more attractive career choices for boys. As shown in Figure 29, only in four Member States (group I) did more girls than boys strongly expect to work in science-related occupations in 2015. In two of these countries (LT, FI), girls outperform boys in science and mathematics in addition to having higher scientific aspirations. In the other two countries (DK, PL), girls aspirations are higher despite lower achievements in mathematics and science. In 11 countries (group II), about an equal share of boys and girls expect to have a career in science. In the majority of countries (group III), however, girls' interest remains significantly below that of boys.

Figure 29. Share of 15-year-olds expecting to work in science-related occupations at age 30, by country (%), 2015



Note: Indicator at the EU level refers to unweighted average across countries; no data available for RO regarding top performing students.
Source: OECD, Programme for International Student Assessment (PISA), calculations based on 2015 microdata [data table I.3.10b and I.3.10c].

Generally, the top performing students have a much higher interest in pursuing a science career in comparison to the rest of the students. In only three countries (CZ, SK, FI), do an equal share of top performing boys and girls in science expect to pursue science careers. In seven countries (DK, EL, HR, LT, NL, PL, PT), top performing girls in science expect to work in a science field more often than boys. Finally, in the remaining 17 Member States, the share of top performing girls expecting to pursue a career in science is considerably lower than the share of boys. Particularly large gaps are noted in Hungary, Germany, Sweden and Spain.

Achievements in science and aspirations to pursue science careers are outcomes of various factors, including gender stereotypes. For example, women are found to be less likely to aspire to STEM careers due to expectations of feeling less good in contexts with unfavourable gender stereotypes (Schuster & Martiny, 2017). Self-confidence or self-efficacy is also viewed as a strong motivational factor that influences both ability and attitudes towards science (Christidou, 2011). Despite being the key motivational driver of striving to achieve highly in science, young women's confidence in their ability to perform well in such fields as chemistry and mathematics is currently found to be lower in comparison to young men's (Glynn, Taasoobshirazi, & Brickman, 2007; Sunny, Taasoobshirazi, Clark, & Marchand, 2016; Yazilitas et al., 2016).

Science aspirations are particularly important to support girls' entry into STEM educational pathways. Low science aspirations are among the major hindering factors between girls' scientific talents and their subsequent studying in STEM educational field (Table 9). In line with higher self-confidence and higher scientific aspirations, boys' early achievements in mathematics and science are also noted to be linked with their advancement in STEM education (Table 9). Parents, teachers and broader societal contexts have a large influence on aspirations of students.

Table 9. Pearson correlation coefficients between 15-year-old girls'/boys' achievements in science and maths (PISA test results 2015) and graduates in STEM by gender (2013–2015 average)

PISA performance	Women		Men	
	Tertiary	Vocational	Tertiary	Vocational
Share of girls who are top performers in science (Level 5 or above)	-0.29	0.07		
Share of girls who are top performers in maths (Level 5 or above)	-0.31	-0.10		
Share of boys who are top performers in science (Level 5 or above)			0.35	-0.01
Share of boys who are top performers in maths (Level 5 or above)			0.44	0.13

Source: Eurostat, UOE data collection on education [educ_uoe_grad02], calculations based on 2013–2015 microdata.

As shown by the multi-level logistic regression analysis (Table 10), women's probability of working in STEM is observed to increase by close to 30 percentage points if they graduate in STEM. For men this probability increases by about 45 percentage points. In addition, men have higher chances of finding STEM jobs even without a STEM educational background. Women's chances of working in STEM are further increased if women have tertiary rather than vocational education, whereas for men the opposite is true. Men with lower-level education (up to non-vocational upper secondary level) have about a 10 p.p. higher probability of working in STEM occupations than men with tertiary education. Altogether, this points to strong gender stereotypes underlying the structure of the STEM labour market. The findings also support Bergmann's (2011) observations that women enter men-dominated occupations, such as STEM, primarily through jobs that require higher or postgraduate education rather than through blue-collar jobs, where the resistance to hiring women is stronger.

Having children or being in an older age group are both stronger impediments to women's chances of working in the STEM fields in comparison to other occupational fields. For men, having children does not significantly affect their probability of working in the STEM sector. Women in STEM are observed to work significantly more hours compared to women in other occupations (Schlenker, 2015). Combined with the fact that they often hold lower occupational positions than men, which implies having less autonomy and poorer working conditions, STEM workplaces seem to provide less scope for staff to combine work and family.

Table 10. Individual factors influencing work in the EU's STEM/EHW fields, predicted probabilities (2014)

	Women in STEM	Men in STEM	Men in EHW	Women in EHW
AGE				
15–29	6.3	34.4	5.7	19.3
30–44	6.8	35.5	6.5	21.3
45–59	4.2	30.6	8.1	21.6
60–64	2.1	28.6	11.5	
MARITAL STATUS				
Married		34.4		21.4
Not married		33.4		19.9
CHILDREN				
Child(ren) in the household	5.6		6.1	
No child(ren) in the household	7.0		6.5	
LEVEL OF EDUCATION				
Tertiary	7.7	34.9	8.9	25.8
Vocational	4.5	31	3.0	12.6
Up to non-vocational upper secondary	7.4	45.5	5.7	19.8
FIELD OF EDUCATION				
Graduate of STEM field	32.4	58.5		
Graduate of non-STEM field	3.4	12.7		
Graduate of HE field			44	55.3
Graduate of non-HE field			3.1	7.8

Note: no data for Malta due to lack of comparable occupational data; dependent variables have been set as binary, i.e. working in STEM or EHW occupations versus working in other occupational fields; only significant results (difference from the reference group $p< 0.05$) presented; grey shaded lines indicate the reference group in the model; separate models run for women and for men; in addition to individual factors, macro-level factors (i.e. the size of STEM and EHW occupational sectors; the Global Innovation Index 2014; the Gender Equality Attitudes Index 2014; the share of women aged 20–24 in tertiary education reflecting gender segregation in higher education) were included, with regression details presented in Annex III; a number of other macro-level factors have been tested.
Source: EU-LFS, calculations based on 2014 microdata.

The aforementioned factors have a rather different influence for women and men working in the EHW field. Men generally have a lower probability of working in EHW than women, especially younger men (15—29 years old) and those with children in teh household. According to Madichie (2013), entering a stereotypically women's field can imply setbacks in prestige and pay for men. In combination with still active stereotypes of men being the main breadwinner of the family, one could argue that men with children still tend to avoid gender atypical jobs due to potential psychological uneasiness and potentially lower pay observed in women-dominated sectors.

Nonetheless, having children has a somewhat smaller effect on men's chances of being employed in EHW than it does for women to be employed in STEM occupations. Moreover, and in contrast to what is observed for the STEM sector, having children in the household is insignificant in terms of women's chances of working in EHW. Overall, women aged 45–59 and married women have the highest probability of working in the EHW field.

Men with tertiary education have higher chances of working in EHW in comparison to men with vocational or lower education. As for women in STEM, tertiary education seems to serve as a 'stepping stone' for men to discover and work in the EHW field.

Organisational-level factors

Working conditions are often viewed as one factor underlying gender segregation (Eurofound, 2013). Research evidence shows that working conditions for women and men within and between gender-segregated sectors of employment are different. In particular, women in men-dominated sectors tend to experience gender discrimination more often than men, as well as differences in task allocation, fewer opportunities for promotion and lower salaries. At the same time, men working in women-dominated sectors have more opportunities for promotion, take higher posts and earn higher salaries compared to women.

Overall, job quality is a multifaceted concept that refers to both actual and perceived differences in employment and working conditions. It refers to characteristics of work (work autonomy, physical working conditions, risks for health and safety), characteristics of employment (working hours, wage, job security) and numerous other characteristics that affect the subjective and objective well-being of employees (see European Parliament, 2009). In the present study, Eurofound's conceptualisation of job quality is used. It is measured by seven job quality indices: physical environment; work intensity; working-time quality; social environment; skills and discretion; prospects; earnings (Eurofound, 2012; Eurofound, 2013; Eurofound, 2016).

Analysis of differences between the median of sub-groups, based on the Kruskal-Wallis test, shows that the indices for physical environment (ergonomic and ambient factors, such as lifting heavy objects and working with toxic vapours) are highest[12] in gender-neutral sectors and lowest in the STEM sector (see Annex IV). Men working in EHW occupations assess their physical working environment more positively than women. In STEM, women report better physical work conditions than men. This can be partially explained by the fact that in STEM men are more often employed in blue-collar jobs, whereas very few women are found in such jobs. Therefore, women in STEM tend to take on relatively higher positions than all men employed in the STEM industry. In contrast, more women than men work in manual occupations within the EHW field and are therefore less satisfied with at least the physical environment.

Overall, work intensity (quantitative and emotional demands, pace determinants and inter-dependency) is slightly stronger in STEM than in the EHW sector, as reported by those working in the respective field. Furthermore, women and men take on the same intensity jobs within STEM sector. This goes in line with existing research observations, that women in STEM take more intensive jobs compared to women in EHW occupations (Schlenker, 2015). In contrast, the job intensity index is slightly higher for women working in the EHW sector as compared to men.

The EHW sector has higher estimated job prospects (possibilities for career advancement) than all other sectors. This might be related to the high share of white-collar occupations including permanent contracts in the sector and clear and transparent processes for career advancement. The EHW sector is also dominated by jobs in the public sector, giving further room for more transparent and well-defined career models.

The median of skills and discretion in the EHW sector is at least 9 points higher than in STEM, indicating that EHW employees perceive their opportunities for the use of their skills and autonomy higher than those in the STEM sector. This is most likely related to the good (and often mandatory) access to opportunities for skills advancement in these specific sectors and to the fact that there are probably more opportunities and resources available for training in the public sector. A comparison between broad EHW and STEM sectors should also be made with caution, as high and low –skilled occupations might have different weights across the two sectors. For example, a number of STEM sector occupations requiring skills at vocational education level (mining, manufacturing or construction sub-sections) are included.

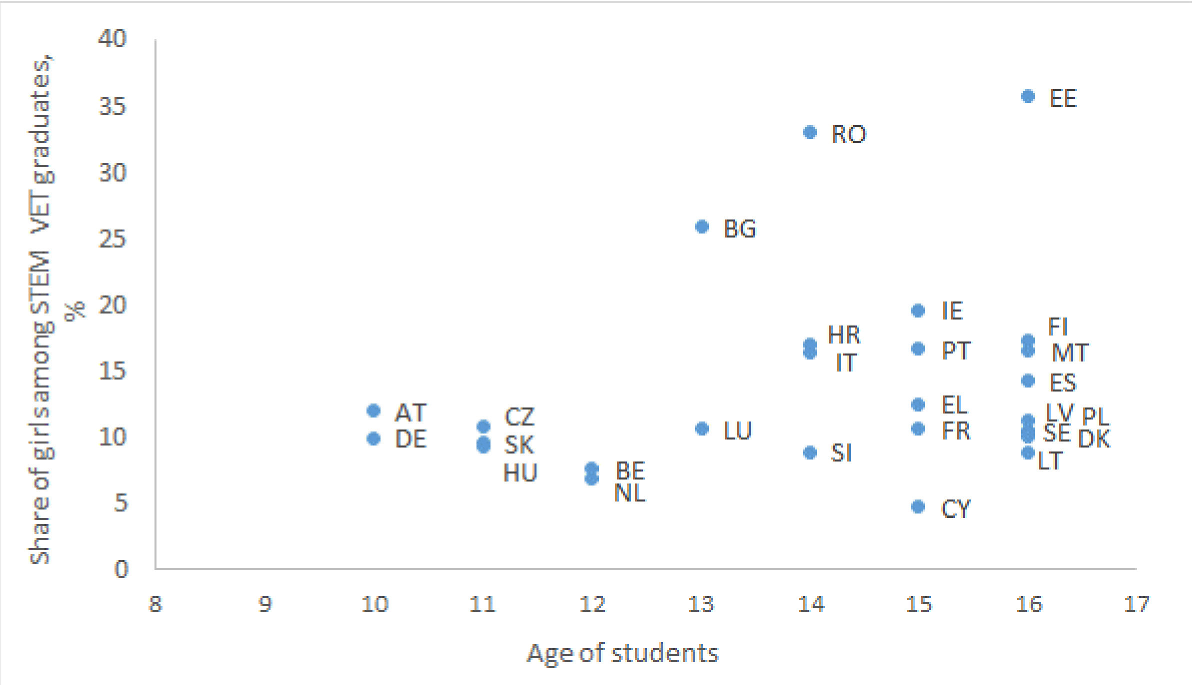
Working-time quality (duration, atypical working time, working time arrangements, flexibility) is considered better in the STEM sector than in EHW. This goes against a popular belief that the EHW sector is organised around more flexible working-time conditions. Atypical work (nights, weekends, long working and unpredictable hours) are particularly prevalent in the healthcare sector. Within the STEM sector women evaluate working-time quality more highly than men. They also use flexible working arrangements more often than men. No significant gender differences in working-time quality are observed in the EHW sector.

[12] A higher Index score means fewer physical risks and thus a better physical environment.

Societal-level factors

The structure of the education system has a strong influence on individuals' choice of education field. Research shows that participation in vocational programmes at the upper secondary level results in gender-typical career choices because vocational offers tend to be gender-typed (Imdorf, Hegna, Eberhard, & Doray, 2015; Smyth & Steinmetz, 2015). Smyth and Steinmetz (2015) find that this particularly applies to recent young men graduates. General education, on the other hand, is less gender-typed because students have not yet been steered towards a specific occupation (Imdorf et al., 2015).

Figure 30. Share of women VET graduates in STEM (2013–2015) and the age of the first placement of students into different educational tracks, by country

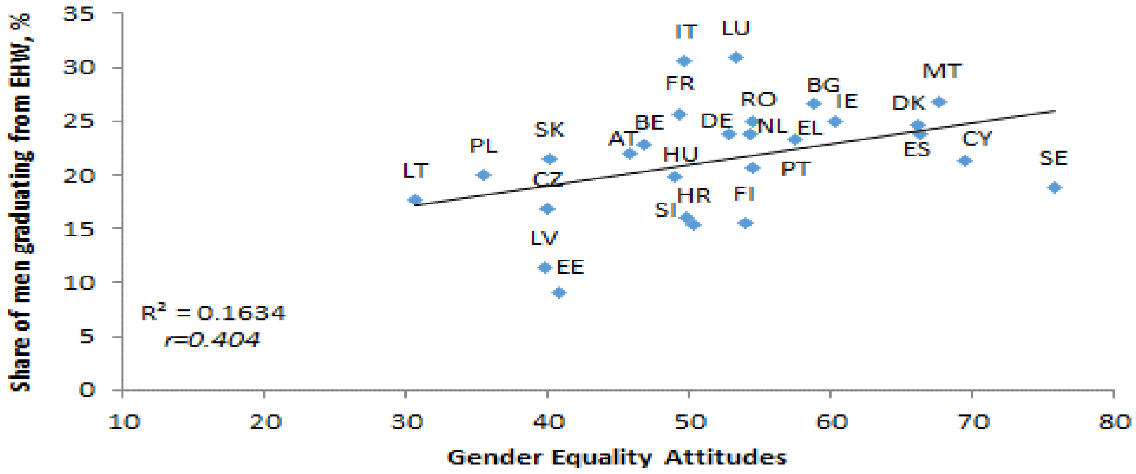


Source: Eurostat, UOE data collection on education: educ_uoe_grad02 [under verification]]; OECD, PISA 2015 Results (Volume II).

Early occupational choices (during adolescence) might also trigger strong segregation of career pathways. As shown by Figure 30, countries where education systems direct pupils onto an educational trajectory for a specific job at an early age tend to have higher gender segregation in STEM, especially at vocational education level. This could also be linked to well developed apprenticeship systems in countries such as Austria or Germany, where apprenticeship training is a part of a (dual) education system and attracts a significant number of adolescents. Overall, this observation goes hand in hand with existing research indicating that challenging gender boundaries by choosing a gender-atypical occupation is hardest for adolescents, whose gender identity development is most salient (Imdorf et al., 2015, p. 89). This pattern is not as clear-cut in tertiary education, as education choice is made at a later stage when many other factors come into play. For example, it has been found that men, more so than women, are more likely to choose courses that are not gender-typed once they enroll on a university course (Imdorf et al., 2015).

Stronger egalitarian gender attitudes at the country level support 'gender-atypical' educational choices among boys. As shown by Figure 31 and also by the results of the multi-level regression analysis (see Annex III), in countries with stronger positive attitudes towards gender equality, the share of men graduates in the health and welfare and education fields tends to be higher. Sweden is an exception, as the share of boys graduating from EHW in tertiary education is much lower than would be expected given the high support for gender equality in the country. In contrast, in Luxembourg the share of boys graduating in EHW is much higher than in other countries with about the same gender equality attitudes among the total population. No such association could be established in relation to girls' educational choices.

Figure 31. Share of men graduates in tertiary education in EHW (%), (2013–2015) and public attitudes to gender equality (%) (2014), by country



Note: Gender equality attitudes are measured as the average share of the population which agrees with the four statements of a Eurobarometer survey ([13]): equality between men and women is a fundamental right; equality between men and women will help women become more economically independent; if there are more women on the labour market, the economy will grow; tackling inequality between men and women is necessary to establish a fairer society; no data available for UK; r denotes Pearson correlation coefficient; R^2 denotes coefficient of determination.
Source: Special Eurobarometer (2014) and EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02].

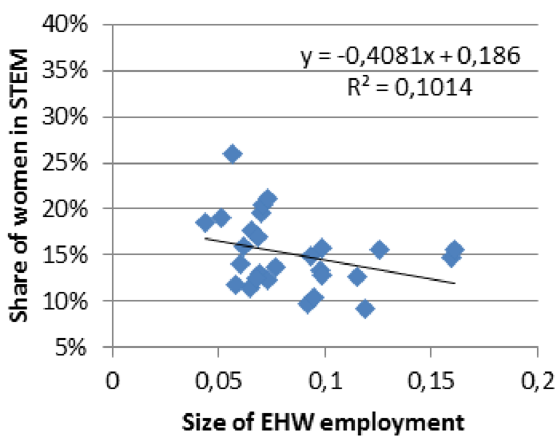
Changes in EU economies might also drive the change for gender segregation forward. For example, Blau et al. (2013) suggest that the entry of men into women-dominated occupations might be somewhat influenced by the long-term impact of the recent recession on men in blue-collar jobs, as well as structural shifts in the economy, which have increased demand for workers in traditionally women-dominated occupations. Furthermore, these structural shifts have given rise to more high-level jobs in women-dominated sectors, requiring an increasing level of skills and education (Brynin & Perales, 2016). Primary school teaching and social care are good examples of occupations which, in many countries, are in increasing demand, require graduate-level education and are accompanied by raising pay levels (Brynin & Perales, 2016). Such trends can enhance men's interest in these occupations as the demand for labour in traditional 'man's' occupations in manufacturing is declining.

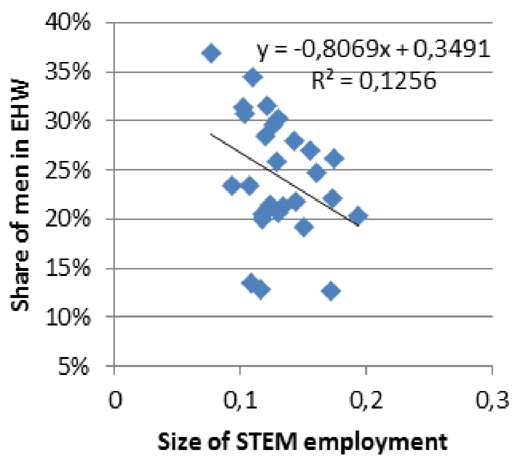
[13] Special Eurobarometer 428. *Gender Equality*. 2015. The survey was carried out in 28 Member States at the end of 2014 among the 15+ age group. See Internet: http://ec.europa.eu/justice/gender-equality/files/documents/eurobarometer_report_2015_en.pdf

Women's entry into STEM occupations is facilitated by a number of macro-level factors, including the size of the STEM sector. As shown by the multi-level regression analysis (Annex III), the larger the STEM sector, the more job opportunities it provides, and the higher the probability of women working in STEM occupations. This also indicates that despite various obstacles and gender tensions within the STEM field, an expanding sector could create possibilities for women's entry, especially given that other prerequisites for entry (education) are in place.

Nevertheless, more job opportunities in such a men-dominated sector as STEM primarily implies more job opportunities for men, with gender segregation consequences for other sectors. Given the fairly stable size of the labour force (due to ageing populations but moderate levels of migration), strong interconnections and competition for skills between STEM and EHW sectors exist, not least due to transferability of competences across occupations. As shown in Figure 29, in countries with a large STEM sector fewer men tend to work in EHW. Thus a large STEM sector seems to imply particularly high opportunities for men's employment. In parallel, though to a somewhat lower degree, high levels of employment in EHW are associated with fewer women in STEM. This presents a paradox of gender-segregated occupational choices. Given this strong gender segregation, increasing demand for labour in some sectors might lead to the increase and rolling-over of gender imbalances across different sectors rather than to more opportunities for all.

Figure 32. Gender segregation and relative size of STEM (share of women) and EHW (share of men) occupations (2013–2014)





Source: EU-LFS, calculations based on 2013–2014 microdata.

As STEM is often associated with an innovative economy, this study also tested the hypothesis that countries with more innovative environments enable higher employment of women and men in STEM. The regression analysis (Annex III), however, suggests a one-sided relationship. The higher the country's Global Innovation Index[14] ranking, the higher men's opportunities to work in STEM. The country's degree of innovativeness, however, does not significantly affect women's chances of working in STEM. Without disregarding other factors, it is likely that innovation and related investments are mostly targeted at blue-collared STEM jobs, which are still largely dominated by men. The way in which innovation is currently promoted thus seems to support growth in STEM jobs, but mainly for men. This points to the ways in which gender segregation distorts the effectiveness of policy tools and the functioning of the labour market.

7. Proposed revision of Beijing Platform for Action (BPfA) indicators

On the basis of the findings of this report, EIGE proposes a number of adjustments in order to streamline the current BPfA indicators, make the monitoring on gender segregation in education, training and the labour market more operational and more closely link it to possible policy responses. Specifically, EIGE proposes the following BPfA revisions (see Table 11 for visual presentation and Annex V for more details):

- **Retain the current indicator under Area K: Women and the Environment and retain the current gender segregation indicator in terms of the gender pay gap under Area F: Women and the Economy.** If the first indicator is specifically designed to monitor gender-balanced decision-making capacity in the area of environmental protection, the second indicator enables the monitoring of pay differences in gender-segregated sectors and occupations. Thus, both indicators meet their specific objectives and provide important complementary information to monitor gender segregation in terms of participation in education, training and the labour market.
- **Propose a new indicator under the Area B *Education and Training of Women*, which would merge and revise information currently (with overlaps) collected by 1) two current indicators under the Area B *Education and Training of Women* and by 2) an indicator on the share of "girl students in tertiary education" under the Area L *the Girl Child*.** The new indicator would expand coverage from tertiary education to non-tertiary vocational education and would focus collection of information on the study fields with the highest degrees of gender segregation. Specifically, the new indicator would enable monitoring trends regarding *"proportion of women and men graduates in tertiary (ISCED levels 5-8) and vocational (ISCED levels 3-4) education and training in the fields of science, technology, engineering and mathematics (STEM) and in the field of education, health and welfare (EHW) – of all graduates in the study field*".

[14] The Global Innovation Index capture various elements of the national economies and of national innovation outputs, including Institutions, Human capital and research, Infrastructure, Market and Business sophistication, Knoweldge, Technology and Creative outputs, More information on the Index is available at: https://www.globalinnovationindex.org/home

- **Propose a new indicator under the Area L *the Girl Child*, which would enable monitoring gender differences in career aspirations and expectations.** As shown by the findings of this report, girls are catching up with boys in science or mathematics proficiency. Nonetheless, better performance does not yet lead into the pursue of science related careers, with stagnant gender related stereotypes influencing future job aspirations and remaining among the major underlying factors of gender-segregated labour markets. The proposed new indicator - *proportion of all and top performers girls and boys in science aged 15 expecting to work in science-related occupations at age 30* - would provide a necessary and timely monitoring tool not only to address gender segregation within the education system but also within the labour market.
- **Propose a new indicator under the Area F *Women and Economy* to monitor gender segregation within the labour market,** with a necessary **focus on occupations of STEM and EHW** employment fields. Though gender segregation on the labour market has an immense influence on the functioning of our societies, economies and the labour market itself, no indicator under the BPfA currently enables monitoring of the phenomenon. The proposed indicator would allow a closer and regular monitoring of gender segregation across the EU labour markets, providing the needed and timely evidence basis for respective education and training, labour market or associated social (i.e. on work-life balance) policy responses.

Table 11. Proposal on the restructuring of BPfA indicators on gender segregation in education, training and the labour market

	Current	New	Final
B: Education and training of women	Proportion of female graduates and male graduates of all graduates in mathematics, the sciences and technical disciplines (tertiary education)	Proportion of women and men graduates in tertiary (ISCED levels 5-8) and vocational (ISCED levels 3-4) education and training in the fields of science, technology, engineering and mathematics (STEM) and in the field of education, health and welfare (EHW) – of all graduates in the study field.	Proportion of women and men graduates in tertiary (ISCED levels 5-8) and vocational (ISCED levels 3-4) education and training in the fields of science, technology, engineering and mathematics (STEM) and in the field of education, health and welfare (EHW) – of all graduates in the study field.
	Proportion of female/male ISCED 5a-graduates of all ISCED 5a-graduates and proportion of female/male PhD graduates of all PhD graduates by broad field of study and total		
L: The Girl Child	Proportion of girl students in tertiary education in the field of science, mathematics and computing and in the field of teacher training and education science		
	15-year-old girls and boys: performance in mathematics & science		15-year-old girls and boys: performance in mathematics & science
		Proportion of all and top performers girls and boys in science aged 15 expecting to work in science-related occupations at age 30	Proportion of all and top performers girls and boys in science aged 15 expecting to work in science-related occupations at age 30
K: Women and the Environment	Proportion of women and men among tertiary graduates of all graduates (ISCED levels 5 and 6) in natural sciences and technologies		Proportion of women and men among tertiary graduates of all graduates (ISCED levels 5 and 6) in natural sciences and technologies
F: Women and the Economy	Gender segregation: average gross hourly wages of female and male workers in the 5 industry sectors (and in the 5 professional categories) with the highest numbers of female workers and the highest numbers of male workers; pay gap in management professional categories.		Gender segregation: average gross hourly wages of female and male workers in the 5 industry sectors (and in the 5 professional categories) with the highest numbers of female workers and the highest numbers of male workers; pay gap in management professional categories.
		Share of women and share of men employed in occupations of STEM and EHW employment fields	Share of women and share of men employed in occupations of STEM and EHW employment fields

8. Conclusions

Despite progress in gender equality, entrenched gender segregation in education, training and the labour market remains a reality for women and men in Europe today. Gender segregation refers to the concentration of one gender in certain fields of education or occupations. It is mostly influenced by stereotypes, working conditions, social norms and cultural practices, which deter women and men from choosing and remaining in professions traditionally dominated by the other gender.

Gender segregation narrows women's and men's life choices, education and employment options by limiting access to certain jobs. It further reinforces gender stereotypes while also perpetuating unequal gender power relations in the public and private sphere. Women usually are in the majority in sectors that are generally characterised by low pay, status, prestige and career prospects, fewer options for upskilling, and often informal working arrangements. The concentration of women and men in different occupations is a major cause of the gender pay gap, gender gap in pensions and women's overall economic dependence throughout life. Overall, the persistent gender segregation in education and the labour market seriously hampers the potential for smart, sustainable and inclusive growth in the EU.

In 2014 a gender-balanced workforce was observed in only 5 occupations within the 20 largest occupation categories in the EU. The fields of **science, technology, engineering and mathematics** (STEM) and **education, health and welfare** (EHW) were the most gender-segregated areas in the education system and subsequently in employment. There is already an acute shortage of STEM and EHW professionals and this is forecasted to worsen in the future, not least due to declining numbers of students in a number of STEM and EHW fields, ageing populations, mismatch of skills as well as an increasing broader need for more STEM skills across all other professions. With close to half of all EU students graduating in STEM (24 %) and EHW (19 %) educational fields, the distinction between 'women-' and 'men-compatible' jobs remains one of the most distorting forces in the labour market. It restricts choices in life and work and may lead to complete disillusionment with and disengagement from the labour market.

Horizontal segregation in the STEM and EHW fields of education and training is particularly pronounced, and progress in reducing it has stalled or started to reverse. Within STEM, ICT, engineering, manufacturing and construction are the most men-dominated fields of education. In the EU, 19 % of students engaged in engineering, manufacturing and construction are women and in ICT - 17 %. Among the EHW study fields, gender segregation was more pronounced within the education field (where men represent a share of 19 %) than it was in the health and welfare disciplines (where men represent a share of 21 %). Throughout the last decade (2004–2015), women's share among STEM graduates in the EU has fallen from 23 % to 22 %. Men's share in EHW remained about the same at 21 %. Across the STEM fields, the share of women graduates was notably declining in ICT (in 20 Member States), whereas no significant changes were noted in the study field of engineering, manufacturing and construction (the largest STEM discipline). The field of natural sciences, mathematics and statistics has sustained its gender-balanced distribution of graduates. No progress from 2004 to 2015 in reducing gender segregation was noted across the EHW study fields, with the share of men in the health and welfare field as well as in the education field remaining below 35 % in all countries.

Gender segregation is much stronger in vocational than in tertiary education in almost all EU countries, which has particularly significant effects on outcomes within the STEM field. More than half (55 %) of STEM and about one third (34 %) of EHW students in the EU graduate from vocational education (figure for 2013–2015). Though a few countries have achieved gender balance in the proportion of women and men tertiary STEM graduates, no country has achieved this at the vocational education level. Gender segregation of lower skilled STEM jobs thus needs to be investigated in more detail, not least due to the changing world of work and various gender consequences of emerging or disappearing jobs would have on women and men.

In the EHW field, no country has yet achieved a gender-balanced share of students either in tertiary or vocational education. Overall, only 13 % of the EU graduates from vocational STEM education are women, whereas 31 % of women graduate from the tertiary education level. This gap is somewhat smaller in the EHW field, but comes at the expense of higher gender segregation, with 16 % of men graduates at the vocational education level and 23 % at the tertiary EHW education level. In addition to a low share of women in STEM vocational education at present, a substantial decrease has been observed during the last decade – both in absolute and relative numbers, pointing to an overall loss of students' interest in STEM studies, especially among women. In contrast, in the EHW field an increase in student interest at the vocational education level can be observed. Nonetheless, the share of men graduates remained low – with an increase from 12 % to 16 % throughout the last decade.

The chances of finding a job are higher for women in the EHW field than in STEM, while the opposite holds true for men. Though only about one tenth of STEM and EHW graduates in the EU get a first job matching their educational qualification, sharp differences exist across the Member States, with the 'matching rate' reaching up to 40 % in STEM and up to 50 % in EHW fields. This indicates vast untapped potential at the country level: graduates' qualifications could be used much more efficiently. Though more graduates find jobs matching their education as their career progresses, gender gaps remain vast. Among tertiary STEM graduates, only one third of women but one in two men work in STEM occupations. Among vocational education graduates, the gap is even greater, with only 10 % of women but 41 % of men working in STEM occupations. Furthermore, the chances of finding a job match have increased for all STEM graduates – but more for women with vocational STEM education – over the last decade. The chances of finding a job to match one's qualification are more equitable in the EHW field, with about half of women and men EHW graduates from either tertiary or vocational educational levels able to find their education corresponding jobs. Furthermore, the chances of finding EHW jobs have particularly increased for men graduates of the vocational education level during the last decade.

If they do not stay employed in STEM, only a small share of women and men graduates choose gender-mixed occupations, such as business and administration professions. The majority continue on gender-segregated pathways, with 21 % of women with tertiary education working as teaching professionals and 20 % of women vocational education graduates working as sales workers. Fewer occupational differences by gender are noted in the EHW field, though gender biases still exist. For example, about 8 % of men with tertiary EHW education become science and engineering professionals, but this is apparently not an attractive choice for women at present, illustrating the presence of various restrictions, such as limited possibilities to take care leave or flexible working conditions.

The chances of finding employment for women graduating from men-dominated fields of education are significantly lower compared to those for men. In 2014 the employment rate among EU women graduates in tertiary STEM education was 76 %. This is more than 10 percentage points lower than the employment rate of men with the same qualification and 3 percentage points lower than the average employment rate of women with tertiary education. In addition, the employment rate of women with vocational STEM education (52 %) is lower than that for all women with vocational education (67 %) and for women in general (61 %). Furthermore, in contrast to the overall increase in women's employment in the EU, the employment rate among women STEM graduates decreased between 2004 and 2014. There was also a notable increase in inactivity rates among women STEM graduates from the vocational education field. Across the EU, the employment rate of men EHW graduates was above the general employment rate of men and also above that of men with tertiary education.

Overall, more than one fifth of all employees work in eight STEM and four EHW core occupations in the EU (2013–2014), though the size of these professions is rather different across the Member States. Gender segregation in STEM and EHW occupations is persistently high and has not improved in the last decade. In fact, the share of men in EHW occupations decreased from 30 % in 2004 to 26 % in 2014 at the EU level. This is partially due to the retirement of men, who make about 40 % of the EHW workforce aged 60–64, whereas there are far fewer men (23 %) among the youngest cohorts. The share of women in STEM occupations increased marginally from 13 % in 2004 to 14 % in 2014; this share is persistent across age cohorts too.

As within education and training, gender segregation is very different across countries and across STEM and EHW occupations, pointing to a vast scope for potential improvements. Gender segregation among stationary plant and machine operators ranges from it being a predominantly men-dominated occupation in Luxembourg to one with a high proportion of women employees in Lithuania and Bulgaria. Building and related trades, electrical and electronic trades as well as metal, machinery and related trades are almost exclusively men dominated across the EU. The science and engineering profession is gender balanced in Latvia only and no gender-balanced distribution has yet been achieved within the ICT field in any Member State. Within the EHW field, gender-balanced distribution among health (associate) professionals has been achieved in a few countries, whereas women are overrepresented in the teaching profession across all Member States. The highest segregation within the EHW field, however, exists among personal care workers, with no country in the EU yet achieving a 20 % share of men in this occupation.

Trends across STEM and EHW professions point to an increasing polarisation across countries and across occupations. This makes it difficult to establish general STEM or EHW trends within the EU, as average stability masks stark differences. The share of women is predominantly decreasing in ICT occupations across the EU. On the other hand, the proportion of women among stationary plant and machine operator roles, which already employ a considerable share of women in a number of Member States, is predominantly on the rise. No substantial changes and trends could be established across other STEM occupations. The share of men is also falling in at least one third of the Member States, and no progress is noted in the others. Positive developments, however, are noted among personal care workers, with an increasing share of men in at least six Member States, counter-balancing a larger fall in France and no significant changes in other countries. Despite increasing demand and an ageing workforce, no changes are noted in terms of attracting more men to the teaching occupation. Overall, this shows that during the last decade and despite policy initiatives, no significant progress has been achieved in attracting and retaining women in STEM and men in EHW. New and structural approaches are needed.

The gender pay gap, prevalent across entire EU economies, is also visible in the STEM and EHW sectors. Paradoxically, despite the 'unattractiveness' of STEM, the sector has a much lower gender pay gap than the EHW field in almost all EU Member States. While in the STEM sector only two countries had a pay gap exceeding 20 %, this was the case for seven countries in the EHW sector. The high gender pay gap in EHW was due to larger gender pay biases in human health and social work activities than in the field of education in almost all EU countries. In a number of STEM sub-sectors, such as water supply, waste management and remediation or construction, women were also noted to have higher average pay than men in some Member States. In manufacturing and ICT, however, men earned more than women in all EU Member States. Overall, the gender pay gap limits the reduction of gender segregation. On the one hand, it can motivate women to take up employment in men-dominated occupations, though evidence shows other gendered barriers tend to counteract this choice. On the other hand, the gender pay gap acts as an important hindering factor in terms of men being motivated to move into occupations dominated by women.

Gender segregation in the STEM field is still particularly influenced by stereotypes regarding masculine identity traits and roles, with impacts across entire career pathways. In secondary-level education, gender differences in achievement in maths and science are narrowing and no longer act as a dominant factor in the choice to pursue a STEM career. More women than men graduate from science, mathematics and statistics fields at post-secondary level, but their share in other STEM sub-sectors remains continuously low, if not decreasing. Aspirations, on the other hand, play a major motivational role in choosing STEM career pathways. Girls' aspirations to pursue science careers, despite their ability in this subject area, remain much lower than boys' in almost all Member States. In part this is linked to women's lower degree of self-confidence about their ability to perform well in the science fields, but lack of adequate counselling, and peer and family influences, are also important. Furthermore, even if they have aspirations to pursue a science career, in the end girls often do not opt for actual careers in science, which points to numerous gendered barriers to their occupational pathways.

Gender biases also imply that educational achievements do not equally translate into occupational successes for women and men. Women's probability of working in STEM increases by close to 30 percentage points if they graduate in STEM. For men, however, this probability increases by about 45 percentage points. In the EHW sector, men's chances of finding jobs are lower than women's.

There are significant differences between the STEM and EHW sectors in terms of career advancement and the ease with which it is possible to combine work and family life. Having children or being in older age groups impede women's chances of working in the STEM field, which is not the case in the EHW field. Overall, women perceive STEM jobs to be more intensive than EHW jobs, whereas for men the opposite is true. Working-time quality is considered better in STEM than in the EHW sector, providing evidence against a popular belief of flexible working-time conditions in EHW. Good access to skills advancement and more transparent and well-defined career models are more often observed in the EHW sector than in the STEM sector. Altogether, this points to various areas of improvements for both women's and men's employment within the two sectors.

Women and men's entry into 'gender-atypical' occupations is facilitated by a number of macro-level factors. For example, more favourable gender equality attitudes within a country seem to facilitate men's entry into the EHW field. The growth of the STEM sector has been found to be linked with growing women's employment in STEM. However, a cautious note should be struck here. Unless gender segregation is being actively combated, more job opportunities in the STEM sector might first of all imply more opportunities for men. This has a knock-on effect on men's interest in participating in the EHW field, for example. Furthermore, increasing innovation in the sector, including through investment, is likely to support growth in STEM jobs, but mainly for men. This exemplifies numerous ways that gender segregation distorts the effectiveness of policy tools and the functioning of economies as well as labour markets.

Recommendations

Gender stereotypes should be addressed at all levels of education and training from an early age

Gender stereotypes lead to gender segregation, and segregation, in turn, reinforces gender stereotypes. Gender stereotypes are broadly recognised as the greatest obstacle to achieving gender equality. They affect decisions made by girls and boys, as well as their self-image. Evidence also shows that gender expectations regarding educational choices are stricter for boys than girls, whereas atypical choices are more acceptable for girls than for boys. Member States should address gender stereotypes and sexism through informal and formal education from a very early age by providing initial teacher training and continuous porfessional development on mainstreaming gender equality in education and by promoting gender sensitive school curricula, teaching approaches, administrative practices and leisure time activities at all levels of education.

Measures addressing gender stereotypes need to be sustainable and conducted over the long term. It is important to foster gender equality awareness among students, parents and teachers, including those dealing with career orientation, and to encourage young women and men to choose non-traditional fields and occupations. For instance, families and their associations could be systematically involved in gender equality promotion in education and career counselling.

However, addressing gender segregation has to go beyond getting individual women or men into particular education courses or occupations. Structural change within education and labour market is needed to secure lasting outcomes. It is necessary to take a comprehensive and sustainable approach to tackling gender differences in teaching content and methods, gender composition of teaching staff, and the vertical segregation and value attached to certain qualifications/occupations. Institutional change will go hand in hand with societal change in terms of the sharing of domestic and caring work and addressing stereotypical societal expectations of women and men.

Combating gender educational and occupational segregation is imperative for closing the gender pay gap and gender gap in pensions

Increasing women's employment rates can sometimes increase occupational segregation and the gender pay gap. Horizontal and vertical segregation of the labour market is a major cause underlying the gender pay gap and gender gap in pensions. Women are concentrated in sectors and occupations which are generally lower paid and less valued. They are also underrepresented in most scientific, engineering and management posts and at higher hierarchical levels, even in sectors where they are in the majority, such as the education sector.

The stalled progress in tackling gender segregation across key sectors of the economy requires actions targeted at both the participation of women and men in the labour market and working conditions, including equal pay. Equal pay between women and men must be further promoted, including by addressing transparency of pay and unconscious bias in recruitment and career progression as well as by strengthening policies and organisational culture to further advance work–life balance. It is important to cooperate with national trade unions (especially in the most gender-segregated professions) in order to fight gender stereotypes and raise awareness among their members on underlying causes of the gender pay gap.

Narrowing the gender pay gap could accelerate progress in reducing occupational segregation and the gender gap in pensions. In addition, measures addressed at gender occupational segregation should also cover the gender gap in pay and pensions.

Work–life balance provisions should be available and encouraged for women and men in all sectors and occupations

Women's disproportionate responsibility for care of dependent family members and household tasks is a major factor of gender segregation in employment. Data show that it is relatively easy for women to make the transition between full-time and part-time employment and remain employed in the same (women-dominated) sector. The sectors in which men are employed are less prone to part-time working, resulting in men not being able to work part-time while remaining in the same sector of employment (EIGE, 2014). This may be a factor preventing men from taking on more caring duties.

Working on a part-time basis can be detrimental in terms of access to economic and financial resources. Low numbers of working hours (including micro-jobs with fewer than 10 hours per week) are mainly associated with women, and often lead to lower earnings, lower access to social security benefits, lower pensions and higher risk poverty. In all Member States the percentage of part-time workers below the low pay threshold is higher for women than for men. Moreover, on average, for the EU-28, the share of part-time workers at-risk-of-poverty is almost double the proportion of individual full-time workers who are at-risk-of-poverty. It is necessary to ensure that part-time work involves a possibility to make transitions between part-time and full-time work, equal career prospects and protection from precariousness, poverty and social exclusion (EIGE, 2014).

The European Commission recently proposed a package of measures on work–life balance ([15]), with particular focus on paternity/parental/carer's leave, flexible working arrangements, accessible care services, inlcuding long-term care, and economic (dis)incentives for employment. When implemented in the Member States, the measures should promote organisational cultures that embrace the work–life balance needs of both women and men. Flexible working arrangements and other provisions in the workplace should consider the changing life-course needs of workers. Part-time work should be considered as an opportunity for *all* (women and men) at specific phases of the life course when work has to be balanced with other needs (i.e. education and training, care responsibilities, health, etc.). The choice should be reversible (transition from part-time to full time job) when the life-course needs change and should not be penalised in terms of pay, career opportunities and access to social protection.

[15] Internet: http://ec.europa.eu/social/main.jsp?catId=1311&langId=en&moreDocuments=yes

Active labour market policies and lifelong learning should be more geared to meet new demands of the labour market

When Member States address labour shortages and support creation of new jobs in STEM and EHW, active measures are needed in parallel to those on decreased segregation so that both women and men would benefit from these opportunities. Active labour market policies should provide more opportunities for young people, the unemployed or early leavers from education to upgrade their skills in response to labour market potential and shortage of specific skills and to broaden educational and career options across fields traditionally dominated by either women or men. As noted by the European Pillar of Social Rights and the New Skills for Europe agenda, lifelong learning is playing an increasingly important role in changing economies and societies. Member States should encourage women and men to engage more actively in lifelong learning to acquire occupational qualifications suited to the new structure and demands of the labour market, including changing employment sector and taking non-stereotypical jobs.

Secondary education should encourage more innovative approaches to career choices

Education systems tend to reinforce gender segregation if they require girls and boys to make choices about studies and career prospects at an early age. Research links segregation across scientific fields at the university level with segregation in study fields downstream at the secondary school level. Too often education systems are not flexible enough and direct pupils onto an educational trajectory for a specific job, especially in vocational education and training, at an early age. Opportunities for secondary school pupils to change their core subjects more freely, in view of their future studies, would introduce better flexibility and offer more career choices.

Building closer links between schools and real-life experience in the workplace could also enable broader occupational choices for girls and boys. It is recognised that business could play a more prominent role in challenging negative and misleading perceptions of STEM or EHW careers by being more involved in education at all levels and providing a context for studies and positive role models. For example, in a number of countries school and business partnerships are being promoted to get young people interested in STEM, especially in sectors with skills shortages. Such initiatives could also include career guidance and labour market information. The evidence shows that girls and boys may not receive accurate information on STEM or EHW courses and careers and may be steered into fields traditionally typical for their gender. Career guidance should counteract gender prejudices about professional careers and provide good-quality information so that young people can make well-informed decisions free from gender bias.

Enriching STEM with arts and humanities could increase its attractiveness to women and men

The European Parliament, in its Resolution on women's careers in science and university (European Parliament, 2015b), recognised that demand for STEM professionals is expected to grow until 2025 and that cross-fertilisation between STEM subjects and the arts and humanities (STE(A)M) holds enormous economic, social and cultural potential, and that women and researchers are well placed to develop links from STEM to STE(A)M.

The evidence shows that learning STEM is more effective when linked to economic, environmental and social challenges, arts and design, and demonstrating its relevance for daily life (European Commission, 2017b). Project- and problem-based learning or community service learning increase young people's motivation, put subject content into context, and offer opportunities for the development of social, civic and entrepreneurship competences and leadership skills.

Gender segregation can be reduced with a better gender balance in decision-making

Vertical segregation by gender is as important as horizontal segregation and has to be addressed to overcome occupational segregation and to promote gender equality. In the European Pact for Gender Equality, the Council urged 'measures to close gender gaps and combat gender segregation in the labour market', including promotion of 'the equal participation of women and men in decision-making at all levels and in all fields, in order to make full use of all talents'. Women make up more than half of the EU population and they are highly educated, yet even in the sectors and occupations where they dominate women continue to be underrepresented in decision-making positions at all levels.

The underrepresentation of women in decision-making is very broad, multifaceted and widespread in all sectors. It is crucial to address it in policies aimed at improving gender equality, in particular women's employment, work–life balance, equal pay, and equal sharing of caring duties. Governments, the social partners and companies in the private and public sectors should agree on far-reaching gender equality policies and targets and implement effective measures supporting women in gaining access to positions of responsibility through more transparent selection and promotion processes, personal development initiatives, sponsoring schemes and other initiatives.

Bibliography

Allegrini, A., Pellegrini, G., & Segafredo, C. (2015), 'Italian female and male students' choices: STEM studies and motivations', in Henriksen, E.K., Dillon, J., and Ryder, J. (eds), *Understanding Student Participation and Choice in Science and Technology Education*, Springer Netherlands, Dordrecht, pp. 297-313.

Ashcraft, C., McLain, B., & Eger, E. (2016), *Women in Tech: The Facts*, National Center for Women & Technology (NCWIT), available at: https://www.ncwit.org/sites/default/files/resources/ncwit_women-in-it_2016-full-report_final-web06012016.pdf

Babcock, L., Recalde, M.P., Vesterlund, L., & Weingart, L. (2017), 'Gender Differences in Accepting and Receiving Requests for Tasks with Low Promotability,' *American Economic Review*, Vol. 107(3), pp.714-747, available at : http://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.20141734

Bergmann, B.R. (2011), 'Sex segregation in the blue-collar occupations: Women's choices or unremedied discrimination?: Comment on England,' *Gender and Society*, Vol. 25(1), pp. 88–93.

Bettio, F., & Verashchagina, A. (2009), *Gender Segregation in the Labour Market: Root Causes, Implications and Policy Responses in the EU. EU Expert Group on Gender and Employment (EGGE)*, European Commission, Luxembourg, available at: http://ec.europa.eu/social/BlobServlet?docId=4028&langId=en

Bieri Buschor, C., Berweger, S., Keck Frei, A., & Kappler, C. (2014), 'Majoring in STEM—What Accounts for Women's Career Decision Making? A Mixed Methods Study', *The Journal of Educational Research*, Vol. 107(3), pp. 167–176.

Blau, F. D., Brummund, P., & Liu, A. Y.-H. (2013), 'Trends in Occupational Segregation by Gender 1970-2009: Adjusting for the Impact of Changes in the Occupational Coding System,' *Demography*, Vol. 50(2), pp. 471–492.

Boll, C., Leppin, J., Rossen, A., & Wolf, A. (2016), *Magnitude and Impact Factors of the Gender Pay Gap in EU Countries*, European Commission, Luxembourg, available at: http://hwwi.org/fileadmin/hwwi/Publikationen/Publikationen_PDFs_2016/Magnitude_And_Impact_Factors_All.pdf

Brynin, M., & Perales, F. (2016), 'Gender wage inequality: The de-gendering of the occupational structure,' *European Sociological Review*, Vol. 32(1), pp. 162–174, available at: https://doi.org/10.1093/esr/jcv092

Burchell, B., Hardy, V., Rubery, J., & Smith, M. (2014), *A New Method to Understand Occupational Gender Segregation in European Labour Markets*, European Commission, Luxembourg, available at: http://ec.europa.eu/justice/gender-equality/files/documents/150119_segregation_report_web_en.pdf

Busch, A., & Holst, E. (2011), 'Gender-Specific Occupational Segregation, Glass Ceiling Effects, and Earnings in Managerial Positions : Results of a Fixed Effects Model,' *DIW Discussion Paper*, DIW, Berlin.

Cedefop (2014), *Rising STEMs*, accessed 21 June 2017, available at: http://www.cedefop.europa.eu/en/publications-and-resources/statistics-and-indicators/statistics-and-graphs/rising-stems

Cedefop (2015), *Employment trends: 2016 Skills forecast*, accessed 15 April 2017, available at: http://www.cedefop.europa.eu/en/publications-and-resources/data-visualisations/employment-trends

Cedefop (2016), *Briefing note 9115 – Skill Shortage and Surplus Occupations in Europe*, accessed 21 June 2017, available at: http://www.cedefop.europa.eu/en/publications-and-resources/publications/9115

Charles, M., & Bradley, K. (2009), 'Indulging Our Gendered Selves? Sex Segregation by Field of Study in 44 Countries,' *American Journal of Sociology*, Vol. 114(4), pp. 924–976.

Charles, M., & Grusky, D. (2004), *Occupational Ghettos: The Worldwide Segregation of Women and Men*, Stanford University Press, Redwood City.

Charles, M., Harr, B., Cech, E., & Hendley, A. (2014), 'Who likes math where? Gender differences in eighth-graders' attitudes around the world,' *International Studies in Sociology of Education*, Vol. 24(1), pp. 85–112.

Christidou, V. (2011), 'Interest, Attitudes and Images Related to Science: Combining Students' Voices with the Voices of School Science, Teachers, and Popular Science,' *International Journal of Environmental and Science Education*, Vol. 6(2), pp. 141–159.

Council of the European Union (2006), Presidency Conclusions (7775/1/06 REV1), Brussels, available at: http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/89013.pdf

Council of the European Union (2007), *Review of the implementation by the Member States and the EU institutions of the Beijing Platform for Action: Indicators in respect of the Education and Training of Women: Draft Council conclusions*, 9152/07, Brussels, available at: http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%209152%202007%20INIT

Council of the European Union (2008), *Review of the implementation by the Member States and the EU institutions of the Beijing Platform for Action: Indicators in respect of the Girl Child: Draft Council conclusions*, 9669/08, Brussels, available at: http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%209669%202008%20INIT

Council of the European Union (2010), *Council conclusions on strengthening the commitment and stepping up action to close the gender pay gap, and on the review of the implementation of the Beijing Platform for Action*, 18121/10, Brussels, available at: http://register.consilium.europa.eu/doc/srv?l=EN&f=ST 18121 2010 INIT

Council of the European Union (2011), *Council conclusions on the European Pact for gender equality for the period 2011-2020*, 7370/11, Brussels, available at: https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/119628.pdf

Council of the European Union (2014), *Council conclusions on Women and the economy: Economic independence from the perspective of part-time work and self-employment*, 11050/14, Brussels, available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/143269.pdf

Council of the European Union (2017), *Council conclusions on enhancing the skills of women and men in the EU labour market*, 6889/17, Brussels, available at: http://data.consilium.europa.eu/doc/document/ST-6889-2017-INIT/en/pdf

Dämmrich, J. (2015), 'Gendered Labor Market Outcomes at Labor Market Entry and Their Relationship with Country-Specific Characteristics: A Comparative Perspective,' in Blossfeld, H.P., Skopek, J., Triventi, M., & Buchholz, S. (eds), *Gender, Education and Employment. An International Comparison of School-to-Work Transitions*, Edward Elgar Publishing, Cheltenham, pp. 62–81.

De Pater, I.E., Van Vianen, A.E.M., & Bechtoldt, M.N. (2010), 'Gender Differences in Job Challenge: A Master of Task Allocation,' *Gender, Work and Organization*, Vol. 17(4), pp. 407–436.

De Ruijter, J., van Doorne-Huiskes, A., & Schippers, J. (2003), 'Size and causes of the occupational gender wage-gap in the Netherlands,' *European Sociological Review*, Vol. 19(4), pp. 345–360.

Eccles, J., Jacobs, J., & Harold, R. (1990), 'Gender Role Stereotypes, Expectancy Effects, and Parents' Socialization of Gender Differences,' *Journal of Social Issues*, Vol. 46(2), pp.183-201, available at: https://www.researchgate.net/profile/Jacquelynne_Eccles/publication/227848517_Gender_Role_Stereotypes_Expectancy_Effects_and_Parents%27_Socialization_of_Gender_Differences/links/00b7d5166b7647bc78000000/Gender-Role-Stereotypes-Expectancy-Effects-and-Parents-Socialization-of-Gender-Differences.pdf

England, P., Allison, P. & Wu, X. (2007), 'Does bad pay cause occupations to feminize, does feminization reduce pay, and how can we tell with longitudinal data?,' *Social Science Research*, Vol. 36(3), pp. 1237–1256.

England, P. (2010), 'The Gender Revolution: Uneven and Stalled,' *Gender & Society*, Vol. 24(2), pp. 149–166.

Eurofound (2012), *Trends in job quality in Europe : A report based on the fifth European Working Conditions Survey*, Publications Office of the European Union, Luxembourg, available at : https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef1228en_0.pdf

Eurofound (2013), *Women, men and working conditions in Europe : A report based on the fifth European Working Conditions Survey*, Publications Office of the European Union, Luxembourg, available at : http://eurogender.eige.europa.eu/sites/default/files/EF1349EN.pdf

Eurofound (2016), *Sixth European working conditions survey: overview report*, Publications Office of the European Union, Luxembourg.

European Commission, *Strategic framework – Education & Training 2020*, accessed 22 June 2017, available at: http://ec.europa.eu/education/policy/strategic-framework/index_en.htm

European Commission (2011), *Tackling the gender pay gap in the European Union*, Publications Office of the European Union, Luxembourg, available at: http://ec.europa.eu/justice/gender-equality/gender-pay-gap/files/gpg2011-leaflet_en.pdf

European Commission (2012), *Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation*, Publications Office of the European Union, Luxembourg, available at: https://ec.europa.eu/research/science-society/document_library/pdf_06/structural-changes-final-report_en.pdf

European Commission (2013), *Tackling the gender pay gap in the European Union, Publications Office of the European Union*, Luxembourg, available at : https://www.wgea.gov.au/sites/default/files/tackling_gender_pay_gap_european_union.pdf

European Commission (2014), Communication from the Commission to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank, 'An Investment Plan for Europe', COM(2014) 903 final, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0903&from=EN

European Commission (2015a), *Acquiring e-Leadership Skills: Fostering the Digital Transformation of Europe*, Publications Office of the European Union, Luxembourg, available at: http://eskills-guide.eu/fileadmin/guide/documents/eleadership_brochure_for_download.pdf

European Commission (2015b), *Does the EU need more STEM graduates? Final report*, Publications Office of the European Union, Luxembourg, available at: https://publications.europa.eu/en/publication-detail/-/publication/60500ed6-cbd5-11e5-a4b5-01aa75ed71a1

European Commission (2015c), *Press release: A new, more inclusive vision of education and training up to 2020*, accessed 23 June 2017, available at: http://europa.eu/rapid/press-release_IP-15-5568_en.htm

European Commission (2015d), *Science Education for Responsible Citizenship*, Publications Office of the European Union, Luxembourg, available at: http://ec.europa.eu/research/swafs/pdf/pub_science_education/KI-NA-26-893-EN-N.pdf

European Commission (2016a), *Employment and Social Developments in Europe 2016*, Publications Office of the European Union, Luxembourg, available at: https://www.portugal2020.pt/Portal2020/Media/Default/Docs/NOTICIAS2020/Relatorio_ESDE2016.pdf

European Commission (2016b), *Rights, Equality and Citizenship Programme 2014-2020*, accessed 20 June 2017, available at: http://ec.europa.eu/justice/grants1/programmes-2014-2020/rec/index_en.htm

European Commission (2017a), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'On a renewed EU agenda for higher education', COM(2017) 247 final, available at: https://ec.europa.eu/education/sites/education/files/he-com-2017-247_en.pdf

European Commission (2017b), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on 'School development and excellent teaching for a great start in life', COM(2017) 248 final, available at: https://ec.europa.eu/education/sites/education/files/school-com-2017-248_en.pdf

European Commission (2017c), *Proposal for a Interinstitutional Proclamation on the European Pillar of Social Rights*, COM(2017) 251 final, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0251&from=EN

European Institute for Gender Equality (EIGE), *Gender Equality Glossary and Thesaurus*, accessed 20 June 2017, available at: http://eige.europa.eu/rdc/thesaurus

European Institute for Gender Equality (EIGE) (2012), *Gender equality and climate change: the review of the implementation of the Beijing Platform for Action in the EU*, Publications Office of the European Union, Luxembourg, available at: http://eige.europa.eu/sites/default/files/documents/mh3212425enc_002.pdf

European Institute for Gender Equality (EIGE) (2014), *Gender equality and economic independence: Part-time work and self-employment. Review of the Implementation of the Beijing Platform for Action in the EU Member States*, Publications Office of the European Union, Luxembourg, available at: http://eige.europa.eu/sites/default/files/documents/MH0414228ENC.pdf

European Institute for Gender Equality (EIGE) (2016a), *Gender and digital agenda*, Publications Office of the European Union, Luxembourg, available at: http://eige.europa.eu/sites/default/files/documents/ti_pubpdf_mh0216896enn_pdfweb_20170124121443.pdf

European Institute for Gender Equality (EIGE) (2016b), *Poverty, gender and intersecting inequalities in the EU: Report*, Publications Office of the European Union, Luxembourg, available at: http://eige.europa.eu/sites/default/files/documents/ti_pubpdf_mh0416244enn_pdfweb_20161208181320.pdf

European Institute for Gender Equality (EIGE) (2017a), *Economic Benefits of Gender Equality in the EU: EU and EU Member States overviews*, Publications Office of the European Union, Luxembourg, available at: http://eige.europa.eu/sites/default/files/documents/ti_pubpdf_mh0116183enn_pdfweb_20170518162039.pdf

European Institute for Gender Equality (EIGE) (2017b), *Gender, skills and precarious work in the EU: Research note*, Publications Office of the European Union, Luxembourg, available at: http://eige.europa.eu/sites/default/files/documents/ti_pubpdf_mh0217250enn_pdfweb_20170503163908.pdf

European Parliament (2009), *Indicators of Job Quality in the European Union – IP/A/EMPL/ST/2008-09*, available at: http://www.europarl.europa.eu/document/activities/cont/201107/20110718ATT24284/20110718ATT24284EN.pdf

European Parliament (2015a), *Encouraging STEM Studies for the Labour Market – IP/A/EMPL/2014-13*, available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2015/542199/IPOL_STU(2015)542199_EN.pdf

European Parliament (2015b), Resolution with recommendations to the Commission on women's careers in science and universities, and glass ceilings encountered (2014/2251(INI)), available at: http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P8-TA-2015-0311

European Parliament (2016), *Report on women domestic workers and carers in the EU (2015/2094(INI))*, available at : http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2016-0053+0+DOC+PDF+V0//EN

EU Skills Panorama, *Homepage*, accessed 26 June 2017, available at: http://skillspanorama.cedefop.europa.eu/en

EU Skills Panorama (2014), *Health sector Analytical Highlight*, prepared by ICF GHK and Cedefop for the European Commission, accessed 21 June 2017, available at: http://skillspanorama.cedefop.europa.eu/sites/default/files/EUSP_AH_Health_0.pdf

EU Skills Panorama (2016), *Teaching professionals Analytical Highlight: skills opportunities and challenges*, prepared by Cedefop for the European Commission, accessed 14 April 2017, available at: http://skillspanorama.cedefop.europa.eu/en/analytical_highligths/prospects-teaching-professionals-0

European Union (2009), Lisbon Treaty.

Evans, J.M. (2002), 'Work/Family Reconciliation, Gender Wage Equity and Occupational Segregation : The Role of Firms and Public Policy,' *Canadian Public Policy/Analyse de Politiques*, Vol. 27 (Supplement/Numéro Spécial 1), pp.S187-S216, available at : http://www.jstor.org/stable/3552351

Foubert, P. (2010), *The gender pay gap in Europe from a legal perspective*, European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities, Publications Office of the European Union, Luxembourg, available at : http://ec.europa.eu/justice/gender-equality/files/gender_pay_gap/genderpaygapfromlegalperspective-nov2010_en.pdf

Gabay-Egozi, L., Shavit, Y., & Yaish, M. (2015), 'Gender Differences in Fields of Study: The Role of Significant Others and Rational Choice Motivations,' *European Sociological Review*, Vol. 31(3), pp. 1–14.

Glynn, S. M., Taasoobshirazi, G., & Brickman, P. (2007), 'Nonscience majors learning science: A theoretical model of motivation,' *Journal of Research in Science Teaching*, Vol. 44(8), pp. 1088–1107.

Guinea-Martin, D., & Solera, C. (2013), 'Do women in female-dominated occupations exit the labour market more? Evidence from Italy, Spain, Denmark and the UK,' *Population Review*, Vol. 52(1), pp. 172–191, available at: https://doi.org/10.1353/prv.2013.0002

Henriksen, E. K., Dillon, J., & Ryder, J. (eds) (2014), *Understanding Student Participation and Choice in Science and Technology Education (2015 edition)*, Springer Netherlands, Dordrecht.

Hillmert, S. (2015), 'Gender Segregation in Occupational Expectations and in the Labour Market: International Variation and the Role of Education and Training Systems,' *Comparative Social Research*, Vol. 31, pp. 123–148.

Hussein, S., & Christensen, K. (2017), 'Migration, gender and low-paid work: on migrant men's entry dynamics into the feminised social care work in the UK,' *Journal of Ethnic and Migration Studies*, Vol. 43(5), pp. 749-765, available at: http://dx.doi.org/10.1080/1369183X.2016.1202751

Imdorf, C., Hegna, K., Eberhard, V., & Doray, P. (2015), 'Educational Systems and Gender Segregation in Education: A Three-Country Comparison of Germany, Norway and Canada,' *Gender Segregation in Vocational Education*, Vol. 31, pp. 83–122.

International Labor Organization (ILO), *ISCO-08 Structure, index correspondence with ISCO-88*, accessed 26 June 2017, available at: http://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm

Jarman, J., Blackburn, R. M., & Racko, G. (2012), 'The Dimensions of Occupational Gender Segregation in Industrial Countries,' *Sociology*, Vol. 46(6), pp. 1003 –1019.

Jensen, Fredrik, and Henriksen, E.K. (2015), 'Short Stories of Educational Choice: In the Words of Science and Technology Students,' in Henriksen, E.K., Dillon, J., and Ryder, J. (eds), *Understanding Student Participation and Choice in Science and Technology Education*, Springer Netherlands, Dordrecht, pp. 135–151.

Kanny, M.A., Sax, L.J., & Riggers-Pieh, T.A. (2014), 'Investigating forty years of STEM research: How explanations for the gender gap have evolved over time,' *Journal of Women and Minorities in Science and Engineering*, Vol. 20(2), pp. 127–148.

Kreimer, M. (2004), 'Labour Market Segregation and the Gender-Based Division of Labour,' *European Journal of Women's Studies*, Vol. 11(2), pp. 223–246.

Legewie, J., & DiPrete, T.A. (2014), 'The High School Environment and the Gender Gap in Science and Engineering,' *Sociology of Education*, Vol. 87(4), pp. 259–280.

Lewis, J. (2009), *Work-Family Balance, Gender and Policy*, Edward Elgar Publishing Limited, Cheltenham.

Madichie, N.O. (2013), 'Sex in the kitchen: Changing gender roles in a female-dominated occupation,' *International Journal of Entrepreneurship and Small Business*, Vol. 18(1), pp. 90–102, available at: https://doi.org/10.1504/IJESB.2013.050754

Martell, R.F., Lane, D.M., & Emrich, C. (1996), 'Male-female differences: A computer simulation,' *American Psychologist*, Vol. 51(2), pp. 157-158, available at: http://dx.doi.org/10.1037/0003-066X.51.2.157

Montt, G. (2015), *The causes and consequences of field-of-study mismatch: An analysis using PIAAC*, OECD Social, Employment and Migration Working Papers, No. 167, OECD Publishing, Paris.

Morgan McKinley (2016), *Gender Pay Gap Ireland 2016*, available at: https://www.morganmckinley.ie/sites/morganmckinley.ie/files/gender_pay_gap_in_ireland_2016.pdf

Morgan, S.L., Gelbgiser, D., & Weeden, K.A. (2013), 'Feeding the pipeline: Gender, occupational plans, and college major selection,' *Social Science Research*, Vol. 42(4), pp. 989–1005, available at: https://doi.org/10.1016/j.ssresearch.2013.03.008

OECD (2012), *Closing the Gender Gap: Act Now*, accessed 21 June 2017, available at: http://www.oecd.org/gender/closingthegap.htm

OECD (2014), *Greener Skills and Jobs*, accessed 21 June 2017, available at: http://www.oecd-ilibrary.org/industry-and-services/greener-skills-and-jobs_9789264208704-en

OECD (2016), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, PISA, OECD Publishing, Paris, available at: http://dx.doi.org/10.1787/9789264266490-en

O'Reilly, J., Smith, M., Deakin, S., & Burchell, B. (2015), 'Equal Pay as a Moving Target: International perspectives on forty-years of addressing the gender pay gap', *Cambridge Journal of Economics*, Vol. 39(2), pp. 299-317, available at: https://doi.org/10.1093/cje/bev010

Peruzzi, M. (2015), 'Contradictions and Misalignments in the EU Approach towards the Gender Pay Gap', *Cambridge Journal of Economics*, Vol. 39(2), pp. 441–466.

Reid, L. (1998), 'Devaluing women and minorities. The effect of race/ethnic and sex composition of occupations on wage level,' *Work and Occupations*, Vol. 25(4), pp. 511–536.

Reimer, D., & Steinmetz, S. (2009), 'Highly educated but in the wrong field?,' *European Societies*, Vol. 11(5), pp. 723–746.

Reskin, B. F., & Bielby, D. D. (2005), 'A Sociological Perspective on Gender and Career Outcomes,' *Journal of Economic Perspectives*, Vol. 19(1), pp. 71–86.

Rolfe, H. (2005), *Men in childcare*, National Institute of Economic and Social Research EOC Working Paper Series, available at: http://www.koordination-maennerinkitas.de/uploads/media/Rolfe-Heather.pdf

Schlenker, E. (2015), 'The labour supply of women in STEM,' *IZA Journal of European Labor Studies*, Vol. 4(1).

Schuster, C., & Martiny, S.E. (2017), 'Not Feeling Good in STEM : Effects of Stereotype Activation and Anticipated Affect on Women's Career Aspirations,' *Sex Roles*, Vol. 76(1-2), pp.40-55, available at : https://link.springer.com/article/10.1007/s11199-016-0665-3

Solomon, Y., Radovic, D., & Black, L. (2016), 'I can actually be very feminine here': contradiction and hybridity in becoming a female mathematician,' *Educational Studies in Mathematics*, Vol. 91(1), pp. 55–71.

Smith, M. (2010), *Analysis Note: The Gender Pay Gap in the EU – What policy responses?*, European Network of Experts on Employment and Gender Equality issues (EGGE), available at: http://www.eif.gov.cy/mlsi/dl/genderequality.nsf/All/F592B6E5C824A8A6C22579A700296E29/$file/the_gender_pay_gap_in_the_eu_egge_2010.pdf

Smyth, E. (2005), 'Gender differentiation and early labour market integration across Europe,' *European Societies*, Vol. 7(3), pp. 451–479.

Smyth, E., & Steinmetz, S. (2015), 'Vocational training and gender segregation across Europe,' *Comparative Social Research*, Vol. 31, pp. 53–81.

Sparreboom, T. (2014), 'Gender equality, part-time work and segregation in Europe', *International Labour Review*, Vol. 153(2), pp. 245–268.

Steinmetz, S. (2012), *The Contextual Challenges of Occupational Sex Segregation. Deciphering Cross-National Differences in Europe*, VS Verlag für Sozialwissenschaften | Springer Fachmedien Wiesbaden GmbH, Wiesbaden.

Sunny, C. E., Taasoobshirazi, G., Clark, L., & Marchand, G. (2017), 'Stereotype threat and gender differences in chemistry,' *Instructional Science*, Vol. 45(2), pp. 157-175.

The Royal Society of Edinburgh (2012), *Tapping all our Talents: Women in science, technology, engineering and mathematics: a strategy for Scotland*, Edinburgh, accessed 21 June 2017, available at: http://www.rse.org.uk/cms/files/advice-papers/inquiry/women_in_stem/tapping_talents.pdf

Tinklin, T., Croxford, L., Ducklin, A., & Frame, B. (2005), 'Gender and attitudes to work and family roles : the views of young people at the millenium,' *Gender and Education*, Vol. 17(2), pp.129-142, available at : http://www.ces.ed.ac.uk/PDF%20Files/TT_0214.pdf

Thyssen, Marianne (2017), "New Skills Agenda for Europe – an Agenda for a Changing World," Speech delivered at the European Commission conference on Changing Skills for a Changing World, Torino. Accessed 21 June 2017, available at: https://ec.europa.eu/commission/commissioners/2014-2019/thyssen/announcements/speech-new-skills-agenda-europe-agenda-changing-world-torino-2017-conference-changing-skills_en

Tomaskovic-Devey, D. (2002), 'Sex Segregation, Labor Process Organization, and Gender Earnings Inequality,' *American Journal of Sociology*, Vol. 108, pp.102-128.

Ulriksen, L., Madsen, L. M., & Holmegaard, H. T. (2015), 'Why do students in STEM higher education programmes drop/opt out?,' in Henriksen, E.K., Dillon, J., and Ryder, J. (eds), *Understanding Student Participation and Choice in Science and Technology Education*, Springer Netherlands, Dordrecht, pp. 203–218.

United Nations (1995), *Beijing Declaration and Platform for Action*, adopted by the Fourth World Conference on Women, 27 October 1995, United Nations, accessed 20 June 2017, available at: http://www.un.org/womenwatch/daw/beijing/pdf/BDPfA%20E.pdf

van der Vleuten, M., Jaspers, E., Maas, I., & van der Lippe, T. (2016), 'Boys' and girls' educational choices in secondary education. The role of gender ideology,' *Educational Studies*, Vol. 42(2), pp. 181–200.

Warming, K. (2013), 'Men Who Stop Caring: The Exit of Men from Caring Occupations', *Nordic Journal of Working Life Studies* Vol. 3(4), pp. 4-19, available at: http://rossy.ruc.dk/ojs/index.php/njwls/article/view/3070/1333

Watt, H. M. G., & Richardson, P. W. (2008), 'Motivations, Perceptions, and Aspirations Concerning Teaching as a Career for Different Types of Beginning Teachers,' *Learning and Instruction*, Vol. 5(18), pp. 408–428.

Yazilitas, D., Saharso, S., de Vries, G. C., & Svensson, J. S. (2016), 'The postmodern perfectionist, the pragmatic hedonist and the materialist maximalist: understanding high school students' profile choices towards or away from mathematics, science and technology (MST) fields in the Netherlands,' *Gender and Education*, pp. 1–19.

Annexes

Annex 1

STEM and EHW study and employment fields

Different study fields, occupations or employment fields are being used under the common umbrella term 'STEM' (European Commission, 2015b). To increase comparability of the results presented in this report, classification of fields of study and work as in relation to STEM and EHW fields is presented herein.

ISCED classification of fields of education used in analysis

In line with the focus of the report, STEM and EHW fields of education cover both tertiary and vocational education levels.

Reference in the analysis	ISCED 1997/ISCED 2011	ISCED-F 2013
STEM	4 Science, mathematics and computing 5 Engineering, manufacturing and construction	05 Natural sciences, mathematics and statistics 06 Information and Communication Technologies 07 Engineering, manufacturing and construction
EHW	14 Teacher training and education science 7 Health and welfare	01 Education 09 Health and Welfare

STEM and EHW: occupations and fields of employment

In line with the STEM and EHW study fields and levels, as defined in the report, corresponding links to employment sectors and occupations are made.

EU-LFS data: two-digit ISCO classifications ISCO-88 (2004-2010) and ISCO-08 (2011-2014):

Reference in the analysis	ISCO-88	ISCO-08
STEM	21 Physical, mathematical and engineering science professionals 31 Physical and engineering science associate professionals 71 Extraction and building trades workers 72 Metal, machinery and related trades workers 81 Stationary-plant and related operators	21 Science and Engineering Professionals 25 Information and Communications Technology Professionals 31 Science and Engineering Associate Professionals 35 Information and Communications Technicians 71 Building and Related Trades Workers (excluding Electricians) 72 Metal, Machinery and Related Trades Workers 74 Electrical and Electronic Trades Workers 81 Stationary Plant and Machine Operators
EHW	22 Life science and health professionals 23 Teaching professionals 32 Life science and health associate professionals 33 Teaching associate professionals	22 Health Professionals 23 Teaching Professionals 32 Health Associate Professionals 53 Personal Care Workers

EHW and STEM related occupations refer to the skills required in relation to respective educational background at both upper secondary vocation education level and tertiary education levels. The brief overview of the tasks performed by workers of STEM related occupations (ISCO-08) is listed below (see EU Skills Panorama; ILO website):

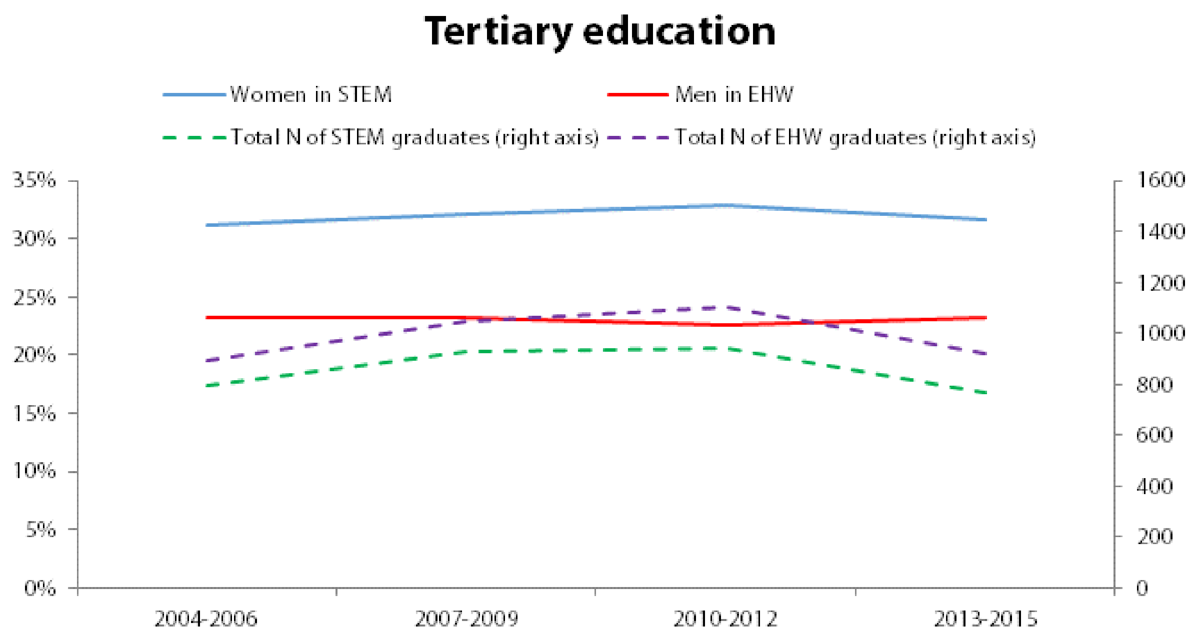
- **Science and Engineering Professionals:** conduct research; improve or develop concepts, theories and operational methods; or apply scientific knowledge relating to fields such as physics, astronomy, meteorology, chemistry, geophysics, geology, biology, ecology, pharmacology, medicine, mathematics, statistics, architecture, engineering, design and technology.
- **Information and Communications Technology Professionals:** conduct research; plan, design, write, test, provide advice and improve information technology systems, hardware, software and related concepts for specific applications; develop associated documentation including principles, policies and procedures; and design, develop, control, maintain and support databases and other information systems to ensure optimal performance and data integrity and security.
- **Science and engineering associate professionals** perform technical tasks connected with research and operational methods in science and engineering. They supervise and control technical and operational aspects of mining, manufacturing, construction and other engineering operations, and operate technical equipment including aircraft and ships.
- **Information and communications technicians** provide support for the day-to-day running of computer systems, communications systems and networks, and perform technical tasks related to telecommunications, broadcast image and sound as well as other types of telecommunications signals on land, sea or in aircraft.
- **Building and related trades workers** construct, maintain and repair buildings; erect and repair foundations, walls and structures of brick, stone and similar materials; shape and finish stone for building and other purposes.
- **Metal, machinery and related trades workers** cast, weld, forge and, by other methods, form metal; erect, maintain and repair heavy metal structures; engage in machine-tool setting as well as in fitting, maintaining and repairing machinery including engines and vehicles; or they produce tools and various non-precious metal articles.
- **Electrical and electronics trades workers** install, fit and maintain electrical wiring systems and machinery and other electrical apparatus, electrical transmission and supply lines and cables, and electronic and telecommunications equipment and systems.
- **Stationary plant and machine operators** operate and monitor, on the spot or by remote control, industrial plant for mining or for the processing of metal, minerals, glass, ceramics, wood, paper, chemicals, or water-treating, electrical-power-generating and other purposes, as well as automated and semi-automated assembling processes and industrial robots. The work mainly calls for experience with and an understanding of the industrial plant, machinery or equipment being operated and monitored. Ability to cope with machine-paced operations and to adapt to innovations in machinery and equipment are often required.
- **Health professionals** conduct research, improve or develop concepts, theories and operational methods; and apply scientific knowledge relating to medicine, nursing, dentistry, veterinary medicine, pharmacy, and promotion of health.
- **Teaching professionals** teach the theory and practice of one or more disciplines at different educational levels; conduct research; improve or develop concepts, theories and operational methods pertaining to their particular discipline; and prepare scholarly papers and books.
- **Health associate professionals** perform technical and practical tasks to support diagnosis and treatment of illness, disease, injuries and impairments in humans and animals, and to support implementation of health care, treatment and referral plans usually established by medical, veterinary, nursing and other health professionals.
- **Personal care workers** provide care, supervision and assistance for children, patients and elderly, convalescent or disabled persons in institutional and residential settings.

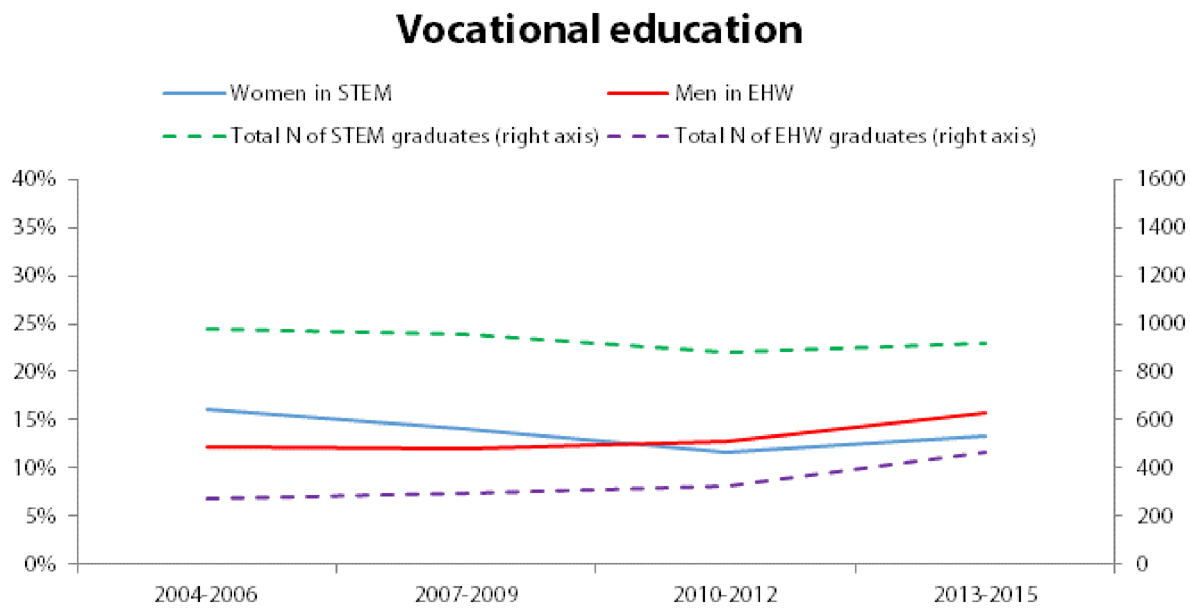
European Skills and Job Survey (ESJS) data and European Working Conditions Survey (EWCS) data:

Reference in the analysis	Sector of employment, ESJS	Sector of employment, EWCS
STEM	Supply of gas or electricity, mining or quarrying Manufacturing or engineering Construction or building Information technology or communication services	Mining and quarrying Manufacturing Electricity, gas, steam and air conditioning supply Construction Information and communication
EHW	Services relating to education or health Social and personal services	Education Human health and social work activities
Gender-neutral	Retail, sales, shop work or whole sale Accommodation, catering or food services Transportation or storage Financial, insurance or real estate services Professional, scientific or technical services	Wholesale and retail trade; repair of motor vehicles and motorcycles Transportation and storage Accommodation and food service activities Financial and insurance activities Real estate activities Professional, scientific and technical activities Administrative and support service activities

Annex II

EU trends in the total number of students and share of women and men in STEM and EHW study fields respectively – by education level (2004–2015)





Note: data are affected by limitations, as reported in Fig. 1 and Fig. 3.
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02, educ_grad5].

Annex III

Results of multi-level logistic regression modelling on working in STEM occupations (presenting odds ratios)

	Dependent variable: women working in STEM						Dependent variable: men working in STEM					
Independent variables	**Model 0**	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Model 11**
Age group (ref. 15–29)												
30–44		1,12***	1,1**					0,96**	0,95***			
45–59		0,62***	0,62***					0,85***	0,80***			
60–64		0,25***	0,28***					0,72**	0,71**			
Married (ref. not married)		0,96	1					1,03	1,06**			
Children in household (ref. no children)		0,77***	0,77***					1	0,99			
Level of education (ref. tertiary)												
Vocational		0,56***	0,52***					0,81***	0,79***			
Up to non-vocational upper secondary		0,97	0,96					1,77***	1,83***			
Graduate of STEM field (ref. all other fields)		13,56***	14,23***					10,08***	10,29***			
Country-level variables:												
Size of the STEM sector				1,07***						1,04**		
Global Innovation Index					1,00						1,02***	
Share of women in tertiary education						0,98***						1
Explained country variance	0,02		0,07	0,03	0,07	0,04	0,06		0,05	0,04	0,03	0,05
Intraclass correlation	0,01		0,02	0,01	0,02	0,01	0,01		0,01	0,01	0,01	0,02
N	508 702	147 170	147 170	147 170	147 170	147 170	568 431	149 836	149 836	149 836	149 836	149 836
Number of countries	27	24	24	24	24	24	27	24	24	24	24	24

p< 0.05*; p<0.01**; p<0.001***
Source: EU-LFS, calculations based on 2014 microdata.

Results of multi-level logistic regression modelling on working in EHW occupations (presenting odds ratios)

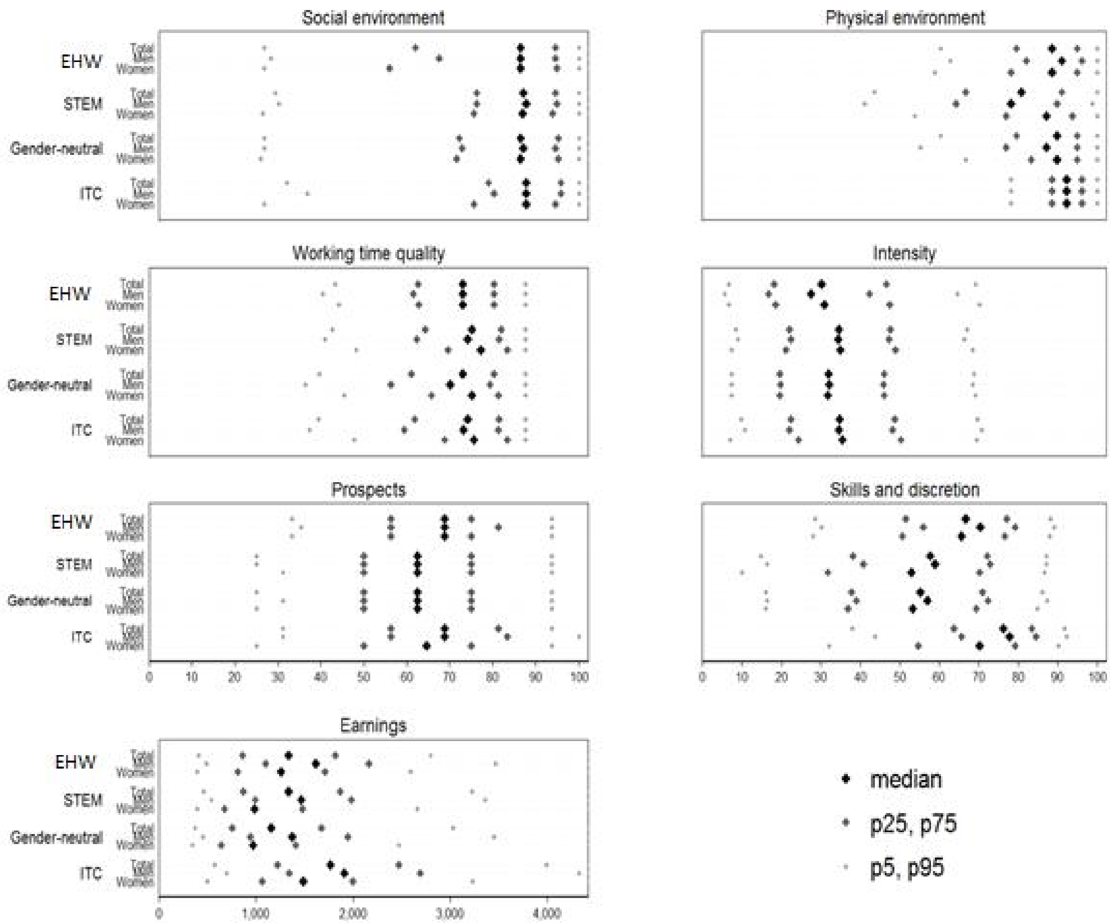
	Dependent variable: men working in HE				Dependent variable: women working in HE			
Independent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Age (ref. 15–29)								
30–44		1,33***	1,21***			1,27***	1,21***	
45–59		1,91***	1,72***			1,15***	1,25***	
60–64		2,95***	2,99***			0,92	1,13	
Married (ref. not married)		0,94	1,02			1,16***	1,16***	
Children in household (ref. no children)		0,88***	0,91**			0,91***	0,99	
Level of education (ref. tertiary)								
Vocational		0,24***	0,23***			0,32***	0,28***	
Up to non-vocational upper secondary		0,49***	0,51***			0,63***	0,60***	
Graduate of HE field (ref. all other fields)		31,39***	32,62***			16,83***	18,05***	
Country-level variables:								
Gender Equality Attitudes Index				1,02**				1,01
Explained country variance	0,02		0,18	0,13	0,03		0,09	0,09
Intraclass correlation	0,01		0,05	0,04	0,01		0,03	0,03
N	568 431	149 836	149 836	149 836	508 702	147 170	147 170	147 170
Number of countries	27		24	24	27		24	24

p< 0.05*; p<0.01**; p<0.001***

Source: EU-LFS, calculations based on 2014 microdata.

Annex IV

Job quality indices by sector and gender



Source: calculations based on Eurofound European Working Conditions Survey 2015

Annex V

Proposed list of BPfA indicators

Area B: Education and Training of Women

In 2007, under the German Presidency of the EU, the Council agreed on three EU-wide indicators, including two sub-indicators, to measure the progress in the EU on the implementation of the BPfA objectives in Area B: Education and Training of Women:

- B1. Proportion of female graduates and male graduates of all graduates in mathematics, the sciences and technical disciplines (tertiary education),
- B2. Employment rate of women and men (aged between 25 and 39 years; and aged between 40 and 64) by highest level of education attained,
- B3a. Proportion of female/male ISCED 5A graduates of all ISCED 5A graduates and proportion of female/male PhD graduates of all PhD graduates by broad field of study and total,
- B3b. Proportion of female and male academic staff differentiated by level of seniority and in total.

The proposal is to replace indicators B1, B3a and L3 (Area L: The Girl Child) with a new indicator:

- **Proportion of women and men graduates in tertiary (ISCED Levels 5–8) and vocational (ISCED Levels 3–4) education and training in the fields of science, technology, engineering and mathematics (STEM) and in the field of education, health and welfare (EHW) – of all graduates in the study field.**

Description of a new indicator

The indicator addresses gender segregation in fields of studies that are considered as key areas for the EU's smart, sustainable and inclusive growth. The Council Conclusions on 'Enhancing the skills of women and men in the EU labour market' call for actions to 'combat gender discrimination, segregation and stereotypes in education, training, vocational training and career guidance; promote gender equality in schools, colleges and universities; encourage girls, boys, women and men from all backgrounds to choose educational fields and occupations in accordance with their abilities and skills, not based on gender stereotypes, and in particular by promoting women's and girls' access to educational fields and occupations inter alia in science, technology, engineering and mathematics (STEM); encourage men and boys to study and work in fields such as social services, child care and long-term care' (Council of the European Union, 2017).

The indicator enables the monitoring of progress regarding the gender balance of graduates from STEM and EHW study fields, including natural sciences, mathematics and statistics; information and communication technologies; engineering, manufacturing and construction; education; and health and welfare. Furthermore, the indicator makes it possible to take a closer look at the gender distribution of graduates across vocational education (ISCED 35–45) and tertiary education levels.

Table 1. Share of women within STEM and share of men within EHW study fields and by educational level – of all graduates in the field, EU average and Member States (2013–2015)

	STEM					EHW			
	Natural sciences, mathema-tics & statistics	ICT	Engineering, manufac-turing & construction	Tertiary (ISCED 5-8)	Voca-tional (ISCED 35-45)	Health and welfare	Edu-cation	Tertiary (ISCED 5-8)	Voca-tional (ISCED 35-45)
AT	50%	13%	16%	26%	12%	24%	18%	22%	20%
BE	41%	6%	13%	26%	8%	21%	21%	23%	17%
BG	67%	41%	27%	38%	26%	33%	22%	27%	13%
CY	78%	34%	17%	39%	5%	34%	15%	21%	n.a.
CZ	59%	12%	18%	34%	11%	15%	15%	17%	8%
DE	48%	14%	14%	27%	10%	21%	19%	24%	19%
DK	50%	21%	22%	35%	10%	19%	31%	25%	14%
EE	79%	25%	29%	40%	36%	11%	7%	9%	12%
EL	53%	31%	19%	38%	12%	24%	17%	23%	19%
ES	53%	18%	22%	30%	14%	26%	22%	24%	26%
FI	56%	15%	19%	28%	17%	15%	20%	16%	16%
FR	47%	17%	16%	31%	11%	18%	24%	26%	9%
HR	64%	21%	18%	32%	16%	21%	5%	15%	22%
HU	52%	14%	16%	31%	9%	19%	17%	20%	14%
IE	51%	20%	15%	26%	20%	24%	27%	25%	16%
IT	56%	17%	22%	41%	17%	34%	7%	31%	26%
LT	59%	17%	18%	30%	9%	17%	19%	18%	17%
LU	48%	8%	12%	27%	11%	21%	32%	31%	24%
LV	61%	18%	19%	33%	10%	12%	8%	11%	6%
MT	53%	16%	16%	29%	16%	20%	24%	27%	9%
NL	43%	8%	12%	26%	7%	17%	20%	24%	12%
PL	71%	14%	25%	43%	11%	23%	15%	20%	15%
PT	62%	15%	27%	40%	17%	19%	19%	21%	14%
RO	65%	34%	34%	41%	33%	22%	6%	25%	15%
SE	52%	27%	20%	33%	11%	19%	20%	19%	23%
SI	61%	9%	16%	32%	9%	24%	12%	16%	21%
SK	64%	12%	18%	36%	10%	20%	19%	21%	13%
UK	53%	19%	23%	38%	n.a.	24%	24%	24%	n.a.
EU-28	**54%**	**17%**	**19%**	**33%**	**13%**	**21%**	**19%**	**23%**	**16%**

Note: On the basis of the currently applied ISCED-F 2013 classification. Data refer to tertiary education (ISCED 5–8) and VET (ISCED 35 & 45). STEM include F05 - Natural sciences, mathematics and statistics, F06 - Information and Communication Technologies, and F07 - Engineering, manufacturing and construction. EHW include F01 – Education and F09 - Health and welfare. Here and further on in regarding 2013-2015 data on education [educ_uoe_grad02], the following data limitations apply : **BE:** ISCED 35 2015 n.a. (2013/2014 average used); **BG, EE, LT, RO, SK, FI**: ISCED 5 n.a.; **CZ, SI:** ISCED 5 n.a.; **IE**: ISCED 35 & 45 n.a.; **EL**: 2015 n.a. (2013/2014 average used), ISCED 45 n.a.; **ES**: for ISCED 8: F05, F06 for 2013 and 2014 n.a. (2015 used), ISCED 45 for 2013 and 2014 n.a.; **FR**: for ISCED 5, 6, 7: F05 and F07, 2013 and 2014 n.a. (2015 used); **HR**: ISCED 35: 2013 and 2014 n.a. (2015 used), ISCED 45 n.a.; **IT**: only 2015 (ISCED E45 n.a.); **DK, LV, HU, AT**: F09 for 2013 and 2014 n.a. (2015 used); **NL**: for ISCED 8: F07 n.a. for 2014 and 2015 (2013 used), for ISCED 8: F01 and F09 n.a. for 2015 (2013/2014 average used), for ISCED 8 F05/F06 n.a ; **PL**: for ISCED 5 F05, F06, F07 n.a., for ISCED 8: 2013 n.a. (2013/2014 average used), F05/F07 for 2014 n.a. (2015 used); **PT**: F09 2013 and 2014 n.a. (2015 used), ISCED 5 n.a.; **UK**: Only 2015 (ISCED 35 & 45 n.a.).
Source: EIGE's calculation, Eurostat, UOE data collection on education [educ_uoe_grad02].

Concept: The share of women graduates of all graduates in STEM fields of education indicates the gender composition of a persistently men-dominated study field. The share of men graduates of all graduates in EHW fields of education indicates the gender composition of a persistently women-dominated educational field. The definition of study fields relies on the ISCED classification of education and training (ISCED-F 2013), thus enabling comparison of EU countries based on harmonised definitions. The suggestion is to monitor two educational levels: vocational education, including upper secondary (ISCED 35) and post-secondary non-tertiary vocational education programmes (ISCED 45), and tertiary education across ISCED Levels 5–8.

Though data cover all EU Member States annually, data gaps across countries and years exist. Due to data availability and reliability limits (i.e. small sample size) across Member States, data are presented as three-year averages. This helps to compensate for the data gaps in some years and to smooth variations due to a low number of graduates in selected fields and countries, where even small changes in terms of absolute numbers can indicate a large change in relative terms.

Data source: The calculation of the indicator is based on Unesco–OECD– Eurostat (UOE) data collection on education: http://ec.europa.eu/eurostat/statistics-explained/index.php/UNESCO_OECD_Eurostat_(UOE)_joint_data_collection_%E2%80%93_methodology

Published: Data are available in the Eurostat online database (educ_uoe_grad02: 'Graduates by education level, programme orientation, sex and field of education' for data since 2013 and educ_grad5: 'Graduations in ISCED 3 to 6 by field of education and sex' for data up to 2012). Data are published as total number of graduates. Thus, further calculations are necessary in order to calculate the total number of graduates in educational fields constituting STEM and EHW, as well as to establish three-year average indicators.

Notes: It is important to keep in mind that the study programmes constituting STEM can be different across countries. For instance, in the case of vocational education in the UK, only graduates of ICT programmes are included. It is also important to note that changes in ISCED classifications since 2013 can have an impact on data comparability to the period up to 2012 for some countries.

Area L: The Girl Child

In 2008, under the Slovenian Presidency of the EU, the Council agreed on three indicators to measure the progress in the EU on the implementation of the BPfA objectives in Area L: The Girl Child:

- L1. Sex and relationship education: parameters of sexuality related education in schooling (primary and secondary),
- L2. Body self-image: dissatisfaction of girls and boys with their bodies,
- L3. Educational accomplishments: comparison of 15-year-old students' performance in mathematics and science and the proportion of girl students in tertiary education in the field of science, mathematics and computing and in the field of teacher training and education science.

The indicator L3 duplicates the new indicator proposed under Area B: Education and Training of Women (see above); it is therefore redundant and shall be removed. A new indicator on the career aspirations of 15-year-old students is proposed:

- **Proportion of all and top performing girls and boys in science aged 15 expecting to work in science-related occupations at age 30.**

Description of a new indicator

In order to increase students' interest in technology and science, both ability and aspirations must be addressed. As highlighted by the EU report *Science Education for Responsible Citizenship*: 'Over the last decades, there has been an increase in the numbers of students leaving formal education with science qualifications. But, there has not been a parallel rise in the numbers interested in pursuing science related careers nor have we witnessed enhanced science-based innovation or any increase in entrepreneurship <...> We must find better ways to nurture the curiosity and cognitive resources of children. We need to enhance the educational process to better equip future researchers and other actors with the necessary knowledge, motivation and sense of societal responsibility to participate actively in the innovation process' (European Commission, 2015d).

The indicator enables the monitoring of students' preferences at age 15 as an early indication of subsequent educational and occupational segregation. Knowing students' expectations at this age can enable early intervention in ensuring adequate career advice that could address gender stereotypes and enable students to best make use of their own abilities and pursue their own interests. This information can also inform policy discussions on reasons for unmet expectations and related policy decisions.

Table 2. Share of girls (of all girls) and share of boys (of all boys) at the age of 15 expecting to work in science-related occupations in the EU Member States at the age of 30

	Total		Top performers in science	
	Boys	Girls	Boys	Girls
AT	27%	18%	39%	29%
BE	25%	24%	49%	41%
BG	29%	26%	53%	44%
CY	29%	31%	58%	49%
CZ	19%	15%	35%	35%
DE	17%	13%	38%	24%
DK	12%	18%	21%	31%
EE	29%	20%	41%	35%
EL	26%	25%	55%	63%
ES	30%	28%	62%	46%
FI	15%	19%	32%	32%
FR	24%	19%	52%	42%
HR	27%	22%	50%	56%
HU	24%	13%	56%	30%
IE	28%	27%	47%	44%
IT	25%	21%	40%	38%
LT	23%	25%	43%	48%
LU	24%	18%	49%	40%
LV	21%	22%	49%	39%
MT	30%	20%	63%	60%
NL	17%	16%	29%	32%
PL	15%	27%	31%	46%
PT	27%	28%	56%	57%
RO	23%	23%	:	:
SE	22%	19%	44%	29%
SI	35%	27%	44%	37%
SK	19%	19%	41%	41%
UK	29%	30%	47%	40%

Note: ':' indicates data were not available.
Source: OECD, Programme for International Student Assessment (PISA) [table I.3.10b and I.3.10c].

Concept: The share of girls and boys expecting to work in science-related occupations at age 30 indicates students' interest in science careers at 15 years of age. The definition of science-related occupations is based on four-digit ISCO-08 classification of occupations. Only professionals and technicians/associate professionals are considered to fit science-related career expectations, including four groups of jobs: science and engineering professionals; health professionals; ICT professionals; and science technicians and associate professionals (OECD, 2016).

The suggestion is to monitor two levels: the share of those expecting to work in science-related occupations among boys and girls in general, and the share among top performers in science. The latter indicator refers to students who achieve a science test score at Level 5 or above and enables monitoring gender biases among students who have high science achievements.

Data source: The calculation of the indicator is based on OECD PISA (Programme for International Student Assessment) data collection: http://www.oecd.org/pisa/

Published: Data are available in the OECD PISA Education GPS (table I.3.10b 'Students expecting to work in science-related occupations, by gender and performance in science' and I.3.10c 'Boys and girls expecting to work in science-related occupations, by performance in science').

Notes: Data cover all EU Member States (from 2015), OECD countries and OECD partner countries. Data collection is based on harmonised principles and coordinated by the OECD, enabling high comparability across the countries. In the case of Belgium, the results in the table refer to the French- and German-speaking communities only.

Area F: Women and the Economy

A number of Presidencies have addressed diverse issues under Area F: Women and the Economy, with current indicators monitoring employment rates and types of employment, work–life balance, gender pay gap, etc. Occupational segregation by gender, however, is not addressed. The proposal is to include a new indicator:

- **Share of women and share of men employed in occupations of the STEM and EHW employment fields – as a share of employees within a respective occupation.**

Description of a new indicator

Despite the explicit goal of the BPfA to eliminate occupational segregation by 'stimulating the diversification of occupational choices by both women and men' and to 'encourage women to take up non-traditional jobs, especially in science and technology, and encourage men to seek employment in the social sector' (United Nations, 1995), no indicator yet monitors progress in reducing occupational segregation. The indicator describes horizontal segregation, i.e. under- or overrepresentation of women and men within occupations.

Table 3: Share of women and share of men employed in occupations of the STEM and EHW employment fields as a share of employees within a respective occupation (2013–2014)

	Share of women								Share of men			
	1	2	3	4	5	6	7	8	1	2	3	4
AT	26%	14%	9%	11%	3%	4%	4%	27%	39%	28%	20%	11%
BE	30%	22%	14%	23%	2%	4%	3%	31%	23%	25%	19%	6%
BG	38%	37%	19%	27%	3%	7%	5%	62%	22%	18%	25%	7%
CY	27%	28%	22%	27%	0%	0%	0%	34%	39%	27%	48%	5%
CZ	25%	12%	18%	9%	1%	4%	6%	37%	22%	22%	11%	17%
DE	23%	14%	16%	15%	6%	5%	6%	22%	36%	38%	15%	16%
DK	31%	17%	17%	21%	5%	2%	0%	27%	16%	34%	24%	19%
EE	36%	31%	20%	15%	5%	1%	5%	48%	12%	15%	7%	4%
ES	26%	33%	20%	21%	2%	1%	1%	32%	32%	30%	31%	7%
FI	24%	21%	20%	28%	4%	3%	2%	28%	27%	30%	12%	7%
FR	31%	23%	13%	11%	4%	6%	2%	38%	34%	35%	20%	6%
GR	29%	27%	17%	16%	2%	2%	2%	33%	48%	34%	29%	17%
HR	33%	36%	15%	10%	1%	2%	1%	57%	27%	20%	14%	9%
HU	22%	12%	17%	13%	1%	2%	2%	46%	32%	23%	13%	14%
IE	28%	25%	25%	22%	1%	2%	5%	30%	19%	26%	34%	12%
IT	29%	19%	15%	16%	1%	3%	1%	32%	55%	22%	36%	11%
LT	30%	26%	24%	21%	3%	3%	5%	63%	11%	15%	11%	2%
LU	20%	15%	11%	13%	0%	1%	1%	18%	40%	37%	20%	12%
LV	44%	27%	29%	27%	3%	3%	2%	33%	15%	15%	6%	3%
NL	21%	11%	10%	15%	1%	1%	2%	20%	28%	35%	21%	7%
PL	27%	16%	21%	12%	1%	3%	5%	21%	18%	21%	29%	7%
PT	34%	18%	19%	10%	0%	3%	1%	59%	26%	25%	31%	7%
RO	23%	31%	26%	35%	3%	6%	11%	53%	21%	23%	19%	11%
SE	35%	22%	16%	18%	2%	6%	3%	27%	23%	27%	22%	17%
SI	29%	17%	14%	17%	1%	6%	5%	43%	23%	22%	20%	17%
SK	23%	17%	13%	12%	1%	3%	1%	43%	33%	22%	10%	10%
UK	22%	16%	16%	25%	1%	2%	2%	27%	24%	32%	31%	12%
EU27	25%	16%	16%	18%	3%	4%	4%	33%	30%	31%	20%	10%

Note: Numbering refers to: **share of women** among science and engineering professionals (1), ICT professionals (2), science and engineering associate professionals (3), ICT technicians (4), building and related trades workers (5), metal, machinery and related trades workers (6), electrical and electronic trades workers (7), and stationary plant/machine operators (8), and to **share of men** among health professionals (1), teaching professionals (2), health associate professionals (3), and personal care workers (4). No data available for Malta; data refer to average estimates for 2013–2014 due to reliability reasons.
Source: EU-LFS, calculations based on 2013-2014 microdata.

Concept: The share of women across occupations of the STEM industry and the share of men across occupations of the education, health and welfare (EHW) sector enables monitoring of occupational segregation with a focus on the work fields that are marked by persistently high gender segregation. To define occupations, the variable 'Occupation (ISCO-08 COM)' has been used (since 2011) in the EU-LFS dataset. As only a one-digit occupation classification has been used for Malta, it is not possible to include the data for Malta. Due to data availability and reliability limits (i.e. small sample size) across Member States, data are presented as two-year averages.

Data source: The calculation of the indicator is based on EU-LFS data (European Labour Force Survey): http://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey

Published: Calculation of the indicator requires access to EU-LFS microdata. Data are not published online with the necessary detail. Microdata access can be applied for from Eurostat.

Notes: The European Union Labour Force Survey (EU-LFS) is conducted in the 28 Member States of the European Union, as well as in 2 candidate countries and 3 countries of the European Free Trade Association (EFTA), in accordance with Council Regulation (EEC) No 577/98 of 9 March 1998. EU-LFS is a large household sample survey providing quarterly results on labour participation of people aged 15 and over. It is important to note changes in the classification of occupations, as ISCO has been updated to take into account developments in the world of work since 1988 and to make improvements in light of experience gained in using ISCO-88. The proposed indicator relies on the recent version of ISCO,
i.e. ISCO-08.