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Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

#### Empfohlene Zitierung / Suggested Citation:

Paksi, V., Nagy, B., & Tardos, K. (2022). Perceptions of Barriers to Motherhood: Female STEM PhD Students' Changing Family Plans. *Social Inclusion*, 10(3), 149-159. <https://doi.org/10.17645/si.v10i3.5250>

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Article

## Perceptions of Barriers to Motherhood: Female STEM PhD Students' Changing Family Plans

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Submitted: 10 January 2022 | Accepted: 11 March 2022 | Published: 30 August 2022

### Abstract

Despite recent pronatalist policies in Hungary, the country has not boosted birth rates at the expected rate. Higher educated women still delay the transition to first birth, a smaller proportion of planned children are born than in Western European countries, and the level of childlessness has also been increasing. As a post-socialist legacy, prevailing traditional family and gender norms strongly constrain the reconciliation of work and family roles, which can prevent women from realizing their childbearing intentions or drive them to live a childfree life. Qualitative studies about how the fertility decisions of women are formed are scarce, particularly in relation to male-dominated high-skilled professions, where the realization of family plans can be especially challenging. The present article explores the barriers to motherhood among female engineers. Results of 27 semi-structured interviews with mainly childless female PhD students in 2014–2015 show that the women were subject to strong social expectations that negatively influenced their fertility plans. On the family side, these involve becoming a mother and being responsible for child care and household chores; on the work side, challenges include the knowledge-intensiveness of jobs and a male career model that hardly tolerates the role of motherhood. As a result, the respondents had further delayed childbearing, forecast reconsidering family plans after first childbirth, and in one case, opted for voluntary childlessness. Women also reflected on how their fertility is at stake due to their postponed motherhood and the cumulative effects of hazardous laboratory work. Several intervention points are suggested to stakeholders.

### Keywords

delayed motherhood; fertility; higher educated women; PhD education; pronatalism; STEM

### Issue

This article is part of the issue “Fragile Pronatalism? Barriers to Parenthood, One-Child Families, and Childlessness in European Post-Socialist Countries” edited by Ivett Szalma (Centre for Social Sciences, Hungarian Academy of Sciences Centre of Excellence / Corvinus University of Budapest), Hana Hašková (Institute of Sociology, Czech Academy of Sciences), Livia Oláh (Stockholm University), and Judit Takács (Centre for Social Sciences, Hungarian Academy of Sciences Centre of Excellence).

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### 1. Introduction

Many studies have been published about how to juggle working life and motherhood, the cultural contradictions involved in mothering and employment, and being a woman and the meanings ascribed to the con-

cept by society (Hays, 1996; Kromydas, 2020). There has also been considerable discussion about the social expectations and norms associated with becoming a mother or staying childless. Remarkably, this debate started as early as the 1910s with concerns about how women were socially controlled through the institution

of motherhood (Hollingworth, 1916; McCutcheon, 2020). Pronatalism sees women primarily as mothers responsible for the reproduction of the population, or even the nation, and has become a widespread and complex ideology globally. In Hungary, as in other post-soviet countries, traditional family and gender norms have never been significantly contested (Gregor, 2016). Recent pronatalist ideologies and policies particularly challenge the career- and fertility-related decisions of female professionals, who are already more likely to be childless, delay child-bearing, or have fewer children than their male counterparts (Mason et al., 2013; Paksi et al., 2016).

Pronatalism further reinforces the ab-ovo patriarchal environment of research organisations, particularly in male-dominated STEM (science, technology, engineering, and mathematics) fields (Nagy, 2014). The demand for unencumbered workers and high levels of performance in professional careers in knowledge-intensive fields has been increasing, and this hegemonic work-centric model has become an essential part of the neoliberal university environment (Moen & Sweet, 2004; Rosa, 2021). Masculine “chilly” environments also transmit negative messages toward women regarding their gender roles (Britton, 2017; Maxmen, 2018) and the latter also regularly face the “second shift” at home, such as household chores and caring tasks (Hochschild & Machung, 2012). These barriers generate severe conflicts between work and family life, strongly influencing women’s family plans and opportunities, or driving them to live a childfree life (Lewis & Humbert, 2010; Szalma et al., 2020).

Qualitative studies are scarce about how the fertility decisions of female professionals are formed, particularly in STEM fields. The present article explores the barriers to motherhood of young female engineers in the East-Central European context. The research is based on 27 semi-structured interviews with female PhD students in Hungary. The structure of the article is as follows: First, we introduce the theoretical background and previous empirical research; research questions and methodology are presented, followed by a discussion and the conclusion.

## 2. Background

Pronatalism is likely to emerge when the size of a population is perceived as insufficient and at risk of decline. The aim of pronatalism is “to promote fertility by representing motherhood as a moral, patriotic and economic duty” (Turnbull et al., 2016, p. 102); accordingly, pronatalist policies and ideologies have been considered a guarantee for the existence of nations (Hašková & Dudová, 2020).

In a recent publication, Hašková and Dudová (2020) showed how Czechoslovakia, like other socialist countries in the same period, moved from deploying an emancipatory discourse to a familialist discourse involving the introduction of strong pronatalist measures after the

Prague Spring of the 1960s. The authors analysed the selective practices and policies that were introduced to increase fertility, ranging from incentives (e.g., paid child-care leave) to restrictions (banning abortion) throughout the region. The emphasis was on fertility growth and child-rearing, and the “qualitative” concerns about the population were in line with the increasingly conservative gender attitude of the Czechoslovak population. This was how the role of women as mothers was cemented. One of the means of accelerating this goal was maternity leave, which was extended to two and then three years. This was intended to enable mothers to return to the labour market only after providing quality childcare to increase fertility (Hašková & Dudová, 2020).

The Czechoslovak case is of particular relevance to the present topic as the Czech and Hungarian gender regimes were very similar both during and after the socialist regime (for example, in allowing long parental leave, promoting family policies supporting the availability of nursery schools, and in traditional attitudes towards gender roles; see Haney, 2002; Křížková et al., 2010). Recently, welfare policies in Hungary are becoming increasingly pronatalist again. However, these selective policies tend to benefit traditional, upper-middle-class, “better-off” families through generous tax breaks and housing loans. Pronatalist ideologies, the lack of sufficient childcare services, and part-time work opportunities are again reinforcing the roles of women as primary caregivers and housewives (Szikra, 2014).

Pronatalism can lead to the negative construction of the “childless other” and thus to the social exclusion of childless women. In a mixed-methods study of childless Australian women, Turnbull et al. (2016) investigated the extent and nature of social exclusion of such women. Their findings indicated that social exclusion is particularly prevalent in social and civic domains, and less so in service and economic domains. They found evidence that childless or childfree women suffered from stigmatization driven by pronatalism. They also noted how deeply women internalised social expectations about having children, which also formed their reactions: “Childless women are not simply passive receivers of social exclusion. Rather, their internalized, disempowered, or empowered responses influenced experiences of social exclusion” (Turnbull et al., 2016, p. 110).

Bartholomaeus and Riggs (2017), in a qualitative longitudinal study, also showed how childless Australian women were pressured and devalued by society for not (yet) having children. The omnipresent pressure of white middle-class mothers on their daughters’ fertility decisions was found to be a vital influence. McCutcheon (2020) reviewed empirical studies on attitudes towards women without children. She found that the attitudes of individuals towards childless women are becoming slightly more positive. Whereas childless women were not appraised negatively, couples with children were rated more positively than in earlier studies. She also concluded that the stigma non-mothers

experienced had shifted from old-fashioned to contemporary forms, coming particularly from family and friends (McCutcheon, 2020).

Pronatalist ideologies have been significantly incorporated by young women and have affected women's decisions regarding childbirth, even if the postponement of first childbirth has become a general trend. From an examination of fertility patterns in Hungary, Spéder (2021) concluded that instead of a continuous decrease in fertility over the past three decades, a new fertility pattern has emerged and solidified: Peak motherhood and childbearing at around the age of 23 to 25 has been replaced by late fertility at the age of 29–31. Better educated women are more likely to have children during a shorter period of their life, between the ages of 28 and 34. The timing was heterogeneous even within the group and can be considered status-related rather than due to the process of individualisation (Spéder, 2021). At the same time, in Hungary as in other Eastern European countries, individuals are defining the "ideal" timing of motherhood at a younger age (Paksi & Szalma, 2009), putting further pressure on the shoulders of higher educated women.

Regarding family size, the proportion of women with one child increased after the political system changed; those with two children decreased, and those with three or more children stagnated. The one-child family model is more frequent among people with a secondary-level education, and the three-child model prevails among lower educated couples (Spéder, 2021). However, in Hungary, proportionately fewer planned children are born than in Western European countries (Spéder & Kapitány, 2014). More specifically, results of panel research also found that temporarily childless women aged between 30 and 45 were typically not able to realise their fertility plans within seven years (Szalma & Takács, 2018). The proportion of childless women at the age of 30 had quadrupled since the turn of the millennium (from 13 to 56%; see Spéder, 2021). Recently, total childlessness has stabilized at around 15% and is highest among the better educated (Szalma & Takács, 2018).

Regarding traditional attitudes towards women's family roles, although they weakened after the turn of the millennium, the majority of society still considers that mothers should not return to their workplace until their child reaches the age of three (Blaskó, 2011). The attitudes of higher educated women towards family roles are also twofold: Gregor (2016) recently found a larger proportion of those who held egalitarian attitudes regarding household chores, but also a larger proportion of those who consider family life and motherhood to be the primary realms of life (compared to the lower educated). Nevertheless, even breadwinner women in Hungary tend to undertake a greater share of household chores (Neményi & Takács, 2016). Consequently, childbearing has the highest negative impact on women's labour market activity in Hungary among EU member states (European Commission, 2018).

Empirical investigations of the situation with PhD students are scarce in Hungary. The issue of their childbearing appeared in a regional study based on ten in-depth interviews with female PhD students of humanities (Tornyai, 2007). It highlighted how they were planning to give up their careers for the benefit of their family and husband due to the severe work–life imbalance they were experiencing. Regarding the timing of motherhood, they followed one of two strategies: They either postponed completing their education and had a child first or, in the majority of cases, postponed childbearing until they completed their studies. Fináncz (2007) surveyed 210 PhD students at the same university who were studying various disciplines. The young persons in their research were aiming to establish both a family and a career. One-fifth of them had children, but another fifth did not view children as an essential part of life. Two percent clearly rejected the idea of motherhood, while the rest had already postponed forming a family for financial or career-related reasons, while other women reported difficulty finding a partner. In another piece of research, members of an engineering faculty agreed that having children involves an interruption in women's careers. Staff members believed in very traditional family and gender roles, including the idea that having a career and motherhood are reconcilable only if women subordinate their job to their family life.

### 3. Research Questions and Methodology

Based on the literature discussed above, we formulated two research questions: What are the barriers to motherhood among doctoral students in the STEM field? And how do motherhood-related intentions change in a male-dominated environment despite the existence of pronatalist national policy?

For the qualitative research design, a semi-structured interview method was applied. The sample consisted of 27 female PhD students of engineering, 15 students taking chemistry, environmental, and bioengineering (CEBE) courses, where course content is characterized by laboratory work and the proportion of women was greatest (at around 34%), and 12 students from the field of electrical and informatics engineering (EIE), where the proportion of women was the smallest (around 3%). These proportions corresponded to the proportions of female PhD students in these fields in Hungary. The variety of institutional and social contexts allowed us to explore the different perspectives of women in STEM (Creswell, 2007). The interviews were conducted in 2014–2015 at a prestigious technical university in Budapest. For data collection, purposive sampling and—in the case of EIE—snowball sampling was also applied, but not even this method helped us to identify any mothers among the PhD students. The students' age varied between 24 and 33 years (28.6 years on average) in all subsamples. The proportion of singles was higher among the EIE students (one quarter) than among the

CEBE students (one-fifth). Five mothers were taking CEBE courses. Twenty-four students were working in parallel with completing their PhD, mainly in universities.

The interviews lasted for 75 minutes on average and were tape-recorded for later transcription. Data collection, analysis, and interpretation were anonymized. The interviewees provided informed consent orally. For the analysis, template analysis within thematic analyses (Braun & Clarke, 2006) was selected, and the interpretation of the data was based on the constructivist paradigm.

#### 4. Results

Motherhood was a fraught issue for the young engineers and a topic that had been worrying them for months or even years. With one exception, all women planned to have a child (or another child) in the near future. In this section, we first describe the barriers to motherhood that women experienced in doctoral schools and workplaces, which include occupational (STEM-related) and organisational barriers (see Figure 1). Then their family plans are introduced in a normative context, with a description of the barriers that influenced women’s fertility plans and their realization.

##### 4.1. STEM-Related Barriers

Interviewees described engineering as a highly male-dominated discipline. The small proportion of women reinforced the image that STEM careers were not suitable for women. There were almost no women in industrial workplaces and few women researchers in research organisations and universities. In connection to this, EIE students reported an alarmingly large number of negative experiences based on gender stereotypes.

The reinforcement of traditional gender expectations associated with an engineering university education was a very intense experience for these women. It was routine for some professors to devalue women’s knowledge. This became manifest when a male professor called it “the shame of men” that women had been allowed to study at the institution. Women studying in technical fields felt this excluding attitude since their first year of university. An elderly male professor also discussed the danger of women “becoming men,” and several interviewees were advised to choose different jobs:

He looked at me as if I was some kind of bitch. He told me he wouldn’t recommend that I go back because it is harmful to men—and again, that word “shame”—that a woman could achieve a [grade] four [B] or a five [A] in maths. (Interviewee#20, EIE, age 33, childless)

Further, the devaluation of women’s knowledge was also a relatively frequent experience among CEBE students. A woman explained that a career in chemistry is like cooking or playing in the children’s kitchen in nursery schools. This indicated the opinion that women could perform well in this field because chemistry was similar to their traditional tasks at home, but also illustrated how women themselves accepted this form of devaluation.

The masculine character of the engineering profession was also reinforced when the attitude of bosses or colleagues at work implied that men were more competent in relation to having technical careers. Therefore, in certain fields—especially where there were fewer women than average (electrical engineering, IT, mechanics)—women had to work harder and perform better.

Overt sexism against women was also evident when male professors said to the group of PhD students that

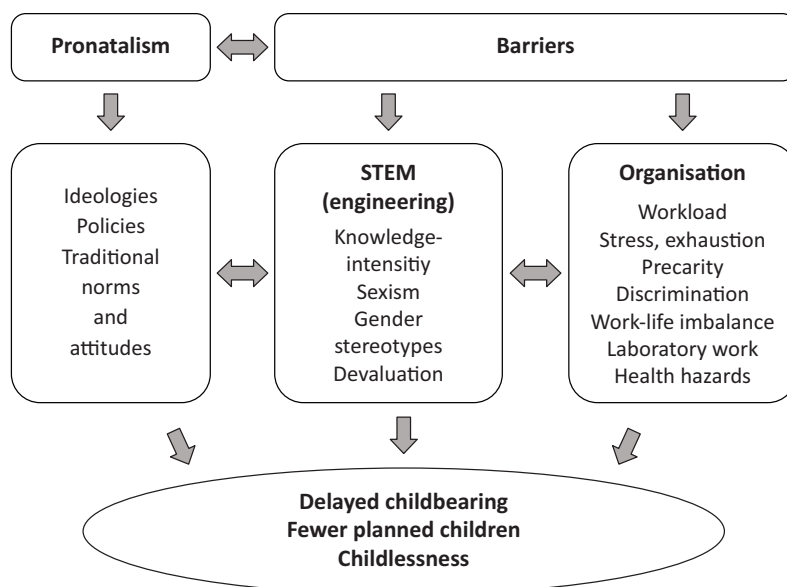


Figure 1. Changing motherhood-related plans of female PhD students in the STEM fields.

women did not understand computer sciences at all. In such cases, women stated that they had individually tried to change the image and “cleverly correct” the “male chauvinist” professor as part of their mission and responsibility.

One way of learning the male norms of engineering was to become assimilated into the majority group. For women, it was necessary to accept the masculine culture, yet to display femininity, even to the point of extremes. However, this strategy did not challenge the status quo either. One interviewee explained how she had adjusted her behaviour to expectations. While she was incredibly hardworking, she was perceived as feminine, even “girly,” and was not seen as a threat to her male colleagues. She consciously maintained this dichotomy in her daily life to avoid professional rejection. This duality creates gender-specific expectations for the women who remain in STEM careers.

Regardless of whether women tried to assimilate, they were likely to be excluded from men’s networks. Many women shared how they were not invited to informal events at which professional or organisational information was circulated or well-paid projects were assigned. Instead, women were assigned reams of administrative tasks because men did not have the patience or time for these, or they were simply happy to get rid of them, or because men were considered unreliable:

I have noticed in this technical field, too, that a woman who is equally competent and a man who is equally competent are assigned different tasks. So [the situation is] so different, and it’s holding women back anyway, and, of course, they may prefer to spend their time bringing up children, and there are some tasks that are not so professional but have to be done—PR, financial, administrative things. Very often women get given them anyway, even if there are hardly [any] women here. (Interviewee#16, EIE, age 26, childless)

Many stories of a hostile or chilly environment indicated how a macho organisational culture discouraged women from staying in engineering. Women’s experiences ranged across a broad spectrum of sexism but also differed in how respondents perceived and understood the actions of men. One interviewee spent her working days trying to compete with sixty men. The men were mostly older and saw women less as colleagues than sexual objects. Cruel manifestations of macho behaviour were also encountered by some women when they were placed in a humiliating position to make them feel inferior in the organisation:

I was sitting there, and they were talking about—I don’t know if you want to hear this—very obscene things, and they took a pen drive and asked me to do something to [it] and threw it on the floor. (Interviewee#19, EIE, age 27, childless)

In this context, it was extremely challenging for the views of women with children to be represented. Engineering offered limited opportunities for women, who were seen as a small component of the workforce. Having children was not perceived as a natural part of life but as an individual, private matter, which did not make the STEM field attractive to women who wanted to have a private life and children too. While it was obviously difficult for young women to fulfil their fertility plans under such conditions, men, especially older male professors, did not understand the specific problems women faced. For example, when a mother of three submitted a request regarding her oral examination (*rigorosum*), she was seen as trying to obtain an undue advantage and set an undesirable precedent. Women also lacked female role models whom they could follow, or from whom they could receive support. Those that existed were described as overburdened, nervous, and burnt out.

There were also faint signs of benevolent sexism in women’s stories of how colleagues helped and supported young women: Doors were opened for them, they were given presentation awards at conferences regardless of the professional quality of their presentations, professors were polite to them at exams if they were expecting a baby, and some women said they had received a better grade for their dissertation because they were pregnant. However, having children was seen as disruptive to the engineering profession, and while women’s structural disadvantage was clear, they made little criticism of the system.

#### 4.2. Organisational Barriers

We identified a large group of factors stemming from organisational and labour market processes that might have hindered or forced the PhD students to deviate from their original plans for motherhood.

The vast majority of the women struggled with work–life imbalance. The massive amount of teaching-related activity and project-based research associated with short deadlines and long experiments in laboratories all resulted in overwork. Due to organisational pressure and the lack of female role models, childless women tried to copy the 12–14 hour “male working model,” which seemed to be quite easily manageable for men. Young mothers managed some family time between their paid work and the night shift at home, but the male environment devalued this “family working model” However, women themselves associated this male working model with the image of the “ideal, good researcher” and a successful career.

Childless women perceived that their high level of work–family imbalance made childbearing impossible, at least until they had received their degree. They hardly knew any peers among electrical and informatics engineers who had successfully raised a child while completing their PhD, and the same applied to chemical engineers in the business sector:

Although I don't have any children yet, sometimes I have no idea which way to look. I really don't have a clue how I will manage all that. I think if you have a job and also do a PhD and have a kid, you can easily lose control. It's very difficult to do a PhD and raise children as well as work. I don't know anyone who could pull it off. (Interviewee#11, CEBE, age 29, childless)

The lack of flexible work practices also imposed substantial barriers to motherhood and work–life balance, particularly in the business sector and in laboratories. Laboratory work was inflexible even within academia. Though students tried to plan their lab days thoroughly, day-long measurements literally could not be stopped otherwise both work and expensive materials would be wasted. Because of the heavy workload and work–family imbalance, female PhD students fell drastically behind with their PhD-related tasks, delaying them from obtaining their PhD degrees.

Precarity and insecurity also increased the uncertainty about childbearing during the students' studies. Women experienced different forms of discrimination based on the grounds of gender or parental status. Half of the working students had received two-to-twelve-month fixed-term contracts and only very few EIE students had permanent contracts. In contrast, their male partners or peers—with the same qualifications—received permanent contracts at the beginning of their employment. Students often considered leaving the field of science entirely. Also discouraging was when mothers' short-term contracts at organisations were terminated before or during maternity leave, as was the case with three mothers included in the present research. Childless women also frequently voiced their fears about reintegrating into the labour market after childbearing. In some cases, they were openly warned that they should not “dream” about receiving permanent status if they planned to become mothers. A childless woman clearly summarised the barriers to motherhood in relation to precarity and discrimination—a phenomenon that was strongly responsible for women “leaking from the academic pipeline”:

We were messing about with two-month contracts and that was constant stress. They don't do that to men. My experience is that when you leave to give birth, stay at home for two years, then go back, they pull funny faces or you get fired. But if you leave the same job to have a second child, it is sure that you are going to get fired. (Interviewee#24, EIE, age 25, childless)

Women PhD students also could not establish families due to the low income they received from PhD scholarships or as assistant researchers. Moreover, at the time of the interviews, tertiary students were not eligible for maternity benefits (this changed a year later), and they also could not work full-time if they had received a schol-

arship. Moreover, EIE students often highlighted that engineering does not allow for long career breaks, particularly not the expected three-year maternity leave that is typical in Hungary.

A large proportion of students had reached their physical limits. Due to their burdens and stress, women experienced ubiquitous tiredness and exhaustion. For mothers, insomnia had become a persistent feature of life. Strain-based work-to-family conflicts caused health problems in many cases. Women were definitely aware of the harmful effects of their overwork—they even predicted having such symptoms after a demanding research project:

Extra hours are expected and ever more scientific results, and there are people who internalise the stress and some people are nervous. You can tell: They have nervous ticks, and they are tense or in a sour mood. (Interviewee#11, CEBE, age 29, childless)

Finally, laboratory work with hazardous substances also implied different health hazards for CEBE students. Although laboratory work was prohibited during pregnancy, women asserted that they could not be cautious enough. A pregnant student shared that two accidents had happened in the lab before she knew about her pregnancy. Moreover, others noticed that pregnant colleagues often worked in labs, supposedly due to the high pressure for productivity. The students also perceived the cumulative side-effects of hazardous substances and their consequences in the long term. They shared how several senior colleagues had encountered gynaecological problems and had struggled to conceive or remained childless:

It is worth [becoming a mother earlier] because the longer period of time women are exposed to hazardous substances, the more difficult [conception] is. They [the interviewee's colleagues] unfortunately had several different health problems, especially in the past, which were just gynaecological in nature. (Interviewee#5, CEBE, age 28, childless)

The previously described delay in finishing PhD studies, on the one hand, and conceiving babies as early as possible in one's career to avoid health hazards on the other, stand in dire contradiction. Hence, female CEBE PhD students were caught in a trap involving the timing of motherhood.

#### 4.3. Family Plans and Constrained Choices

In the following, we introduce how prescriptive social norms and the above-introduced STEM- and organisational-related barriers influenced the formation and modification of PhD students' family plans.

In most cases (20), young female engineers wished to have two or three children. Those who planned to have two children wanted siblings for their children and they

felt they could raise a maximum of two children responsibly regarding time, energy, and money. Those planning three or more children were typically CEBE students, including all the five mothers in the sample, and they were more often socialised in large families. However, EIE students—all childless—clearly opted for fewer children, and several shared the opinion that women’s intentional childlessness was widespread in their occupation. Only a few women (2) planned to have one child. A chemical engineer aged 28 was voluntarily childless. She described herself as too “immature” for childbearing, but later she shared that a child would change the equilibrium of her life.

Women’s perceptions of the timing of motherhood were firmly based on social norms and shared expectations. The majority considered the age range 25–30 to be the “ideal age” for motherhood, their thirties to be “late” to have a first child, and “too late” from 35 onwards, considering the health risks it could involve. Engineers regularly perceived strong social pressure from their environment. The role of norms was so vital that in several cases women questioned their own will compared to social pressure concerning their own childbearing intentions:

I often contemplate this—whether I really want to have a child myself or if this is social pressure, and if it is just an expectation that women have to have children, or that the time has come for it. (Interviewee#23, EIE, age 27, childless)

The fierce opinions of family members mainly targeted the timing of starting a family and family size, including in indirect ways such as when a husband of a chemical engineer put his wife under pressure when he stigmatised her female colleague who planned to have only one child. Colleagues and friends also voiced their opinions, and women often voiced their anger at why external actors felt authorised to intrude into their private sphere. An electrical engineer was particularly irritated by her male colleagues’ directness because no one else in their professional environment had established a family at this “early” age. She also contrasted the situation with that of her male peers, who were never asked or pressured about their fatherhood:

I always get at my workplace that “since you already have a husband, you can go and have a child, which would be much better.” But there’s really nobody else doing this because they are all in the same situation as me, and everyone is somehow trying to close this stage [finish their PhD]. (Interviewee#26, EIE, age 33, childless)

Hence, these female engineers often hid their family plans in order to avoid social pressure and stigmatising. An electrical engineer even vehemently protested that social pressure had had the reverse effect on her childbearing intentions.

Despite the strong social pressure and their original intentions, women in the present research had delayed motherhood due to their enrolment into the PhD programme. Around half of the women in this sample acknowledged (sometimes with sadness) during the interviews that they had already passed the original deadline they had set themselves in their younger years. They also often confessed that they believed they would have had (more) children by now, but had seemingly already failed at it. The idea that by the time they were 30 they would have had “two or three children,” and that, comparatively, “reality is obviously different,” was phrased quite frequently. With one exception (an unplanned child), all mothers in the sample had had their first child after enrolment. However, childbearing during the completion of a PhD also seemed like a bad option for the majority of the childless women due to the severe work–family conflict it implied, as discussed in the previous section. In addition, delaying completion of a PhD for two or three years was a common phenomenon in their academic environment, meaning respondents would typically be at least 30 or more before graduating, which they considered being too late for motherhood. This scenario generated very high levels of stress. Many older students also understood the risk of their shortened period of fertility and they were also worried about the realization of their fertility plan within such a short period, while they rejected artificial reproduction technologies due to the risks they involved.

The majority of CEBE students felt they could no longer postpone childbearing and found it better to have a child—as the least bad option—at the end of their PhD studies. Their dilemmas were more closely connected to age norms, normative pressures, and work–life balance problems. EIE students tended to delay motherhood more, even after obtaining their degree. They rather reasoned about STEM-related barriers—such as the loss of knowledge that would occur during a career break due to the knowledge-intensiveness of engineering—and about the biological limits of childbearing, and conception-related problems. Singles were more common among EIE students and lacking a partner contributed to their childlessness. For the 33-year-old informatics engineer quoted below, both her masculine profession and its knowledge-intensiveness had curbed the realisation of her family plans to a large extent. She had difficulty maintaining long-term relationships with men who would hardly accept her as an engineer, and because of the workload that her PhD and private sector job involved:

On the one hand, I believed that I would obtain my PhD degree earlier—I had different ideas about what it meant to pursue it. On the other hand, both partnership and family are tied to life situations and opportunities that change over time. (Interviewee#23, EIE, age 33, childless)



Finally, although these women had postponed their motherhood to pursue an academic career, the majority of them felt they would have to choose between the two after childbearing. The pressure to choose was tangibly stronger for CEBE students, perhaps because they planned to establish a family earlier than EIE students:

I think it is hard for women to be mothers and to remain wives—to remain in the workforce and be housewives at the same time. I think the whole of female society is in a situation which is not simple, I mean this group we are talking about now. Difficult. You have to give up something. I think several women have given up their careers. And I think if a woman wants a child, the child should come first. (Interviewee#11, CEBE, age 29, childless)

The unequal share of household and caregiving tasks did not support these women's motherhood plans either. The dominant and traditional attitudes about family roles in Hungary were apparent in our interviews as well. While childless women shared household chores with their partners in a quite egalitarian way, mothers played quite traditional roles. The mothers in this sample had already partly sacrificed their careers due to their constrained choice, and the majority of the childless women said they would choose family over work after childbearing. A large proportion of women even stigmatised female peers who had delayed motherhood long after obtaining a PhD degree as being fixated on their careers.

## 5. Discussion

Our research focused on two interrelated topics: the main barriers women PhD students in STEM fields face while planning their motherhood, and how, despite persistent pronatalist policy, intentions about motherhood change and become less feasible in a male-dominated environment. In harmony with our first research question, we identified two main types of barriers: (a) the masculine features of the STEM fields and (b) organisational obstacles.

Our results confirm earlier findings that the hegemonic work-centric model of neoliberal universities (Rosa, 2021) and the masculine environments of STEM fields (Nagy, 2014) do not support motherhood. The high volume of teaching, administrative and research tasks, the hierarchical nature of the organisations, expectations about performance, and, in the business sector, the lack of flexible working practices negatively influence work–life balance (Moen & Sweet, 2004).

The related barrier identified in our research was a masculine organisational culture. This was particularly salient in the field of EIE, where the message was that becoming a mother would not allow one to become a “good researcher” and pursue a successful research career. It was a particular challenge for women PhD stu-

dents to have a child and be accepted within the engineering profession. Our results also agree with the findings of earlier studies that women in engineering receive less recognition and are given fewer professional responsibilities and organisational support but are subject to more (hostile or benevolent) sexism (Maxmen, 2018; Nagy, 2014). Their professional environment devalues their competencies, pushing women to work more and harder. This effort burdens them beyond their capacity, causes different health problems, and diverts their focus from other fields of life, such as family and children (Lewis & Humbert, 2010).

Moreover, although young male researchers suffered from precarious employment too, women were often discriminated against based on gender—e.g., by being awarded extremely short working contracts, or not having the opportunity to return to their previous employer after childbearing. This finding agrees with that of previous research that identified how gender-based discrimination was one of the five most frequent grounds for discrimination from 2010 to 2019 in Hungary, along with age, state of health, social background, and financial status (Neményi et al., 2019).

This finding leads to our second research question on changing intentions about motherhood in a male-dominated environment. The main “solution” we identified was to decrease or postpone motherhood. PhD students initially aimed to become mothers in their twenties, but their enrolment in doctoral school pushed them to postpone motherhood. This fertility pattern is also a part of the standardisation process of life courses (Spéder, 2021). However, in our case the barriers we explored delayed motherhood well beyond graduation in the highly masculine fields despite the perception of heavy social pressure from families regarding the gender role of mothers. It is no surprise that all childless women aimed to become mothers. Our results support previous findings that voluntary childlessness is still a relatively rare phenomenon in Hungary (Szalma & Takács, 2018), and provide evidence for the claim of prejudice against childless or childfree young people (McCutcheon, 2020; Turnbull et al., 2016). This situation explains why our respondents tended to stigmatise female peers who delayed motherhood long after obtaining PhD degrees as fixated on their careers.

It is noteworthy that women working in the fields of EIE were more liable to plan to have fewer children and tended to delay motherhood more than those studying and working in the more gender-balanced field of chemical engineering. From this, we suppose that the negative influence of STEM-related barriers may be stronger on women engineers' family plans and motherhood than the pressure of organisational barriers.

Becoming a mother in Hungary typically goes hand in hand with gender inequality in the household division of labour. While childless women shared household chores with their partners in a relatively egalitarian way, mothers played quite traditional roles in this regard. This result

resonates with Gregor's (2016) findings about the changing attitudes of higher educated women. Strong social expectations mirrored the traditional attitudes of society in general, as defined by recent selective pronatalist ideological and policy contexts. The former targeted "better-off" traditional families, as Hašková and Dudová (2020) and Szikra (2014) claim, including those female professionals who tend to have fewer children (Mason et al., 2013).

## 6. Conclusion

Women professionals face a dual barrier in relation to STEM fields. First, their access to STEM fields is limited, along with their opportunities for a successful research career. Second, they are also likely to have to sacrifice their motherhood; their intentions change under the normative pressures they are subject to in their environment, and due to the barriers they face. Although many of the STEM-related barriers have already been discussed in academic literature (Britton, 2017; Lewis & Humbert, 2010), our results reveal how the pressure of the professional and organisational culture in STEM for high performance and assimilation into the masculine world of science prevent women from realizing their fertility plans. Fertility decisions during PhD studies can only represent initial steps in changing the family plans of these young engineer women; it is still an open question how they will be able to realise these plans at later career stages, if at all. Eliminating barriers to childbearing can also enhance parenthood and the work–life balance of non-female students, and decrease the attrition rates of doctoral students.

It is paradoxical that on the one hand women are delaying their motherhood—thereby confronting internalised social norms, endangering their own and their babies' health, decreasing their opportunity to realise fertility plans, and risking being subject to stigmatization as workaholics—to pursue a career in science. On the other hand, after becoming mothers, a wide range of structural barriers force them to choose between their families and careers, and the young engineers in our research—having no other option—tended to choose the traditional path: prioritizing family over work.

The present results offer several intervention points for stakeholders. However, if gender norms and professional culture do not develop in such organisations, even selective pronatalist ideologies and policies will not lead to change. This suggests one way of making engineering careers more attractive to women.

This research is not without limitations. The women in the sample had not reached the end of their fertility period so their family plans were malleable and subject to later realization. Fertility behaviour is a complex phenomenon and focusing on a wider range of factors would have extended the scope of the article. Future panel research may focus on how the fertility plans of women working in highly masculine engineering disciplines may

be realised beyond the age of 40, as well as on attitudes towards voluntarily childless women in Hungary.

## Acknowledgments

We would like to thank the academic editors of this thematic issue and the reviewers for their assessment and insightful suggestions. This project has received funding from the National Research, Development and Innovation Office (K104707).

## Conflict of Interests

The authors declare no conflict of interest.

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