

# **Attractive Academia?**

**Selection processes from PhD  
to further academic career  
with special emphasis on the  
supervisor relationship**

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### *Abstract*

The problem of gender inequality within academia and particularly within STEM areas of research (science, technology, engineering, and mathematics) is well known. Although the number of PhD students is increasing over time, there still seem to be hurdles to higher advancement in an academic career. As PhD students obviously have an initial interest in STEM, inquiring into selection processes in this stage of career might shed light on the problem. Through a survey questionnaire and 18 in-depth interviews with doctoral students (women, men, juniors, and seniors) randomly selected from four departments at Chalmers University of Technology; Mathematical Sciences (MV), Computer Science and Engineering (D&IT), Applied Information Technology (ITTI), and Signals and Systems (S2), which are all represented in the three Areas of advance of Chalmers curricula: Life Science Engineering, Information and Communication Technologies and Building Futures, as well as four supervisors, this study discusses individual and organizational selection processes and how the supervisor relationship can be improved. Contrary to general expectations, the study shows few gender differences, both in terms of expressed needs and experienced circumstances. Two problems emerge as particularly important for both sexes; coping with stress and conditions for developing an academic identity. Strategies for coping on different levels are discussed; individual, organizational and national/global. For example, organizational features in relation to status of teaching, elitism and competition, homogenic versus heterogenic environments.

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## Introduction

Gender equality is a strived-for goal in most democracies around the world, for most areas of society, including higher education. However, while gender equality is progressing in, for example, political representation, the situation in higher academia and especially within STEM areas of research – science, technology, engineering, and mathematics – seems to lag behind. The 2009 EU publication *She Figures* reports that from 36% females among PhD holders in science and engineering the proportion of women drops to 33% in grade C academic staff, 22% in grade B, and just 11% in grade A (highest) (European Commission, 2009). This is also true in the otherwise gender-equal country of Sweden. In Swedish universities, the share of female professors in STEM areas was 15.8% in comparison to 33% among PhDs (2015 figures) in natural science and technology (Statistiska Centralbyrån, 2015). The newest report from the UKÄ (2016:16) assesses the general development during the last decade in Sweden in higher education and concludes that the situation has slightly improved; however, at higher levels in academia the situation is still very gender unequal.

Why is male dominance in higher academia a problem? In the literature, there are commonly three arguments for gender equality. First, gender inequality can be a sign of discrimination against women, in which case the value of *justice* and equal treatment is violated (SFS 1974:152). Second, there is an argument of *utility*, holding that biases in recruitment patterns are likely to lead to insufficient use of resources such as talent and experience, when some groups are left “untapped” in recruitment. Third, there is a *legitimacy* argument, which holds that given that a country or an

organization strives for gender equality, it shakes the legitimacy of that body if it does not live up to these goals. The representation of a minority group can also have a *symbolic* importance, as it gives members of the group a sense that it is possible for someone like them to reach such a position.

This report focuses on factors that attract PhD students and prevent them from continuing an academic career. This stage is interesting, as the number of women drops rapidly between PhD and post doc positions, and thus, this period can be considered crucial for changing the composition of persons in academia. The report aims to shed light on the selection processes from PhD to a further academic career. It considers individual and organizational selection processes and focuses specifically on the supervisor relationship, as this can be seen as central. The material consists of in-depth interviews with 18 doctoral students, both women and men in different stages of their doctoral careers (junior and senior), as well as with four supervisors. Survey results are reported in the aggregate. To protect the anonymity of the students and faculty members who were interviewed (IPs and IPHs) [or whatever the correct definitions are], we identify them only by their assigned numbers in the report on the interview study. The study was funded by three Areas of Advance of Chalmers: Life Science Engineering, Information and Communication Technologies and Building Futures, and the respondents were randomly selected from four departments at Chalmers; MV, D&IT, ITTT and S2, which are all represented in the areas.

In sum, the study shows few gender differences, both in terms of expressed needs and circumstances of the PhD students. Also from the side of the supervisors no particular differences between male and female PhD students emerge. Two problems seem particularly important for both sexes during the PhD period; coping with stress and developing an academic identity, which involves both personal and organizational (Chalmers) features. A number of suggestions and dilemmas are brought forward, together with ideas on which level they need to be handled; individual, organizational and national/global (for a summary see the concluding section).

### **Judicial framework**

This study is situated within the judicial framework of Swedish gender equality policy as well as Chalmers gender equality policy, which are presented below.

#### Swedish Gender Equality Policy

The goal of Swedish gender equality policy is that women and men should have the same power to form society and their own lives, which includes four subareas (Government Offices of Sweden [Regeringskansliet], 2016; Proposition 2005/06:155; SOU, 2005:66):

- Equal division of power and influence. Women and men are to have the same rights and opportunities to be active citizens and to shape the conditions for decision-making.
- Economic equality. Women and men must have the same opportunities and conditions with regard to education and paid work that provide economic independence throughout life.

- Equal distribution of unpaid housework and provision of care. Women and men must have the same responsibility for housework and have the opportunity to give and receive care on equal terms.
- Men’s violence against women must stop. Women and men, girls and boys, must have the same right and access to physical integrity (Regeringskansliet, 2016).

Within higher education additional laws regulate interaction, for example, in Högskolelagen [the Swedish higher education department], in which it states “högskolornas verksamhet ska jämställdhet mellan kvinnor och män alltid iakttas och främjas” (SFS 1992:1434).

Chalmers gender equality policy and its scientific underpinnings  
Chalmers is a “foundation,” which gives the organization more degrees of freedom than universities have. However, the above-mentioned rules for gender equality still apply. Chalmers’s own gender equality policy states “Interventions in support of equality and equal worth are intended to counteract the stereotyping of people and to draw attention to and influence norms and values that impact on daily work.” The present policy is based on the changed direction of equality work at Chalmers decided by the Principal in 2007.<sup>1</sup>

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<sup>1</sup> Further information about equality policy at Chalmers is available at [http://www.chalmers.se/insidan/SV/om-chalmers/jamstallldhet/chalmers-policy/ny-inriktning-for\\_](http://www.chalmers.se/insidan/SV/om-chalmers/jamstallldhet/chalmers-policy/ny-inriktning-for_)

The policy builds on research in the following way: Janet Shibley Hyde introduced the “gender similarity hypothesis,” arguing that women and men are more similar than different in regard to talent and intelligence (Hyde, 2005). Building on meta-analyses, her research supported the finding that biological differences in intelligence between women and men are so small that they cannot explain the gaps found in representation in the area of natural science. She concluded that “[r]ather than focusing on gender differences, mathematics and science educators and researchers could more profitable [sic] examine ways to increase awareness of the similarities in performance and in ability to succeed” (Hyde & Linn, 2006; Hyde, 2005). Further, the threat of stereotype has been identified as one basic mechanism that enforces gender inequality. Begun by Spencer, Steele and Quinn (1999) and continued by Dar Nimrod and Heine (2006), this research has explored what happens with minorities’ math results when their gender or race is made salient before the tests and found that the performance for both groups decreases. Also in the Swedish context, Eriksson and Lindholm (2007) have showed that the threat of stereotype has the power to affect math performance.<sup>2</sup>

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<sup>2</sup> The authors used the same technique of making gender salient in an experiment; however, they did not only vary sex, but also whether gender was considered as an important part of the respondents’ identity. They concluded that “Men performed better than women when gender was made relevant among participants who did *not* see their gender as an important aspect of their identify, while participants high in gender identification were unaffected by gender identity relevance” (p. ).

## **Previous research on male dominance in academia**

### Images of male dominance

There are several images that describe the dominance of men in academia or other organizations. First, the “pyramid” (Riis & Lindberg, 2003), or vertical imbalance, describes how gender representation in organizations resembles a pyramid, where the number of women is great at the bottom, but decreases the higher up in the organization one looks. A second metaphor is the “glass ceiling” (Morrison, White, & Van Velsor, 1987), which points at how women seem to be prevented from rising beyond certain levels in the organization for some hidden reasons, the invisibility of which upholds the metaphor of “glass.” A related metaphor but from the opposite perspective is that of “sticky floors,” referring to how women have difficulties rising above the lowest levels in an organization (Booth, Francesconi, & Frank, 2003).

A third metaphor offers a tentative idea of a mechanism producing this situation, the “pipeline” (Berryman, 1983) or the time-lag hypothesis. It holds that the reason why today we see fewer women at the top is because they were few at the time when they entered the organization—or the pipe. This theory predicts an automatic increase of women over time if more women are recruited at the bottom (Dahlerup, 2010). The general empirical conclusion of this hypothesis is that the development takes longer than predicted, and that development is not so linear, which indicates that other factors are also involved. Lindberg, Riis, and Silander (2011) examined both a time-lag and an open-discrimination hypothesis in the case of Sweden in the 1990s but found no conclusive support for either of

them. They concluded that more complicated models are necessary that, for example, also consider factors outside of those dominating in academia, such as policies connected to the combination of care and career.

The “leaking pipeline” is a further elaboration of the latter image and states that women leave their academic careers to a greater extent than men, hence that women “leak” from the pipeline (Dahlerup, 2010). The hypothesis has been examined in Sweden by Charlotte Silander et al. (2013), who used a total selection of persons receiving a doctoral degree in the 1990s in Sweden. They did not find any support for the hypothesis and concluded that actually more men than women leave academia: in the area of technology 59% among men left academia versus 49% of women (Silander, Haake, & Lindberg, 2013).

Suggested mechanisms behind the persistence of male dominance in academia

Schematically, research aimed at finding mechanisms behind persistent male dominance in academia distinguishes between mechanisms on different levels, the first being the *individual* level, where individuals may prioritize other options, but where an individual may also be discriminated against. Discrimination can be more or less open, as in a recruitment situation, or it can be subtler, in the form of informal norms that encourages some groups more than others. This latter points at mechanisms at a second level, the *organization*, that may work by facilitating for some individuals but constraining for others. Third, yet other studies emphasize the overall *policy* structure that affects how likely it is to be able to

combine care (having a family and children) and career. Fourth, there is a global level that captures demand from the global competition. Commonly, scholars argued that factors on different levels interact. A study by Lindberg, Riis, and Silander (2011) suggested, for example, using a more complex two-dimensional explanatory model distinguishing between range (academia/non-academia) and inward/outward (self-selection/discrimination) factors to acknowledge the more complicated patterns that affect the numbers of women in academia and science.

#### Global and policy level

The global level concerns the global academic market, which, on the one hand, shows patterns of male domination across the world, but also smaller national variation. Above all, the goal of internationalization of research, which includes that researchers spend time abroad, for example, as a post doc, makes competition in the sciences global. Further, national policies that facilitate to combine care and career may help to increase gender equality in the Swedish context, however if competition is global, this becomes more difficult. These levels of analysis are commonly considered as frameworks for analysis on gender imbalances in STEM areas.

#### Organizational level

Organizations are governed by both formal and informal rules/norms and commonly studies that focus on gender imbalances in organizations focus on informal norms. A considerable part of the studies focusing on discrimination at the organizational level describes how informal connections within a homogeneous group of people may account for the difficulties of women in breaking the

glass ceiling. Under the heading of “old boys network,” formulated in the United States in the 1970s, Cole, Rubin, and Cole (1978) described a group of older, established male academics who were connected in a network, and who largely controlled who was given research funding. The term interprets the selection to an academic career as a process of power, whereby a group who has power keeps it within the network. A study empirically investigating such processes was that of Wennerås and Wold (1997), who showed that a woman needed 2.5 more bibliometric qualifications to be assessed as equally competent by the Swedish Medical Research Council (MRC) in a grant application.<sup>3</sup> More recently, Sandström et al. (2010) examined the importance of connections for funding on grant decisions connected to “excellent research milieus.” They concluded that women were less successful in receiving larger funds, mostly due to women applying for these larger sums to a lesser degree: in general, about 15% of the applicants were women, to compare with 30% in project funding within medicine and 18% within natural science and technology.<sup>4</sup> Second, building on a measure developed previously by Sandström and Sandström, they found some support for funding decisions being based on connections rather than merit.<sup>5</sup>

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<sup>3</sup> After the study was published, the research council increased the share of female applicants who received funding.

<sup>4</sup> See also Universitet- och högskolerådet (2014).

<sup>5</sup> In the first call from the funding agency SSF 17 it was more likely that persons proceeding to the second step had a close relationship to one of the assessors than researchers in the group who did not proceed to step 2. There was a second call from SSF, and here, Sandström et al. used a principal component analysis of the applicants’ merits and found that no measurement of publication could well predict success in funding, hence

However, other studies find no support for the hypothesis that demands on qualification differ between women and men. In a study by Riis and Lindberg (1996) using data from the 1980s from the Swedish context, the hypothesis found no support. In a study set at Chalmers by Stensöta (2010) a bibliometric analysis of the total number of persons recruited to Chalmers over 2.5 years showed, contrary to expectations, that women were not discriminated against in recruitment or promotion, in the sense that no higher demands were put on them. However, the study showed that the composition of assessors had a gender component, as women assessors ranked women high to a higher degree than male assessors.<sup>6</sup>

A more psychological interpretation of the mechanisms described above is that “equal seeks equal,” the mechanism being coined “cognitive particularism.” It is argued that humans use scanning techniques when interacting with other people, and that we are drawn to what we already recognize and also find it easier to appreciate, as we give it more attention. In this line of reasoning, Travis and Collins (1991) distinguished between “cognitive particularity,” which is a similar view on science and methodology, and “social particularity,” which means having a shared social background, for example, two people who have both attended Harvard.

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that something other than publication decided who received funding. In the third case, a call by the Swedish Scientific Council, the null hypothesis, that scientific closeness had no impact, could be rejected.

<sup>6</sup> Seventeen persons could be compared, given that different scientific areas have very different publication patterns.

Using these ideas on mechanisms, Michelle Lamont (2010) outlined research-area-specific ideas on excellence and evaluative cultures within history, anthropology, economics, and philosophy. Lamont suggested different cognitive styles: “In philosophy, members claim a monopoly on the assessment of their disciplinary knowledge. In history, a relatively strong consensus is based on a shared sense of craftsmanship, Anthropologists are preoccupied with defining and maintaining the boundaries of their discipline. English literature scholars experience their field as undergoing a legitimation crisis while political scientists experience theirs as divided. In contrast economists view their own field as consensual and unified by mathematical formulas” (p. 4). Lamont also argued that we use both cognitive and emotional evaluation when making assessments.<sup>7</sup> In a study particularly set within STEM areas, Williams and Ceci’s (2015) experimental study revealed that there was a 2:1 faculty preference for women on STEM tenure track, which also was interpreted as mirroring differences in evaluation based on gender.

#### Individual level

The individual level concerns factors that make individuals choose different priorities. According to the research by Hyde (2005) and the “gender similarity hypothesis,” men and women are psychologically more similar than different, and any difference that is found is too small to be able to explain the large differences in

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<sup>7</sup> A similar position is highlighted in a previous study by Langfeldt (2006). She situated the thesis in an institutional perspective and argues that a better understanding of how assessment processes are affected by the way they are organized could enable conscious choices about how these processes *should* be organized.

representation in, for example, STEM areas of research.<sup>8</sup> A study by Else-Quest, Hyde, and Linn (2010) also refutes biological reasons for unequal representation, as the difference between women's and men's math performance differs between countries. The threat of stereotype hypothesis, also described in the introduction, states that individuals internalize expectations of the environment to be good at some things and not at others. In this way, an expectation that some groups are better at, for example, math is internalized by members of other groups so that they perform worse than they would have in a neutral environment.

Different groups can also experience different organizational cultures in different ways. For instance, there are studies on competition that show how different individuals respond differently to competition. "The male warrior hypothesis" states that men react more strongly to intergroup threat than women do (Van Vugt, De Cremer, & Janssen, 2007). A laboratory experiment conducted by Gneezy, Niederle, and Rustichini (2003) showed that increased competitiveness in an environment significantly increases the performance of men but not of women. There is also research that suggests that there is a gender difference in how people prefer to compete and that women prefer to compete in teams, while men prefer individual competition (Healy & Pate, 2011).

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<sup>8</sup> Hyde (2005) re-analyzed 46 previous meta-analyses of psychological sex differences and found that women and men in most respects are similar, but the differences are noticeable regarding motor skills, sexuality (casual sex and masturbation), and physical aggression.

Individual factors also encompass different priorities in life. Men, to a greater extent than women, generally tend to opt out of commitment within certain areas of life, such as commitment to family and children. This has the longer-term effect of men retaining more resources in terms of time and energy available to be invested in other areas of life such as career and research (Jónasdóttir, 1991). This is usually known as self-selection; that is, women and men select themselves for different areas of society through their own choices. Regarding responsibility for children, women generally take considerably more responsibility than men, as shown in the number of days of parental leave taken, as well as the number of hours devoted to children during a normal working week (Statistiska Centralbyrån, 2016). Those who choose to devote themselves more exclusively to a career create an unequal competitive situation relative to individuals who choose to devote themselves to both career and family. This might have the effect of women losing out in the competitive situation, but it might also lead women to preemptively opt out of this career path because they are unwilling to compete under such conditions.

The situation for doctoral students

Individual choices are made in different stages in the career, and some studies have inquired into what career step seems to be crucial for the “leaking” of women. Sadler et al. (2012) examined interest in STEM areas during high school in the US context, using a representative national sample of 6000 students at 34 two- and four-year colleges, and found that previous interest was the best predictive factor; however, the share of girls who expressed interest in STEM areas dropped from 15.7% to 12.7%, whereas it remained stable at

39.5%–39.7% among men. In another study Riegle-Crumb et al. (2012) examined the importance of prior achievements. Analyses used data from three national cohorts of college matriculates across three decades to consider differences across several indicators of high school math and science achievement at the mean and also at the top of the test distribution. “Regardless of how prior achievement is measured, very little of the strong and persistent gender gap in physical science and engineering majors over time is explained. Findings highlight the limitations of theories focusing on gender differences in skills” (p.14).

The situation for doctoral students in the context of Sweden in particular has previously been examined. There are survey data on the situation among doctoral students that show some gender differences, but not so large. The survey DoktorandspegeIn 2008 (Jacobsson & Gillström, 2008), which was distributed to a total selection of PhD students at two occasions, shows that most PhD students are content with their education; 81% say it’s “good” (4) or “very good” (5), on a scale of 1 to 5. About 10% reported having experienced maltreatment, and the most common basis for such maltreatment was gender. About half of the respondents felt that demands were unclear, and about equally as many had experienced negative stress “to a very high degree (5), on a scale of 1 to 5. Among PhDs who had been on sick leave more than two weeks, women were three times more frequent represented than men. Further, one fourth said that they had too little time with their supervisor and that he/she showed too little interest in their work. These figures show the total picture and are not divided between research areas. In regard to plans for the future and in particular the situation in natural

science, between 34% (technology) and 38% (natural science) said they "probably" or "definitely" would continue working at the University after completing the PhD.

There are also studies that particularly examine the situation among doctoral students in STEM areas. Uppsala University conducted a study (Björnemark & Ingesson, 2009) where responses were separated between research areas, in which 69% of doctoral students in technology and natural science said they were content with their PhD education to a "fairly high" or "high" (5) extent (on a scale from 1 to 5). Ten percent reported maltreatment, most commonly based on sex; the figure for social sciences is, however, twice as large. In regard to plans for the future in academia, the most common point of critique focused on conditions for employment. The unsure working conditions in terms of employment are negative for starting a family, and it is difficult finding post doc positions without moving abroad.

A similar study at Stockholm University (Charpentier Ljungqvist, 2014) shows that 63% in the department of natural sciences, were content with their supervision; however, 40% had had problems with their supervisor, and it was slightly more common that women had experienced this, 45% compared with 37% of men. Among PhD students who had been on sick leave, insufficient supervision or lack of constructive critique from the supervisor was a common complaint. Women were about three times as frequently represented among PhDs on sick leave longer than 14 days, 14% in comparison to 5% for men. Women gave higher responses on all stress indicators in the report. Nineteen percent of women had experience of negative

special treatment compared with 3% among men. In terms of parental leave, the dominating view was that this is widely accepted in academia during the PhD period. A further significant result is that PhD students find that they don't receive enough guidance career-wise.

In similar ways, a study at Lund University (Holmström, 2013) among 320 doctoral students in natural science shows that 70% were content with their education; however, there were greater gender differences, to women's disadvantage: Within the Faculty of Science just over 70% of the women stated that they were "highly" satisfied, as against 75% of the men, while within the Faculty of Engineering LTH 60% of the women and just over 70% of the men "highly" satisfied (on a five-point scale, from "not at all satisfied" to "very highly satisfied"). Taken across all faculties, about 80% of doctoral students considered that they were receiving sufficient supervision. However, one in five doctoral students reported having had problems in relation to supervision, generally in terms of difficulties over communication and insufficient support. The Faculty of Science was somewhat above average, with 30% having experienced problems in relation to supervision, while the Faculty of Engineering LTH was level with the average, at 20%. In this study the women, generally speaking, reported problems in relation to supervision to a greater extent than the men, something which was true for all faculties, with just over 15% of the men and 30% of the women reporting that they had experienced problems with their principal supervisor (these numbers were roughly the same for all faculties). Within the Faculty of Engineering LTH, just over 20% stated that they wanted to continue working within academia after graduation,

while this proportion was just over 35% within the Faculty of Science. This is lower than the figures for other faculties. Women were less interested in a future within academia than men were, with the greatest difference shown within the Faculty of Science, where nearly 50% of the men but only 25% of the women were planning to continue working within academia after achieving their PhD. Conversely, these differences were very small within the Faculty of Engineering LTH. When it came to discussing their future plans with their supervisor, almost six out of ten doctoral students who had completed at least 75% of their postgraduate training reported that they had not at all (37%) or only to a small extent (20%) discussed life after their doctorate with their principal or assistant supervisor. The difference between men and women was marginal in this respect. Seen across the whole of the university, 20% of the women and 16% of the men experienced their situation as very stressful, with similar numbers reported from within science and engineering. Just over 20% of the women and 7% of the men within the Faculty of Science and the Faculty of Engineering LTH had sought medical advice for stress-related problems, the numbers for the women being somewhat above the average of 14%, while the men were at the average of 7%.

A study from Lund (Areskoug Josefsson & Bergenzaun, 2016) examines in particular reasons among PhD students for staying in academia. Based on a questionnaire survey in 2012, with responses from 1244 doctoral students at Lund University, the study examines the views held by doctoral students concerning a future university career. The study shows that the three principal factors generating an interest in a future within academia, for both male and female

doctoral students, were, respectively, an interest in their field of research (83% and 79%), flexible working conditions (66% and 70%), and the academic environment (55% and 43%). Factors contributing to lack of interest in a continued academic career were, respectively for male and female doctoral students, the difficulty finding relevant employment (29% and 34%) and financial reasons (30% and 25%). “The academic environment” also stands out as a factor that contributed to lack of interest in an academic career, and this is the factor where the difference between the sexes was greatest: just over 33% of the women stated this factor, as against 24% of the men.

Further analysis of the Lund University results also shows that women’s interest in a continued academic career decreased over the course of their studies more than was true for men. At an early stage of their studies, about 10% of both men and women reported a decline in their interest in a future career in academia, but towards the end of their studies just over 25% of the men and 37% of the women reported this. The reason for their declining interest was said to be largely the academic environment, something that stated by women more often than men (70% as against 60%). However, the difference between faculties was relatively great. In the Faculty of Engineering LTH more reported an increased interest in an academic career (35%) rather than a decreased interest (25%), while the opposite was true in the Faculty of Sciences. Doctoral students who had considered giving up their studies reported two further factors as having influenced them negatively: performance pressure and competition. Here, as well, there were clear gender differences: 35% of the men and 50% of the women reported negative impact of

performance pressure, while 41% of the men and 52% of the women reported that competition had affected them negatively. In the group of doctoral students who had not considered giving up their studies, fewer than half reported these factors as having affected them negatively.

The situation of PhD students at Chalmers as it appears from the employee survey from 2016, is discussed in the empirical section.

### **Outline of study**

This study focus on what proceeds between career-steps and especially between the PhD and further academic career. The recent report from UKÄ (2016:6) underlines that it is interesting to explore what happens between career steps and hold that there are no significant gender differences among the doctoral students who finish their PhD education within eight years. An important factor that makes some people end their PhD education prematurely is “insufficient support from supervisor,” which supports the idea in this report to focus on supervision of PhD students.

### [Studying norms related to gender inequality or comparing how women and men relate to research?](#)

A considerable part of gender equality research set in academia centers on describing the academic culture from a gender perspective, using the framework presented by Joan Acker (1992). She argued that instead of adding the variable sex to an existing framework, we need to explore the processes along which gender is produced in organizations. This body of research has convincingly

shown that gender is flowing into a number of, if not all, features of working life that were previously considered “neutral.” Hence, it has become more difficult to argue that something is unrelated to gender.

On the other hand, there is limited value in repeatedly showing the presence of norms attached to female and male in hierarchical ways. An otherwise informative study on the topic from University of Göteborg (Berg, Peixoto, & Wyndham, 2012), falls into this trap, as the basis for drawing more constructive conclusions on how to improve working conditions, is diminished. The study compared three different faculties, of which one was natural science and described differences, so its scope is broad. However, as the topic of the study is gender equality and the respondents’ answers are not contextualized by for example seniority, it is not straightforward how the findings can improve working conditions for women and men in academia. We learn that there are norms of gender inequality at work, but we do not learn what brings forward these stories in the particular cases, which makes it difficult to suggest solutions for how to handle problems better

In sum, it is questionable in how far interviews focusing on gender equality today contribute to our understanding of the circumstances affecting the conditions of research in gendered ways. Although gender equality is one feature of a research environment, the main part of what happens in these areas centers around the research. In this report, we takes the same stand as King et al who say that “Yet, too often, assumptions about differences between groups, whether the differences pertain to assumptions about their ability to succeed or their preferences to participate, are reinforced and subsequently

lead to the creation of more disparities” (Correll, 2001; Hyde & Linn, 2006). Hence, according to this citation, focusing on gender equality may increase stereotypes about how women and men differ that enforce rather than weaken gender inequality.

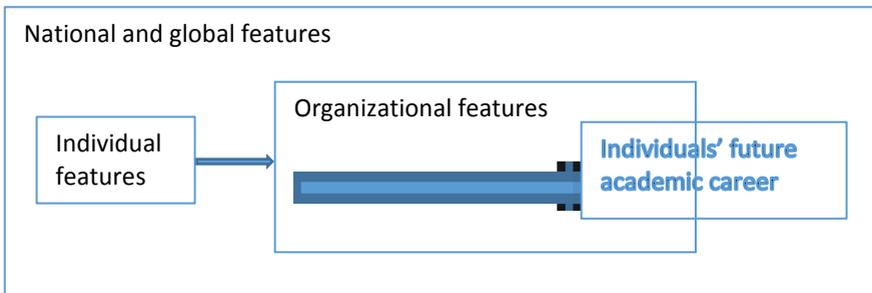
The research strategy of this study was therefore to examine how doctoral students reason about their actual tasks of “doing research” and about experiences related to the PhD situation. As such, the academic career, what attracts and what repels, is in focus. Except for the last question, where they were asked specifically what they thought about gender equality in academia, gender was not problematized unless the respondents did this themselves. Instead, conclusions on gender have been drawn by comparing the narratives of female and male doctoral students.<sup>9</sup>

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<sup>9</sup> In relation to previous gender-oriented research focused on the conditions within academia, it should be stressed that the research strategy in this paper is not the same as simply “adding gender” to an existing analysis. This would be the case if we had used survey questions and had only used questions that had to do with career in a traditional way, for example, excluding questions of care-and-career or assuming that every person reacts in the same way to the same environment. As we used semistructured longer interviews, the respondents had every possibility to channel their responses into what they experienced as important for the PhD situation. Using this method of inquiry, it is not possible to just “add” gender. Any person who takes a critical stance towards any particular part of academia is reformulating the responses to the question, hence affecting the larger content and framework of analysis as well.

As this study was set in Sweden, the overall policy level was held constant, which makes factors related to policies such as parental leave less important to study. What the study can say something about, however, is the individual's motivation to continue an academic career and how it is motivated or explained away, as well as the organizational factors that facilitate or hamper some individuals in developing as researchers. It studies how doctoral students experience their milieu and this is discussed as one thing that affects whether they want to stay. Further, the supervisor relationship is seen as central for how PhD students experience their situation. The figure 1 describes the framework of analysis:

Figure 1. The framework of analysis



Figur 1 illustrates how work in Academia is influenced by national and global features that surrounds the individual and the organization (Chalmers). The outer box indicate that these features works as an outer framework for the conditions in academia. On the national and global level we find, for example, demands of international academic experience, which make academic careers a matter of being attractive in the global research community. On national level we find policies that facilitate or impede combining an academic career with having

children, for example parental leave. Within this outer box, we find individuals who start their PhD studies with individual attributes such as talent, discipline, social skills and possibilities to keep stress at arms length, etcetera. The arrow to the organization, in this case Chalmers, signifies that individuals enter the organization with a specific set of attributes. At the same time, any organization mediates the importance of these individual factors for a future academic career, as it facilitates or impedes them by both formal and informal notions: the organizational culture refers to what is “taken for granted” in the organization and how people are expected to handle problems and occurrences. Organizations can also be more or less including/excluding, more or less transparent and of course, it matters who the other persons populating the organization are. These three factors combined; the national global- the individual and organizational features together forms the possible future academic career of an individual, which represents the arrow to the future academic career, which can proceed within the organization (Chalmers) but also elsewhere, which is indicated by the box being split between Chalmers and the outer box.

The overall aim of the study was to shed light on selection mechanisms in academia between career levels and especially between the PhD degree and a further academic career. A second aim was to deepen the knowledge about how the relation with the supervisor may increase the attractiveness of academia. The table below shows the population in the form of the total number of doctoral students and faculty at Chalmers and our four departments, divided by sex.

Table 1. Doctoral students and faculty at Chalmers, D&IT, ITTT, S2, and MV (early November 2016)

		Total number	Number of men	Number of women	Percentage men (%)
Chalmers total	Doctoral students	814	543	271	67
	Faculty	872	667	205	76
D&IT & ITTT	Doctoral students	74	59	15	80
	Faculty	80	61	19	76
S2	Doctoral students	58	46	12	79
	Faculty	57	51	6	89
MV	Doctoral students	34	21	13	62
	Faculty	65	52	13	80

*Note:* Faculty includes Professor, Associate Professor (docent) Assistant professor and University lecturer.

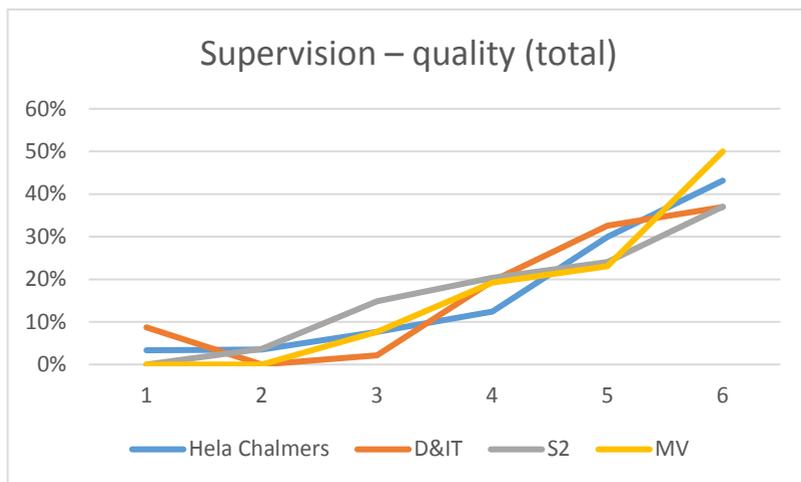
As can be seen in Table 1, men predominate at Chalmers at both the faculty and doctoral student levels. The domination of men is generally higher at faculty level, which supports the idea that this stage is important for any gender equality goal. The pattern is reversed at D&IT+ITTT where there is a lower share of women in the faculty.

### **Employee survey, Chalmers 2016**

Chalmers conducts a survey on working environment and in 2016 it included several additional questions to doctoral students. Below three questions from this survey are reported that relates to the

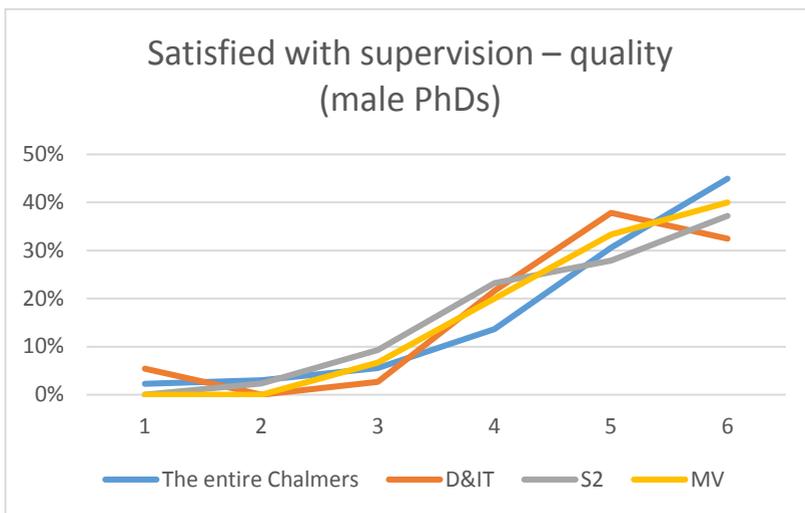
supervisor relationship, equality and stress. Responses for ITTT are excluded as there are too few responses to secure anonymity. For the same reason the comparison between women and men is discussed as differences between a) total selection of respondents and b) male respondents.

Figure 2. Satisfied with supervision – quality (male and female PhDs)



*Comment:* Percentage of respondents choosing each category between (1) “totally disagree” and (6) “totally agree” to the proposition: I am content with the *quality* of supervision”. “No answer” is included in the percent basis, but not shown in table. Number of respondents: Chalmers (639), S2 (52), (D&IT (49), MV (26).

Figure 3. Satisfied with supervision – quality (male PhDs)

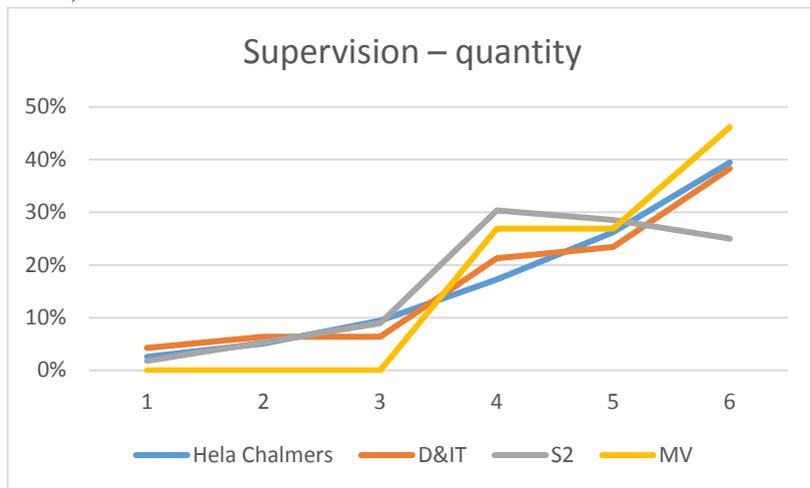


*Comment:* Percentage of respondents choosing each category between (1) “totally disagree” and (6) “totally agree” to the proposition: I am content with the *quality* of supervision”. “No answer” is included in the percent basis, but not shown in table. Number of respondents: Chalmers (404), S2 (42), (D&IT (40), MV (15).

Figures 2 and 3 show responses to the question: “I am content with the *quality* of supervision” for the total population (Graph 1) and men only (Graph 2). Responses can be given on a scale ranging from (1) “totally disagree” to (6) “totally agree”. As can be seen from Graph 1, doctoral students are generally content with the quality of supervision, as a large number of respondents give answers 4-6. If we compare the responses among male PhDs with that of the total population, Graph 2 with male only respondents show slightly lower responses (6) “totally agree”, at MV and D&IT, hence male PhDs are slightly less content with the quality of supervision at these

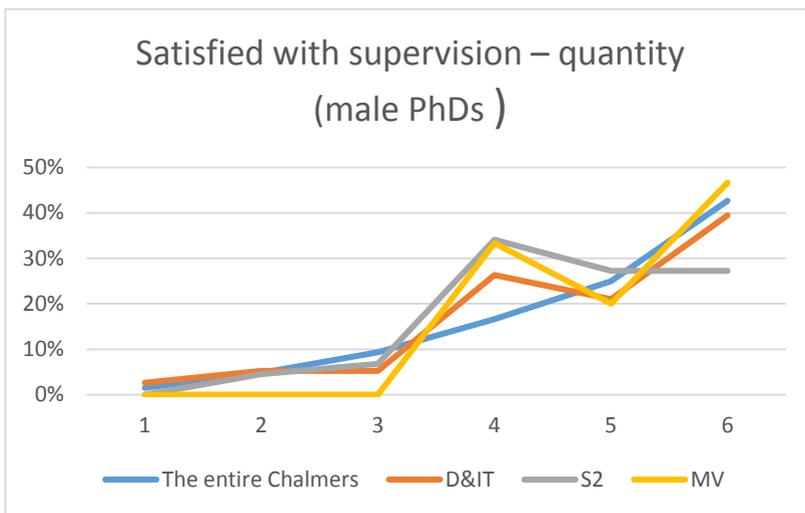
departments. Graphs 3 and 4 show satisfaction with the quantity of supervision.

Figure 4. Satisfied with supervision – quantity (male and female PhDs)



*Comment:* Percentage of respondents choosing each category between (1) “totally disagree” and (6) “totally agree” to the proposition: I am content with the *quantity* of supervision”. “No answer” is included in the percent basis, but not shown in table. Number of respondents: Chalmers (639), S2 (57), (D&IT (49), MV (26).

Figure 5: Satisfied with supervision – quantity (male PhDs)

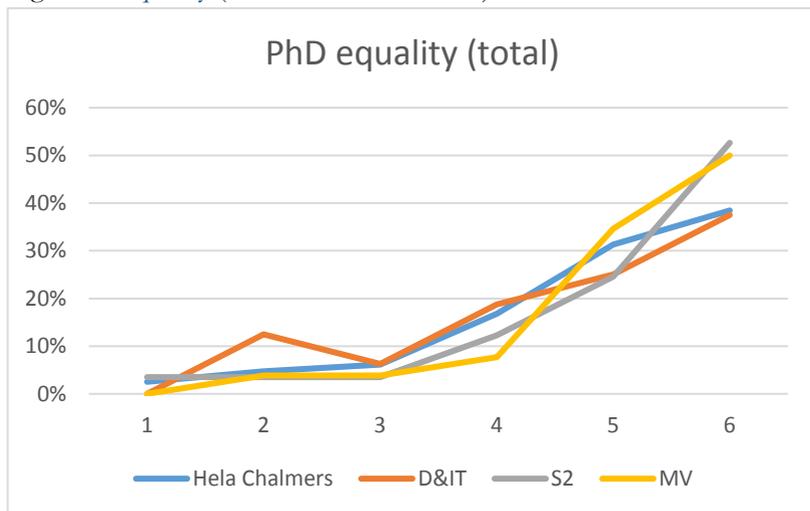


*Comment:* Percentage of respondents choosing each category between (1) “totally disagree” and (6) “totally agree” to the proposition: I am content with the *quantity* of supervision”. “No answer” is included in the percent basis, but not shown in table. Number of respondents: Chalmers (404), S2 (45), (D&IT (40), MV (15).

The Figures 4 and 5 show responses to the question “I am content with the *quantity* of supervision”. Also, here, graph 3 shows that most PhD students are content, however, among male PhDs (graph 4), the response (5) seem less frequent than response (4), which indicates that some men are slightly less content than women. Between departments it is clear that doctoral students at S2 are slightly more dissatisfied with the quantity of supervision than PhD students at other departments. This is true both for women and for men. The respondents who were not so satisfied with their supervision

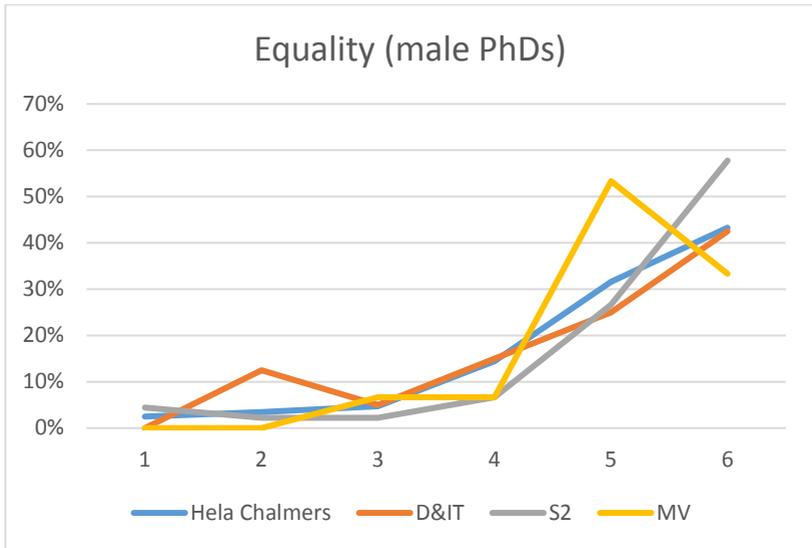
(meaning that they answered 1-3), were posed a follow-up question asking them pre-given suggestions on what they wanted more of. Frequent answers were: “time with supervisor”, “feed-back”, “interest” and finally “better communication”. The questionnaire also included a question about equality: ”I feel that my department/institution is a workplace that promotes equality (regardless of ethnicity, disabilities, gender, transgender identity, sexual orientation, religion or age),” which is shown in Figures 6 and 7.

Figure 6. Equality (male and female PhDs)



*Comment:* Percentage of respondents choosing each category between (1) “totally disagree” and (6) “totally agree” to the proposition: ”I see my department/equivalent as a workplace characterised by equality (irrespective of ethnicity, disability, gender, transgender identity, sexual orientation, religion or age).” “No answer” is included in the percent basis, but not shown in table. Number of respondents: Chalmers (654), S2 (58), (D&IT (51), MV (26).

Figure 7. Equality (male PhDs)



*Comment:* Percentage of respondents choosing each category between (1) “totally disagree” and (6) “totally agree” to the proposition: “I see my department/equivalent as a workplace characterised by equality (irrespective of ethnicity, disability, gender, transgender identity, sexual orientation, religion or age).” “No answer” is included in the percent basis, but not shown in table. Number of respondents: Chalmers (418), S2 (46), (D&IT (42), MV (15).

As can be shown in figure 6, many doctoral students “totally agree” (6) that their work-place is characterized by equality. The graph 6 report the findings among men only. Here, it is clear at MV that men to a lesser degree give answer (6) than when women are included, while at S2 the opposite finding emerges and men choose the “totally agree” (6) category more frequently.

Respondents who answered 1, 2 or 3, that is, indicated a lower level of agreement with this statement, were given a supplementary question: "In the following area(s) I see my workplace as not having been characterized by equality (during last year)." Most respondents in this subset say they have not themselves experienced discrimination; among those who have experienced discrimination "gender" and "other" as type of inequality is reported with equal frequency. Most of them have not sought help tackling the problems.

The Employee survey also entailed two questions about stress. First, "I feel that I in general have a work load that I am happy with". At Chalmers totally, 19 percent of the respondents are *not* content (answering 1-3 on a scale between 1 and 6). At S2, this share is smaller than on the other departments included in this study (7 percent in comparison to 16 percent (MV) and 20 percent D&IT). The second question is: "I feel that there are possibilities for recovery and reflection in my work". (I.e. a period of intensive work is usually followed by a somewhat quieter period.) Also, here S2 receives better assessment: The share answering 1, 2 or 3 is at Chalmers on the whole: 21 percent, at S2 9 percent, at MV 28 percent and D&IT 24 percent.

### Summary

In sum, doctoral students in the sample are largely content with the supervision they receive in terms of *quality*. In comparison with Chalmers at large, the share of respondents choosing the highest category is slightly less at D&IT and S2, whereas it is higher at MV, where supervision quality seems to be very good. It is striking that female PhD students are more content at both MV and D&IT as the

scores drop when only men are analyzed. In regard of *quantity*, S2 stands out as providing less quantity than the other departments as well as Chalmers totally, and this is so for both women and men. In regard of *equality*, the general picture is also good, both MV and S2 have higher scores than Chalmers generally as well as at D&IT. At MV fewer male respondents give the highest response “totally agree” (6), whereas at S2, the opposite pattern occurs where fewer female PhD students give highest score. Of respondents who give the lowest responses (1-3) on the question of equality, half of them had experienced inequality themselves and the other half observed it in the environment. “Sex” was given as cause for inequality in half of the cases and “other” for the other half. Most of them have not sought help tackling the problems.

### **The interview study**

The original data of this study is provided by 18 in-depth interviews with doctoral students (women, men, juniors, and seniors) randomly selected from four departments at Chalmers University of Technology; MV, D&IT, ITTT, and S2, which are all represented in the three Areas of Advance of Chalmers curricula: Life Science Engineering, Information and Communication Technology and Building Futures, as well as four supervisors, this study discusses individual and organizational selection processes and how the supervisor relationship can be improved. To protect the anonymity of the students and faculty members who were interviewed (IPs and IPHs) we identify them only by their assigned numbers in the report on the interview study.

### The initial attraction to academia

The path to academia is commonly a result of both ambition and contingencies. A number of respondents said that they had known from the beginning that they were aiming at a PhD, but that the road to their PhD degree and in what particular subject they came to study was a road with some bends. Some respondents said that they had always aimed at doing a PhD because they were good in school and that a PhD is “part of the plan” for their career. “I was always good at schoolwork, enjoyed the school environment, and moreover this has been what I have felt best at, academic work” (IP1). “Because I was going into a special school with people with exceptional talents—this kind of thing” (IP14). “I’ve always wanted to do a PhD so right after I was done with my courses in my masters I was already looking for PhD positions” (IP13).

Others mentioned in particular the interest in “digging deeper into something” as an important part of the attraction with academia. This was especially prominent among students who had taken up their PhD studies after a few years in the industry. “I wanted to get even deeper into the theory.” (IP3). “I did not enjoy working there [in the industry] that much, because there is this constant task that you keep doing, the same thing, and people ask you to do this” (IP13). “I have always wanted to do a doctorate and always been interested in academia and in the world of research. I enjoy delving deep into things.” (IP2).

Yet others were inspired by a particular problem, which then often also coincided with finding the problem “useful.” “The simple answer [to why I started on a PhD] is that I saw this advert for this

particular project and I thought it would be such great fun. I have always enjoyed being able to apply available models to actual problems (IP5).” “I found that mathematics can also be useful. And then I really got into it” (IP4).

I don’t remember how I was thinking, but I have always enjoyed swotting and learning things. But another reason was probably also that I thought I could make a difference. And perhaps it might be possible to see that somebody had made use of what I have produced. (IP6).

A special relationship with a person who becomes the supervisor can also be decisive: “I had no intention to start a PhD but then I met my supervisor and we got along really well, and I felt as if I would have the opportunity to develop things that I was interested in (IP5).” “The reason why I put in an application was, of course, partly that I thought that this was just such great fun and partly that I really liked those who worked there.” (IP11).

Yet others mentioned coincidences combined with finding teaching interesting:

I couldn’t face thinking about what I wanted, and doing a doctorate wasn’t an absolutely new idea. . . but then I discovered that I really enjoyed teaching, and then I felt that doing a doctorate might perhaps be a way towards a future in teaching, without having to change career and become a schoolteacher. (IP1)

## Summary

In sum, respondents mentioned five things that had attracted them: first, the fact that they were good in school and that doing a PhD was “part of the plan”; second, the possibility to get deep into something; third, the desire to work with useful (and not only theoretical) problems; fourth, the special relationship with a person (later the supervisor) or a milieu; and fifth, the opportunity to teach.

Do the attractions last? The pros and cons of being a doctoral student

Thinking about why one wants to start a PhD might be very different from how it actually is experienced, once having started. To begin with, almost all respondents said that they liked very much being a PhD student; that also included not only persons who had had good experiences but also, for example, those who had been on sick leave due to stress. As this study did not include respondents who had left the PhD position prematurely, this endorsement of the situation may not be surprising; yet, it should be interpreted as a positive sign.

I am really enjoying myself. The thing is that I don't quite look at it as a job, in that I find what I am researching very entertaining. This learning new things is great fun. I know that my friends say that we work too much, but, it is a bit difficult to pinpoint it, but I don't regard it as a job, so I don't think long working days are a problem. I think it is really great to be working with so many people of the same age, everybody talks with everybody else, we socialize in our free time and so on as well. (IP7)

However, there are, of course, both pros and cons to the PhD situation.

The pros

*Teaching*

Surprisingly, many PhD students mentioned teaching as one of the fun things in academia—more than mentioned it as a reason for embarking on the PhD.

I find teaching great fun. I didn't expect to enjoy it so much, but I think it is great fun. So this is the second course I'm teaching now. It is very time-consuming if you want to do it well; you are forced to think about things in a different way, which is interesting. (IP15)

IP12 actually changed his/her direction of studies to be in an environment where there was more teaching and explained what he/she found so good about it the following way:

It gives you tangible proof [that you have achieved something]. When you have managed a training session, run a course, . . . somehow you have reached a goal—done some good . . . This is an important reason why I elected to apply for a doctoral student post right from the start and that also influenced my choice of department. It has been good fun explaining to others, classmates and sisters and brothers, and I suppose I have received indications that I am not quite at sea—might perhaps even be doing it fairly well. (IP12)

*Interviewer: What is good fun about doing a doctorate?*

I suppose it is simply that you feel that you are developing and that there are many different things to do. You teach, you do research, and you do course work. Course work is probably the most boring. Teaching I almost enjoy most now. You get to feel that you are good at something, and it is a bit more sociable. You can interact with the students. (IP3)

Teaching is also something that attracts students from abroad to do a PhD at Chalmers: “I like that we can teach. It’s a very specific experience, because most of the PhDs in other countries don’t have this. I learn a lot, actually, how to present, how to explain, how to interact with people. I really like that part (IP14). “I enjoy teaching very, very much. It’s something that many of the other PhD students around me all know, and I always exchange with them the things that I do with the students and the techniques that I apply to them” (IP13).

*Digging deep into theoretical problems*

Another pro that continues to be an attraction of doing a PhD is the luxury of being able to think more deeply about a theoretical problem. “You have plenty of time to think seriously about technical problems—that is a real luxury. If you think that something seems like an interesting problem then you can devote a week to contemplating it without having to get anybody to go along with this—other than your supervisor” (IP12).

### *The freedom*

Related to the possibility of digging into a problem of one's own choosing is the freedom, for example, in regard to working hours: "I think doing a doctorate is the best kind of job you could have. There is so much freedom. Of course that might also be a drawback, but I think it is great fun" (IP5). "Yes, so that, having no fixed working hours is, of course, really nice, because ideas don't, of course, always arrive when you want them to turn up. Personally, I usually get my ideas in the bath, and then you just have to jump out and write them down quickly and get something sorted." (IP11). "The main thing that I really like, other than learning and challenging, being challenged, is that the time is flexible. Sometimes I want to work a lot, sometimes I'm not that motivated, so it's flexible. It's really good. (IP14)

### *Engaging with useful problems*

Working with "useful" or "real" problems also seems to be an attraction that lasts.

It isn't that you are sitting there inventing new mathematical theorems, rather that you get to join in solving real problems and meet people with different skills, educational backgrounds. That is probably what I like the very best. (IP1)

It is enjoyable to work on something that you find important and that feels relevant. I also like that it is a bit more applied compared with when I studied [previous subject]; that involved a fair amount of theory. Here you get to the answers a bit

quicker, you write down your code, you do your run and then something comes out. (IP5)

*A “good day” means having succeeded in research*

The pros that one has internalized may be different from what one actually feels was a “good day” at work. Here, moving forward with research seems to be important.

Of course, it’s progress in my research. That is very important. I specifically enjoy it a lot when I get acknowledgement from others. It doesn’t have to be a big appreciation but when they understand and they also acknowledge what you do, and then that also means that I am somehow important and contribute to what other people might need as well. And, of course, for a PhD student, an amazing day could also be that day when you have your paper review accepted, or you realize that the result of months of research is now being finalized and you can publish it. (IP13)

“A good day is when I get a result from my work” (IP18). Seeing results can also be in relation to teaching: “The days when I have teaching, I also enjoy that. Communicating with the students and implementing different teaching techniques with them and seeing the result” (IP13). A feeling of accomplishment can also be enhanced by setting partial goals. “The thing is that I put up little partial goals each week for what I should achieve during the week, so if I complete one of those partial goals, then it is a good day” (IP15).

The cons

*Being alone*

One drawback of doing a PhD also has to do with the freedom, and this means being responsible for organizing one's own work. Being alone in one's work can be a source of discomfort:

As far as research goes, you don't have a direct goal to reach to. It's kind of open-ended, and sometimes things don't work out as you planned and then you feel a little lost, frustrated maybe. And if you're working alone, you need a lot of motivation from within, and that intrinsic motivation is sometimes hard to bring out in those difficult times. So I think those are the downsides of working alone or doing research. (IP8)

*Stress*

"There are so many courses. This is insane. 120 point is too much. This I dislike the most (IP9)." The greatest downside of the freedom in academia is stress. One respondent described how one of the positive things about working in the academy—the freedom—also has a negative side—stress: "I am really enjoying myself, I wouldn't want to do anything else. But it is also stressful. Of course, there is a reason why I had a breakdown" (IP6).

I mean, I should not have to stress myself but I feel terribly stressed, so I am actually waiting for an appointment with a psychologist in the occupational health clinic to have a chat about things related to stress. I think I'm stressing myself more than I ought to be doing, actually. . . I think I would also see

this as connected to flexible working hours as well, because even if that is useful for dealing with a variable workload at different times, you also create a more stressful environment for yourself in that way unless you apply iron discipline to yourself. It can easily happen that you spread the work out across the whole week instead of setting clear boundaries—“here I am working, here I am off work”—and not to mix them because I think that it is actually really, really important to maintain those kinds of boundaries if you want to feel well and not be stressed out. (IP11)

Because when you are doing a doctorate, you are just never done. There is always more for you to do. . . . So, therefore, I might think that it would have been better just to teach, then I wouldn't have had to think up new things. Within a research project it might be the case that you are sitting there investigating a variant on a partial problem and then realize that this was not a good way to proceed. You might have been sitting there reading for a whole month and then you haven't had any real benefit from it. (IP12)

*Unclear expectations and “Am I good enough?”*

Apart from stress, feelings of not being good enough are a source of discomfort.

Of course, I have recurrent imposter syndrome, that I definitely have.

*HS: What was it called?*

Imposter syndrome—you walk around thinking “I am not at all as good as all the others here, any minute now they will discover that I am only here because I talked myself into it and then they will throw me out.” It is one of these things that come and go, and my supervisor is quite good at counteracting it; he is very good at giving me self-confidence, I think, but I am also quite good at counteracting this self-confidence that he is so good at giving me. For example, because our subject is so very applied, I often walk about feeling inferior because there are far too few Greek letters in my papers, or well, simply that when you see some really theoretical piece, chock-full of proofs and all that, then you think that “wow, that one must be bloody clever.” (IP11)

Several respondents particularly expressed a feeling of not being sufficiently good for the environment as being a personal problem: “I experience feelings of ‘not being good enough’ but I think it’s my feeling; you don’t feel anything from other people, everyone is very nice. It doesn’t come from other people; it’s more something I tell myself. But I think maybe it’s natural to have that (IP4). As will be discussed below, a personal experience may be anchored in the environment, even though the person does not feel it this way, and the environment may well have some features that weaken or increase such feelings.

### Summary

In sum, some attractions of the PhD lasted after the respondents had embarked on the road, such as being able to dig deeper into a problem and to work with useful problems. Other pros seemed to

materialize as they started, such as the fun of teaching and the freedom one enjoys in academia concerning both working hours and choice of direction of research. Especially the fun in teaching was unexpectedly mentioned by most PhD students. In practice, however, a good day mostly has to do with accomplishing research tasks, with moving forward with research. The cons mostly have to do with the downside of freedom, which can create stress, and also with feeling of inferiority, of not being good enough.

### Coping

Coping refers to how a person handles specific tasks in a specific environment. It fits to describe the situation of the doctoral student, as the environment and the supervisor relationship are important for how a doctoral student experiences his/her situation. Below, these strategies are discussed as individual and organizational strategies, where the latter refers to how an organization may help individuals to cope better.

### Individual strategies

“Coping” here refers to how one comes to a position on “how a person like me handles situations like these,” which is inspired by the way institutional theory regards individuals as anchored in informal norms within institutions (March & Olsen, 1989).

### *Taking time off to keep stress away*

There are coping strategies for dealing with stress and balancing demands with recreation. As several of the respondents had colleagues who had been on sick leave for stress or had ended their PhD studies prematurely, the question of what distinguishes

“survival” in relation to stress is interesting.

I am fairly good at shutting out all the world so that if I sit down to watch a film, play a game, or read a book I am very good at cutting out all else. It disappears completely. So I think this has to do with having a really strong ability to bury my head in the sand. If something bothersome happens I bury my head in the sand for a while, and then the world will have to make do without me for a while. Then, when I emerge from the sand, then I can have a go at resolving it. (IP11)

It has always been important for me to have a good “work–life balance.” So even if I know that there will be stressful periods, I’ll book some kind of holiday afterwards. Then I won’t be here because then I have to rest for a bit, but, of course, not everybody does that. So even if I know that I am sometimes at the limit, and if I know that I should perhaps not take a holiday, I will do it anyway because I know that later on this will help me come back with so much more energy and ability to work much more efficiently, and better. (IP16)

*Making a plan and sticking to it*

Keeping stress away is also about having a plan and keeping to it.

I think I have a good supervisor who helps me adjust the expectation of myself, [to see that] you can also do more. My supervisor helps me a lot with this. I am disciplined enough. I keep working. My advice to PhD students would be, Make to-

do lists, write down plans. . . and I also don't think you should have only one project. Maybe a smaller one on the side—so you can switch. (IP9)

### *Finding one's role*

Doing a PhD expands over five years and includes time to grow into a new personality in relation to this job task. Many describe the path to finding one's personal role in academia as demanding and involving the learning of different coping strategies. Finding a role also means taking a clearer stand toward feelings of being not sufficiently good. Several respondents described feeling that “no one was like me” and that a confrontation with a milieu perceived as homogeneous, and where one stands out as different, was challenging. “I had difficulty finding my identity because I was different—in terms of subject” (IP5). “It was when I started to see myself as the interdisciplinary doctoral student that I actually am, that I started to feel that I am actually good, and stopped focusing on my deficits” (IP16). *HS: But you make it sound as if this journey was quite easy? Was it?* “No, it has been bloody hard. It has been anguish, anguish, anguish. Really (IP2).

For many, doing a PhD means going from an environment where one felt oneself to be among the brightest to a milieu where one is average. This entails changes in self-image.

I don't know if it is all that relevant, but I suppose it is simply that, it is one of these things that, all the time, ever since I was little, I was top of the class at this and that, and then to be dropped into an environment where all the others were also

top of the class, when all of a sudden you are at best mediocre, even if it is ridiculous, I know, but you feel it. (IP112)

If one has had problems with stress, this change in self-image is even more strongly felt.

I haven't felt the pressure to have to be best, but because learning has been easy for me I have been quite used to being clever, but now, when I haven't been that good, not managed ordinary things, this has meant a adjustment of my self-image. (IP17)

### Organizational strategies

#### *Finding one's role in a homogeneous environment*

Coping has a lot to do with the demands of the environment, especially when it comes to finding an identity, as this necessarily is created in interaction with the environment. Finding one's path is an endeavor that can be facilitated but also constrained, depending on the milieu. The doctoral students who talked about finding their role on a difficult path had in common that they did not easily flow into an existing milieu. It may be because they were hired to develop a new line of inquiry, which meant having to create a research milieu in its own right.

I thought that I was entering an atmosphere of people doing very different things but instead it was a very homogeneous group, and I thought that was a pity. But now I have learned to exist in this environment. Of course, it was also the case that

because I didn't have those skills, or, it was difficult to know what skills I had, then it was always the case that "Oh well, [own name], you don't have to manage this first time round. (IP2)

Interviews with supervisors also paid witness to how the situation is very different for doctoral students who are recruited as "second PhD" to a research project where most things have found their place, in comparison to how it looks for the first PhD where things are not at all that firmly set.

Different research groups have different cultures; it all works a bit differently. Then, it is also a case of entering under differing circumstances. Some projects are very thoroughly organized. For instance, if you join as the second doctoral student within an ongoing project, it is often very much easier for that doctoral student than if you were starting up a new activity where the doctoral student had to take a great deal of responsibility. (IPH4)

Even if different research projects in this way require more path-breaking in terms of identity by some PhD students, it is worth noticing is that it seems that a homogeneous milieu makes the process of finding one's identity more difficult. This is not something that operates only in relation to being different in research direction but also in relation to social background, and it is mediated both by how homogeneous, and also by how elitist, an environment is:

What I find difficult about doing a doctorate is the social

climate. I suppose it is partly that I come from a different cultural background than most of those who are doing a doctorate here, and with this I probably mostly mean from a class perspective. But also that people are so terribly competitive, when I can't see any point in that.

*Interviewer: How does it show?*

It is people's interests, topics of conversation, the general interactions. . . It is a question of all the time showing that "we are part of the elite, aren't we, tee-hee." It is to some extent that attitude that I don't quite like. (IP3)

### *The elitist milieu*

Respondents tell stories of an elitist milieu that is likely to contribute to the imposter syndrome described above and where we can question whether it also contributes to research. It can be expressed as demands on knowledge that are seen as important within the institution in a rather authoritarian way: "They said, 'If you are going to be a doctoral student in this department then you'll have to be able to teach in these courses'" IP14). Another example is how students learn not to pose questions.

Well, it was during the final years of secondary school that I was asking lots of questions' at that time I was always asking questions.

*Interviewer:: And when you arrived at [the department] you noticed that this was not possible?*

Yes, it was evident already after the first lecture, when someone asked a question and the lecturer said, "since you seem to be the only one who didn't understand this, we can

talk about it afterwards.” Similarly, if someone asked a question, then you could hear some people sitting there sighing.

*Interviewer: Who was it who said that?*

It was an old maths teacher. Other than that he was very good, but to some extent he set the tone. (IP5)

It seems that such cultures are also sustained by persons who have embarked on an upward career trajectory and probably experience the competition more fiercely than others.

We have one group where the leaders are post docs and where we talk about certain subjects. Once I questioned what the leader thought we should talk about, and I said that I thought that we ought to focus more on fundamental aspects. His reply was that “if you don’t know those already you might as well leave.” And that is typical, those kinds of comments that keep people down so that they can continue to throw their weight about. (IP3)

In such a milieu it might become more important to show that one has the answer than that the best answer is produced:

Since we are dealing with a specific subject area I would have thought that we should discuss the subject area more in the spirit of “oh, I see, is that the way it is, how interesting,” but instead it is more that you must all the time beat your own drum and go “see there, I knew this and you didn’t,”—that it ends up being that kind of style. People all the time have to

assert themselves in contexts that are specific to the subject. And I can't see the sense in that; I can't see why you must compete. (IP3)

Another example is that people in power seem to protect themselves from criticism, as a PhD student who was engaged in a conflict experienced:

“We had a departmental meeting later on, where this [problem] was raised, and basically there were three professors who spent 15 – 20 minutes discussing this question and mostly telling us why the person responsible had not made a mistake by assigning teachers to the ‘wrong’ courses. They argued that ‘it was probably a failure of communication’ and after a female professor provided input they said ‘let us now close this discussion’... I would say it is an example of old men protecting each other’s backs and a culture where it is more important to defend and support your workmates, than to address problems”. (IP1)

*“It’s worse in other places”*

Even if these responses describe an environment that is not at its best, Chalmers is not the worst case, and several of the respondents said they liked it so much at Chalmers, and/or their particular department, because it was better than where they were before. Some respondents found the environment much better than the place they came from that was worse.

And that was part of why it was such a relief to come into this

environment, that there wasn't this constant pressure to be the best, the smartest and not to ask questions, you mustn't seem stupid and things like that. (IP5)

I find it very nice. At least from my experience in [the previous situation] because I come from a small university and PhD students were not treated so well; they need to work a lot and they don't have such an important role as here. Here, students can call the professor by name, but in [the previous situation] you call them by surname. It's a more distant relationship. Also, during the PhD they can't spend so much time with you, so you're a little lost. And the environment itself—here we have a kitchen, I have an office, and everyone is very nice. I wouldn't have expected that such a feeling would have existed, so I'm very happy (IP4).

“I had a very good experience of the whole working environment. The hierarchies were flat and you also actually spent time with your supervisor, it wasn't like that in [the previous situation]. There it was rather patriarchal and hierarchical. (IP16)

### Summary

Coping on the *individual level* has to do with strategies for coping with stress, including finding a balance between work and recreation. However, it also has to do with finding one's role and research identity in the milieu. Combatting feelings of inferiority is part of this process, as one has to find a way to consider oneself sufficiently good. Although this is an individual process, organizational features may enhance or impede feelings of inferiority.

The *organizational milieu* can support coping, but can also make it more difficult. It seems as if a homogeneous milieu enhances a sense of feeling different, which might impede identity building for those who do not fit the pattern offered. Homogeneity can manifest not only socially, but also scientifically. Generally, the process of finding one's way is more difficult for PhD students who work with new projects. Further, there were stories of competition, and “feeling elitist,” that must be discussed with regard to how far these aspects actually increase the quality of research and how far they work detrimentally with relation to this goal. Finally, PhD students who came from other environments, both internationally and from different departments at Chalmers, told about these things being worse in other places.

#### Coping in the supervisory relationship

An important part of coping has to do with the supervisory relationship. Below, this relationship is highlighted from the doctoral student perspective and the supervisor perspective.

#### The doctoral student perspective

Finding a supervisor with whom it “clicks” was one of the factors that persuaded students to embark on a PhD, and this relationship is, of course, important for the doctoral students. “Because I think having a good supervisor is very, very important if you are to have a good experience or even manage to get yourself through these five years.” (IP11)

*Being interested and enthusiastic, and non-hierarchical*

Characteristic of those who waxed quite lyrical when they talked about their supervisor was that they described the relationship as a kind of teamwork, where the two are working closely together.

I mean, he is fab. He is super-super good, really. Tops. You feel so inspired when you have meetings with him. He was also very good at the beginning here, bringing me into the project, and he had already prepared good tasks for me to carry out even on my first day, so that was a good introduction. (IP5)

Relationship with my supervisor? Very inspirational—that was why I chose to change my specialization. The way he explains things gives you the impression that he actually understands what he is talking about. Very calm and methodical (IP12)

My supervisor has the habit of saying “if you have a good idea, just go for it, I’ll fix the bureaucracy,” or something like that. Just to be trusted and to get the opportunity to investigate your ideas. . . We meet up regularly, we get on well, it is productive, and at the same time we have fun at our meetings and when we think up new ideas and so on, so I think it is working very well. (IP11)

What is working well is that we are friends outside work so we can talk about things that are difficult and things that are good and provide constructive criticism, while at the same time it is very serious when we are talking about the research. It isn’t so hierarchical. I feel that there is space for my ideas, there is

space for me to say what I have got to say and for me to steer my project in the direction I want. At the same time he is not afraid to say what he thinks. I feel that we are listening to each other; even if he holds the baton when we have our meetings, and he has the final say, it nevertheless feels like it is all on a reasonably equal footing. (IP15)

These excerpts describe how a supervisor should be interested in the research topic and develop an equal relationship with the doctoral student. In particular, fairly young supervisors who didn't have as many doctoral students seemed to be good at finding time and supporting the work of the student.

*Support for dealing with stress*

Another important feature of a good supervisor is a willingness to support the student in dealing with stress. There seems as if more experienced supervisors are better in giving this kind of support:

*Interviewer: What is your relationship like?*

I suppose it is a bit ambivalent. Of course, he is very young and not particularly domineering. . . My feeling is that the older supervisors have a completely different style. They are often more distant but at the same time better at this thing of saying "this is going well, you are on the right track." (IP3)

Latterly, I have been feeling that "oh, no, I have only 18 months left, I must complete everything now, now, now" and been terribly stressed out. It did feel a bit better when I could talk about it, and he was able to show me in a calm and

objective manner that “look here, you are only lacking very, very few teaching hours, one more paper, and then you have a really good dissertation, you need only very few more course points; it is nothing to get stressed about, everything will sort itself out in good time.” That, of course, made me feel a bit better, but that side of it is still there at the back of my head. (IP11)

To keep the stress away in the form of feelings of inferiority is also something a good supervisor tries to do:

Well, that is something that I perhaps feel that my supervisor has not been that good at, giving praise, even if he is getting better at it, so he has perhaps realized that it is needed. As far as I am concerned, positive feedback is terribly important. So that I can feel proud, particularly because I might not myself be very good at thinking that what I have done is very good, then it is nice to have someone else telling you that it is. (IP1)

Other things about being introduced to an environment—this isn’t exactly his strongest point. Almost all supervision time is spent discussing things that are directly related to the research project. I have requested that as well, because initially I didn’t get any general image of the research project, was just sitting there with my questions of detail—no sense of what was going on in a wider perspective. (IP12)

*Helping to plan the work*

Being good at planning one's work is a good way of holding back stressful situations. Here, supervisors may also help:

My supervisor, generally speaking, doesn't like talking about boring things like planning. He enjoys looking at data, he really enjoys it when I bring along strange graphs and "let's see, what is happening—wow, that's fun." But he sort of squirms each time you come wanting to draw up a plan for something, and it has taken me quite a lot of time to understand that I have to sort of force him to do it. And, of course, these days I do this, but I am not too keen on talking with people if they start fidgeting. You notice this, of course, and then you feel that you want to get away from it. It is a fairly natural reaction. (IP2)

*Response on whether you are "good enough" – appraisal talks*

Stress also has to do with not knowing what it takes, how high the bar is set for one's performance.

I think what I would have needed more of would be a more continuous evaluation of how things are going and how you are doing the job. I haven't had a single performance review with my boss, because supervisors are not allowed to do performance reviews with their students, so therefore, I have these with another professor in the same department who doesn't know me. So, I have been here for a year and a half, but nobody has told me about my strengths or weaknesses, what I need to work on, those sorts of things. (IP1)

One thing that could work better—it would be good to know that a supervisor will give both positive and negative feedback, that she would speak up if there were problems. She doesn't do it very often, whether it is because there are no problems or she finds it difficult, but I don't quite trust her, actually, to give negative feedback when this is needed. (IP17)

So how can a supervisor persuade a PhD student that he/she is good enough? “We have regular meetings, one to two a year, to discuss planning and not research. And then I ask him do you think I am good enough. He says: “Why wouldn't you be good?”—and after the third time I started to believe him (IP9).

#### *Communication skills and holding your temper*

Communication skills are generally important, but in particular to find out early if something is not going according to plan. However, not all supervisors have good communication skills. Some PhD students describe their supervisor as “a bit temperamental” and “not always good with people”, while there is also a narrative of the relationship being marked by fear. “I'm also afraid of him” and “I think they will be happy to get rid of me and I will be happy to get rid of them”. These are the worst examples of communication failures between PhD and supervisor.

What can be said, is that it's important to detect malfunctions early and that several PhD supervisor relationships go through a period of mal-communication or before they run smoothly.

Even though the sample is not that extensive several respondents talk about their experiences of having been on sick leave because of stress related issues and also about these things happening in their environment. All respondents that have experienced this talks about a situation that did not work and where time passed without anyone doing anything. Hence, a general conclusion could be that better communication would make all parts earlier notice when something does not go as planned.

“Sometimes you keep trying to find a solution to something and perhaps you wouldn’t dare to go to the supervisor because you think that you should do it yourself, and then perhaps you are torturing yourself for too long and you should have contacted the supervisor a bit sooner” (IP16).

Supervisors who are described as being good in communication often are said to have psychological skills: “His hobby is psychology. He is interested in personalities and what motivates persons. He tries to remember how it was for him. Sometimes you get stuck, gets frustrated. He has open conversation, ’how are you feeling and why’. Every time he thinks I am frustrated he comes to me and asks (IP9).

### *Working conditions*

It is better if you start looking at the doctoral student post as ordinary employment; the more you are able to regard a doctoral student as an employee, then I think it is quite OK to act like that, but it becomes problematic if you are of the opinion that doctoral students are serfs and that you are

terribly disappointed if a doctoral student leaves ahead of time, but at the same time you put a lot of energy into those you believe in. Then, basically, there will be doctoral students who feel that they have to stay on for five years but nobody really cares that they are there, and of course it feels as if you can see that there are people who feel obliged to complete it, because of funding, but there is nobody who is particularly interested in what they are doing, and I think that is a big problem. It doesn't really help that person to feel good. (IP1)

## The supervisor perspective

### *Importance of communication*

The purpose of supervision is, from the side of the supervisor manifold:

”There is a common understanding that there is only one purpose, but there are several; being the last teacher in a way, to be a mentor, to be a coach, ... its important also to support after the PhD degree, to help them plan something that suits them and help them” (IPH3).

All interviewed supervisors emphasized how different each doctoral student is, no just in terms of their research topic, but also how they are as persons, how they become motivated, and so forth.

Of course you have to adapt yourself to the doctoral student. Doctoral students differ from each other; they are like all human beings, they are different, have different needs, and, of course, the aim is that you have a current value for the doctoral

student and a final value, and since you also have the time aspect there is a “should be” value also for the doctoral student. (IPH4)

The supervisor relation varies, partly in how it is carried out in a formal sense, partly due to personal chemistry. Some doctoral students are the kind who come in, “now I have something I’ve been mulling over for a while that I can’t quite sort out” and then you are standing there tossing ideas at the board. Usually some new ideas come up or you find some new directions to search in. That is the supervision I like best, when you do just exactly the supervision that is needed. But they are not all like that; some sit there for several weeks by themselves without asking a single question. Usually they haven’t got anywhere by themselves, either, but as a supervisor I lose control to a very large extent in that sort of situation. (IPH1)

The latter supervisor described both how doctoral students are different and also how communication is essential for developing a good relationship. Communication must be seen as essential for a good working relationship, especially when things do not go as planned:

Of course, it is very rare that things go according to plan, and then, of course, you have to deal with the situation that then arises with stress and perhaps different expectations. It might be the expectations of the research group, the expectations of the doctoral student, my expectations, different views of the requirements for a doctoral dissertation, so that you align

yourselves in such a way that you have a common view of what is expected. At the beginning the doctoral students usually have a very fuzzy view of what they have got themselves into, and then after a while it feels like a terribly overwhelming goal when problems mount up, and then you have to guide them through this process and try, as a supervisor, to get them to understand that this process is normal and that this is what things usually look like in projects. (IPH4)

*“Unclear expectations” from the viewpoint of the supervisor*

The doctoral students talked about increased stress when expectations were unclear.

I think it is very much a question of my own self-confidence, which is very unstable, and which was damaged quite a lot when I first came here. Expectations were very unclear; they didn't know what I had knowledge of, and I didn't know what I was expected to have knowledge of, and all of a sudden I felt that I had come here, that there was a whole load of expectations that were not very explicit. It was very difficult to communicate around expectations and competence. (IP2)

From the position of the supervisor, such lack of clarity can be the consequence of not knowing how good a student is or what constitutes a well-defined problem to examine in a PhD program.

"That's really a cause of concern for me in the supervisor relationship, whether the problem is wrong. Maybe someone else works with it on the other side of the earth but will finish

before, or the problem is already solved, but no one remembers the article anymore or the problem is too difficult – or too easy.” (IPH3).

This problem of not having full control over the research problem the doctoral students take on, is prevalent both in more theoretically driven research and more applied areas.

You might, of course, ask yourself, what is the easiest way forward? Strictly speaking that would be when everything is well organized and everything is well defined and everything is clear and transparent and all problems are just difficult enough and everything moves ahead at just the right speed, not too easy so that you get bored but just enough so that you get just enough of a challenge. But, unfortunately, the reality of real projects isn't like that. . . In the case of doctoral students, of course, you have to modify the doctoral projects a little bit by and by; depending on the progress made by the doctoral student, usually there is space for that in most projects. (IPH4)

It is a matter of not knowing how complex a problem is, but also of not knowing how a particular PhD student performs.

Why PhD students refrain from continuing an academic career from the point of the supervisor

As a supervisor, of course you want to keep the students that you find particularly talented in your team, or within academia. One supervisor tells about a “super-talented PhD student:

“He was about to compile a major research grant application with lots of other people but then he saw all these professors who were retired with their CVs and he suddenly could see himself in the future be doing that. ... I think this is mostly a critique on the appraisal system, that it’s about writing papers that are very similar and no one cares about in the end... I think he saw a difference between the people he admired and those who had academic status” (IPH3).

#### Summary

It seems clear that communication could always be improved in the supervisory relationship. This is especially important when something is not going according to plan and when, as often happens, time passes without the people involved noticing that something is wrong. One respondent told about a meeting that they organized at the department in which all participated; that can be one way of increasing this type of organization:

We arranged get-togethers where we discussed our expectations of the year of research, what we thought was good and bad, long-term ambitions, where we saw ourselves going—good group discussions—important within the

group. . . You might, for instance, say that you didn't think that you were given enough space, people who had collapsed completely, you are not sufficiently—we addressed that as well—those were very good sessions, everybody left them feeling much happier and more positive. (IP10)

The problem with not sufficient planning- or appraisal assistance seems to be something that supervisors can integrate. The problem with unclear expectations and communication generally is more difficult, as it partly reflects that the supervisor does not know how difficult a particular problem is and how skilled a particular PhD student is. Even though communication may form a way forward, to decrease the problem, not everyone can develop to become a communicative virtuose.

#### Selection processes for the PhD position

The main question in this study was to shed light on the selection processes. The normative goal is that these processes should be as fair as possible and not discriminate on grounds other than those related to the specific work-tasks at hand..

In relation to starting the PhD almost all respondents had previous contacts with their supervisors, for example during their masters. This is interpreted as of contacts is a necessary part of becoming a PhD.<sup>10</sup> According to the respondents, it seems common to have

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<sup>10</sup> It should be noted that this builds on a selection of respondents who actually received a position. To examine selection processes more thoroughly also those who did not would have needed to be studied.

done a master's with the supervisor who might be considered for the role of PhD supervisor. Normal procedures of showing oneself as a talented student are therefore often part of the plan to receive a PhD position. "I was already looking for a PhD position and I realized the supervisor might have something, so I started doing my master's thesis with the same supervisor" (IP13). Another person talks about how the supervisor got really impressed by who the student could self-study a required course and get the highest grade, which secured the person a place as a PhD student. Having an interest in the topic is also considered very important to be able to pose the right questions and also to keep up the interest for the duration of the PhD:

I think it is important to devote yourself to something you are genuinely interested in. . . perhaps that is when you ask more questions and better questions than the average student during lecture breaks and perhaps catch the teacher's attention. (IP12)

I emailed everybody I knew who in some way knew something about doing a doctorate and asked them how it worked, what you might think about, what it entailed. One of those I asked was my old supervisor from my previous job and that person gave me a tip about some vacancies they had there. (IP3)

They [the project leaders] accessed Ladok and checked who had good results on which courses, and then they emailed people they thought could be interesting. And then I was invited to do my exam project here and then I accepted. (IP1)

At the same time as the respondents describe long interview processes, which indicates that the processes of being accepted as a PhD student runs along open competition. There is nothing in the interviews indicating that these processes are something else than “fair”. However, given the almost total presence of previous contacts, this clearly also plays a role.

The possibility of a pre-decision of a candidate is only problematized in one occasion and that is in relation to gender. It is discussed that outcomes of an interview process might be made-up in advance when a good woman is among the applicants, as women are in minority and that men who compete with these candidates don't have a chance. Regardless if such pre-decision is actually taken place, such discussions are problematic and should be discussed in an open manner. This is further discussed in the section gender.

### Summary

In relation to standards of fairness that hold transparency and open competition as important, this study seem to indicate that selection processes to PhD are open however almost all respondents did have earlier contacts with their supervisor or other persons in close to him/her, which make contacts seem a necessary condition to succeed in these interviews.

### Selection processes for a further academic career

The most central question in this study is selection processes to a further academic career. This section summarizes features that are mentioned as important for choosing or not choosing a further academic career.

*Am I good enough?*

To enjoy a further academic career and to have fun doing it means to get the possibilities to actually develop your ideas and having colleagues who actually want to interact with you. An important question is then “Am I good enough?”

I want to continue; the question is if I am good enough? It’s about what comes after the post doc. It’s difficult to get a permanent position. This uncertainty that you have for several years. This is why I ask if I am good enough. Am I good enough to come up with good questions, am I good enough to lead people. There are a lot of changes from PhD and researchers. The independence that comes with the price. . . I’m a driven person, I know I have the energy but don’t know if I have everything.” (IP9)

*HS: Is there anything else that might make academia attractive?*

Possibly a bit more self-confidence. As I mentioned, I hadn’t planned to do a doctorate and then I hadn’t planned to do any post doc work, since I had been thinking that “I am probably nothing in myself, I am not smart enough.” So I don’t know if I would be able to do well within academia. Perhaps now during my final year, or during my post doc, I might develop a bit more self-confidence, that I am actually capable of doing research on my own. (IP16)

These respondents talk about how doing research of your own, including coming up with good research questions, is quite a different thing from being a PhD where you do not stand alone with

these problems. Several of them, especially the more senior respondents, also have a more realistic picture of what makes it fun in academia. If you do not find people who think your ideas are worthwhile and interesting to explore, there is no fun in working.

*It takes a long time to know you have succeeded*

For most of the respondents a further academic career was far from evident. Among those who openly said that they did want an academic career, they added, “if I am good enough” (IP17). “I like many things. I like the field in general. I want to stay in academia, again if I am good enough for it” (IP 9). This reflects that doing an academic career is not decided as quickly as one receives a position in, for example, the industry. Generally, it is seen as a long process before you know you have succeeded:

This thing about employment status, of course, isn’t an entirely insignificant aspect. If you want to aim for a faculty position, then you must first do a post doc abroad. And if you intend to come back to Chalmers you need a lot of lucky breaks for there to be a possibility of a research assistant post. (IP12)

*No to project leadership and fund-seeking tasks*

Among the things that repelled students is that the higher one gets, the more project leadership-oriented tasks, including fund-seeking, one has to take on—this they found discouraging, along with stress and being constantly compared with work colleagues.

To be honest, I have no intention of staying on. I’m planning to use the post doc period to learn new things, develop

contacts, hopefully spend some time abroad. I don't particularly enjoy sitting writing applications. I enjoy technical problems and problem solving, [and] the higher up you get the less there is of that. This is my extremely clear experience of everyone I have spoken with, when I have discussed careers. (IP10)

Yes, right now it feels as if I would like to continue within academia, but I have also got the impression that a lot is about applying for money, applying for grants, being more of a project leader and not doing that much research myself. It is possible, at any rate, I imagine I might do a post doc and see how that transition works out, because that would at any rate be like a little intermediate step. Whether it works out or doesn't work out, and then you'll make your mind up based on that. (IP9)

Then you also see how the senior researchers in the group, in the department, in academia, how hard they work. There are many who work really hard for their existence. Research grants, etc.—it must be like running your own small business; you market your activities, and then it is a question of doing good stuff and attracting people. This is, of course, very demanding. (IP12)

*No to stress and competition*

What I feel is that precisely because of the social climate I would probably sooner work in industry in the future. For me this is an important matter.

*HS: Then you are thinking of this thing about competitiveness?*

Yes, exactly. It might be fun to compete in the context of a competition, but always to have to be on your guard when you talk with people at work who ought to be there to give you support, and you yourself ought to be there to give them support, that isn't anything that I want for my future. (IP3)

It's different from person to person, but I'm the kind of person who requires that nurturing. I nurture my students and I feel responsible for their future. I would want my supervisors and managers to feel that way, and feel responsible for my future and my learning and so on. And that doesn't happen, and sometimes, for me, it makes no sense in continuing. (IP8)

I try to let the opportunities be open so I can consider both academic and industrial aspects, but the main thing for me is to not have stress as much as I had during my PhD, for example. So it is the main thing that I will consider when [it's time] to choose the future position. (IP14)

In academia you, of course, have more freedom than in industry. But those I know who are working there are also able to be a bit creative and decide for themselves what they want to research, so long as they receive research requests, those that pay. (IP16)

There are few areas of work where the employees constantly are compared with their colleagues and where a lot of energy is put into how to make this comparison even more precise:

All these bibliometrics, constant evaluation. It is more or less as if you should be of a certain ideal height, for instance. . . . As a person? Yes. That you have to be 180 cm or 175 cm or whatever, and then you bring out the measuring tape every Monday morning and check “yes, you are still 184 cm” or “you are still 192 cm” or whatever. I think this is quite repellant for some people. I can also imagine that certain people who are extremely competitive, strictly speaking, it isn’t particularly interesting what you do, what is important isn’t whether what I do is good; instead what is important is that I am better than you. That is what makes them tick. And this is encouraged more within the universities than in industry in my view. Naturally, if you are going to work in some mega-organization, like ABB, Volvo, or Astra, if you are aiming to become some kind of top boss and get onto the Group Executive Board, of course, competition for that kind of jobs is crazily fierce, but this, of course, affects a very small proportion. (IPH2)

*Yes to concrete results*

Preferring to see direct results of one’s efforts is also a reason not to choose academia:

I didn’t have any plans for a career in academia. . . . I am probably too fond of seeing tangible results from what I am working on. Now, of course, it is papers that you produce; those constitute the export product itself, so to speak, and, of course, that is enjoyable, but I do believe one would in the long run appreciate it more if the results were useful in some more tangible way. (IP12)

I feel that industry is a bit more attractive . . . for the reason that you actually make things, you construct things. I am not saying that a researcher does not contribute to society but I think it is easier to have an impact if you are in industry. And just like many others it would be fun setting up your own business. (IP15)

*Combination with family life*

The demands of relocating to continue an academic career were also mentioned. For some, the idea of traveling to other countries was one part of what makes the work fun. Others mentioned the difficulties of combining a career with having a family. Importantly, this was mentioned by as many men as women; however, about half of them did not have children yet.

If possible, I could imagine continuing teaching. But I would, of course, never get a research post here, and I have no idea where I could continue afterwards. . . It might be possible to move to some other research group, as a post doc or something like that, but I don't feel I can do that for any length of time because my children, of course, have their roots where we live and so on. I think it is really important for children to have roots somewhere. (IP3)

I have always said that I don't want to stay on in academia and I think that is still how I feel, and this is partly because, as I was saying, both what is best and what is worst about academia is that you always have something to do. I know that many here have a family and manage to make that work, but I think

you must be very, very good at time management if you are to make something like that work. (IP15)

### Summary

The reasons for not choosing a further academic career relate to the pros and cons of the PhD situation. Competition, administration, and high demands speak against a further academic career, as does having to move. These are ambitious people, and the fact that it takes such a long time to know you have succeeded, meaning that you have a permanent position in a place you like, is discouraging.

What seems attractive with the future academic career is to move to different places; to actually succeed meaning continue to have freedom to work with your ideas and interact with people who think you are smart.

### **Gender?**

The report shows generally few gender differences in responses. The survey responses in the employee survey showed that women are slightly more discontent than men, but differences were very small. The qualitative interviews also showed few examples of reasoning where women and men differed. Women and men mentioned similar pros and cons and also expressed similar needs. Assessments and needs in the supervisory relationship seemed to be similar between women and men, as were their experiences regarding how their supervisors treated them. Even conflicts between studies, on the one hand, and establishing a family and having children, on the other, were mentioned by both women and men. Hence, one major conclusion from this study is that gender differences are not

prominent and that general strategies and tools can be applied.

However, two issues need to be discussed in relation to gender: the question of role models and the question of dissatisfied men.

### *Role models*

Role models are commonly seen as important for minority groups to feel that “persons like themselves” can take up a career where they are in minority. In the sample, some female respondents said that they appreciated role models, while others said they didn’t care:

By and large it feels as if all the senior researchers here are men. And this is something I just don’t understand because I grew up in a very equal home, where there was no difference between male and female, as I saw it, and half of us were guys and half girls during my engineering studies, and if you look at teachers I also had a fair number of female teachers during my studies. (IP2)

”One problem that I see, regarding gender an staying in academia, we dont have many models. ... [my model] is everything, and im happy that I have a woman to look up into. Men have so many role models, we dont have so many as women (IP9).

It’s not mandatory that I personally have to have women around me, but I think it brings in a balanced environment, so it’s good that way. It should be that way. Otherwise, you don’t feel empowered. I don’t know if all women feel that way; you

don't have to feel that way every minute of the day, but in general you don't feel empowered if there isn't a balanced number of females at your workplace. You feel less empowered, I think. So yes, it's important. (IP8)

I have never really looked at it like that. On the other hand, I remember from Physics being really pleased when there was a female lecturer, because that didn't happen many times, but it was good when it did happen. (IP5)

Still, some others didn't see the need for role models and said they "don't think like that." Yet, among these, some acknowledged that co-working seems to happen along gendered lines:

"I have never really looked at it like that." (IP5)

I don't quite feel that the culture is somehow discriminating against women or for that matter against men, but, on the other hand, I have often thought about the fact that it often is the case that women are collaborating with women and men are collaborating with men. And if you think about people higher up and who they are collaborating with it is often the case that the women are collaborating with other women. (IP3)

*Who is unfairly treated?*

There are also indications that an "inverted" gender equality discussion is present at Chalmers. A basic tenant in academia is that recruitment should be based on merit whereas other features that might come into play, such as gender, should not be paid attention

to. However, there are discussions of "hidden quotas" referring to how talented men might have difficulties to receive a position when they are competing against a talented woman. The reasoning then goes like: "this position is for a woman but we need to invite men to interviews as well otherwise it looks strange". This is not very present in the material, but it is still important to discuss, and it also addresses findings from earlier investigations at Chalmers conducted by Stensöta (2010; 2014; 2016).

First, a study on recruitment patterns at Chalmers building on a bibliometric analysis of total selection received position in competition during 2,5 years, find no evidence that women were given a special route to positions. This finding spoke against both expectations of women being discriminated against, which was the general finding of Wennerås and Wold (1997), where women needed to be 2,5 times more qualified than men to receive a position, but also against expectations that women were given a "lighter route" into academia to meet demands of gender quality more quickly. Hence, the study of Chalmers did *not* find any evidence that such discrimination occurred in actual recruitment at Chalmers.

At the same time, the present study, as well as previous interview studies conducted by Stensöta (2014; 2016) give at hand that senior members of departments touch upon the problem that gender equality aims may also distort "fair" competition so that individual men may be discriminated against when the unequal balance between women and men as groups is targeted.

Such discussions are problematic for several reasons: First, in related to the topic of this study, and the selection processes to the PhD: this study gave at hand that personal contacts are important when it comes to receiving a PhD position. We might interpret the presence of contacts as indication of a kind of pre-decisions in PhD-candidate selection, in which case such selection would be more common. Another story that tells about interferences to open competition is that the person who have developed a new area of research comes first in hand if this research continues, which also violates the open competition-principle. If this is so, then the story about talented men don't standing a chance if they compete against a talented woman can be interpreted as if this type of unfairness does not stand out as problematic in itself, only when it is men who risk losing against women.

Second, if it is actually so that men refrain from competing against women, meaning that they don't apply if they know there is a good woman competitor, this is of course not good. This possibility is discussed in previous research: Just as there is research on competition that says that any individuals handling of competition depends on who they compete with, and that gender plays a role here, so it might be more embarrassing for men to lose against women in a competition for a position. At the same time, the opposite is also possible: if a man loses against a woman this can always be rationalized as her being favored because of her sex, which would mean that losing against a man is felt more "real".

Third, one could argue that the problem is that the reasons for choosing candidates are hidden and not transparent. From this point

of view it could be defensible to use quotation to receive more gender equality, but it should be open so that no individual persons (men), think they stand a chance but in reality, do not. That the lack of transparency in itself is a problem, is backed up by research on stereotype threat, where it is argued that individuals perform best in an environment where they are convinced that rules are transparent and fair.

Fourth, the more general problem addressed is how historical discrimination of women can be combatted today without discriminating against individuals in this process. As Chalmers has a goal of not recruiting more than 70 percent men, this most likely involves situations where women and men have similar merits, and the woman is selected. How can an organization cope with these situations without developing a “hidden” discussion about “hidden quotation”?

One respondents also provide a story about men higher up in the hierarchy who cannot cope with gender issues becoming important: “I know that we have some professors who are almost ‘men’s rights’ activists, this mindset that thinks that all who care about equality are ‘bloody social justice warriors’ and that sort of thing. I have heard the story of a Christmas party where they had hired a speaker on equality and one of the professors got terribly agitated and was going to start arguing with the speaker, and then a few days later he bombarded the email-list with a lot of links about the ‘evil feminists’ and things. And I can just imagine, I mean, I really hope that he doesn’t have any female doctoral students because being in that situation must be dreadful (IP11). Even though the example above

is a unique instance and the respondent did not experience it him-/herself – it might be something that happened long ago, it should not occur in a public environment.

### **Concluding discussion**

The concluding discussion first summarizes the findings from the interviews about pros and cons of the doctoral student period that affect the selection processes. These features are discussed on different levels: individual, organizational, and that of the global/national research community. Three issues are then discussed more at depth: 1. coping on individual and organizational level; 2. the supervisor relationship and 3. findings related to gender. This presentation leads to some points of discussion and dilemmas that need to be addressed as well as suggestions for how to proceed now including who owns the questions.

#### Selection processes

First, the selection process for doing a PhD almost always goes beyond the student establishing contact with a particular person/environment, and is followed by a formal, often ambitious, recruitment process. This study cannot shed light on the question of whether these interview processes are “fair,” but it is striking that personal contacts with a particular supervisor or environment seem a necessary early step in embarking on a PhD. Most respondents had some personal connection to the department where they applied for the PhD, and although they had to undergo a formal hiring process with interviews, it seemed as if this personal contact were important to succeed. Table 2 summarizes the findings from the interviews of

the pros and cons of the doctoral student period that affect the selection processes for future academic careers.

Table 2. Pros and cons affecting the selection processes

	<b>Pros</b>	<b>Cons</b>
<b>Individual</b>	Teaching “Digging deeper into problems” Freedom Working with “useful” problems	Being alone Stress Unclear expectations “Am I good enough?”
<b>Organizational</b>	“Better than in other places” Nice people	Elitist milieu Homogeneous milieu
Global and national <b>research community</b>	“Digging deeper into problems” Freedom Working with “useful” problems	Demands a lot of investment Long payoff times—“It takes a while to know if you have succeeded” Project leadership and fund-seeking are less attractive than doing research

Table 2 summarizes the selection processes as pros and cons of the PhD period, as experienced by the respondents. As expected, the pro of academia lies in the freedom and the opportunities to dig deeper into problems, and also includes working with “useful” problems, which can be experienced as positive in comparison to the often more theoretical bachelor’s and master’s studies. What is unexpected is the fun many PhD students reported about teaching. Teaching was

experienced as concrete interaction, instant rewards, and so forth, which formed a welcomed break in the sometimes unrewarding research.

On the con side there is stress and being along as well as unclear expectations and feelings of inferiority. These features can be enforced by an elitist and homogeneous milieu, which makes it more difficult for people who do not belong to the mainstream to find their way.

The future academic career is partly structured by national and global features, and especially the more senior PhD students acknowledged that a future academic career would demand a great investment of time and energy, and that payoff times often are long. “It takes a while to know that you have succeeded.” The journey from PhD studies to gaining a faculty position takes several years, over one or more post doc positions, research assistant positions, and lectureships.

Several respondents expressed a real concern that they would not be good enough to perform what it takes to build a research environment. Some others were repelled by the project management that comes with becoming a successful researcher, applying for funding, and so on. Further, almost all respondents mentioned that it takes a long time to recognize one’s success, defined as having a permanent position and also being in an environment where one’s talent and skills are appreciated.

Previous research indicates that achieving such success becomes more of a hurdle for women than for men, as men can postpone their parenthood biologically longer than women and also because their priorities in life differ. However, in these interviews men also expressed needs to be at home with children, so either young people regard parenthood in a more gender-equal way, or they have not yet come into close contact with the dilemma.

It is important to note that the three levels; individual, organizational and global & national research community, stand in contact to each other as the figure 1 modeled. An individual is placed in a certain environment which facilitates and impedes particular features of particular individuals.

#### *Points of discussion*

From this summary, three points of discussion can be carried forward:

- How can the organization take advantage of the PhD students' appraisal of fun in teaching?
- How can the organization take advantage of the PhDs' finding fun in research and no fun in project management, and of their fun-seeking inclination?
- Is it necessary to be good in all three tasks (teaching, research, project leadership) to be a successful academic?

#### *Coping better*

The selection process for a future academic career is influenced by the possibilities of coping with problems. Coping is performed by

individuals in an environment, so coping strategies can be distinguished on both these levels. Two points of discussion that emerged from the interviews as being especially important to cope with are stress and the academic identity. Table 3 summarizes the strategies aiming at these goals on the two levels of analysis: the individual and the organizational.

Table 3. Coping: goals and strategies on the individual and organizational levels

	<b>Coping with stress</b>	<b>Developing an academic identity</b>
<b>Individual</b>	Making a plan Taking time off to keep stress away	Finding one's role is more difficult for those who belong to minority groups and those who develop new research themes
<b>Organizational</b>	Elitist milieus—the fine line between setting high standards that evoke the best in people and creating a repressive milieu	A homogeneous milieu offers more narrow opportunities for role building, which negatively affects those who are not of the mainstream

In regard to stress, there are individual strategies, such as making plans and regularly taking time off after a period of heavy workload, that help to keep stress levels at arms length. On the organizational level, it is a question of where the fine line should be drawn between creating a milieu that sets high standards and evokes the best in people and one that becomes repressive in its competitiveness.

Finding one's role is necessary, and in academia this seems to be more difficult for people who need to create their own path, either

because of personal differences in terms of socioeconomic background, gender, or ethnicity, or because their work area involves breaking new ground, for example, in an interdisciplinary field. It seems that an environment that is too homogeneous makes it more difficult for individuals who do not belong to mainstream groups.

### *Points of discussion*

From this summary, two points of discussion can be carried forward:

- The optimal degree of competition. A competitive milieu is generally considered to be good for motivating people to achieve their best. However, there are stories in the findings that describe elitist milieus that repress questions and participation. So, where is the fine line between setting high standards and creating an elitist work environment?
- The homogeneous environment. Almost all respondents talked about the task of finding one's way being a troublesome and often painful journey. A common feeling was that "everyone else is different than me." An organizational milieu can enforce these features of homogeneity, and this can occur at the expense of those who do not fall into mainstream, for personal, research-oriented, or other reasons. Hence, we should pose the question: who benefits from the homogeneous milieu?

### [The supervisory relationship](#)

Table 4 summarizes the findings in regard to the supervisory relationship.

Table 4. The supervisor relationship: a two-way process

	<b>Doctoral student perspective</b>	<b>Supervisor perspective</b>
<b>Supervisory relationship</b>	Supportive and interested Available Help with planning Help with feelings of “not being good enough” Good communication skills No bad temper Unclear expectations are stressful Notice malfunctioning relationships quicker	All PhD students are different Importance of communication “Unclear expectations” may be part of the process

In regard to supervision, PhD students experienced it as strongly positive when supervisors were engaged in their work. Further, the personal quality of the good supervisory relationship was striking. Personal does not mean having a “private” or “friends” relationship, but rather that the relationship is deep enough to be unique; that seems to be a necessary part of a good supervisory relationship. Few PhD students in the sample were dissatisfied with the amount of supervision they received; some said they received little, but they found it OK. Several respondents asked for more help with planning/appraisal talks. Some supervisors did book regular meetings for planning and general feedback, but most supervisors didn’t, and this was a point of discussion among PhD students, both at Chalmers and in previous surveys at other institutions. A concrete suggestion for improvement is to make planning meetings a regular occurrence in all supervisory relationships.

Communication skills were also mentioned as important. Some PhD students were satisfied with their supervisors' communication skills but most were not, even though the number of persons who were openly dissatisfied were not that many. Clearly, communication skills have to be strengthened. However, while it might be rather easy to agree on what should not be part of the supervisor's repertoire, for example, having a bad temper in relation to PhD students, it is probably too much to require that a person who is doing good academic work and has PhD students also must be a virtuoso in communication.

At the same time, it seems important to detect instances where communication between the PhD student and supervisor is really deteriorating, and to do so earlier than is often the case now. Several PhD students who told of malfunctioning relationships, some of which have improved, talked about long periods—often several years—before this problem was noticed by the supervisor.

What the supervisor perspective adds to this is that “all PhD students are different”—in terms of their research problems, of how they work, of what type of support they need, and so forth. From this we can learn that the quicker a supervisor learns about a particular PhD student, the better the relationship can become. Here, as well, communication is crucial and should be strengthened, if possible.

Another point of discussion where PhD students and supervisors may have difficulties meeting is clarity in demands. Many PhD students requested more feedback on how well they were performing and how well their projects were proceeding. It may, however, be

very difficult for a supervisor to actually have control over complex levels of projects, so not giving feedback of these kinds could be a sign of not knowing, more than an unwillingness to share what one knows. A supervisor also wants the student to be as good as possible, and this might reflect from the PhD's perspective that demands are unclear and that it is difficult to know when they are being met.

### *Points of discussion*

From this summary, four points of discussion can be carried forward:

- Can obligatory appraisal talks be incorporated into supervision?
- Can the supervisors' communication skills be improved (e.g., through coaching)?
- Can points of control be introduced to ensure early detection of cases where communication has become very bad?
- How can the clarity of demands be strengthened, yet remain within the control of the supervisor without interfering with the capacity and will of the PhD student to work hard?

### Gender

A third point that is central to this study is gender. In contrast to many expectations about gender and STEM areas, this study discloses *few* differences between women and men. The qualitative interviews also showed that Women and men mention similar pros and cons and also express similar needs. Assessments and needs in the supervisor relationship seem to be similar between women and

men, as also the experiences they had from how their supervisor treats them. Even collisions between grounding a family and having children is mentioned by both women and men. Hence, one major conclusion from this study, it is that gender differences are not prominent and that general strategies and tools can be applied.

In terms of gender more specifically, role-models seem to be important for some women but not all. Generally, it seems more important for senior women, than junior. There is also evidence of some men not being able to cope with the discussion of gender at all, and even if its unclear how long ago the recited occurrence happended, such instances are of course not good.

A deeper going problem that need to be discussed, that was not a prominent part of the respondents' stories in this examination, but which have been mentioned in other investigations at Chalmers, is the presence of a "hidden" discussion on the importance of gender in situations of recruitment or advancement. The general problem is here, how the historical discrimination of one group (women) can be combatted without the discrimination of individuals (men). The discussion both has a material side, where it can be asked how this problem is handled in specific situation and with which concrete results. However, it also has a more immaterial side, where the discussion in itself may be damaging, regardless if its describes accurately what happens or not. Research on stereotype threat as well as research on corruption and bad governance in general, lift transparent rule-following as a foundation for any good-working organization and for the best achievements of individuals. Hence, it is important that this problem is discussed.

However, there are also indications that some individuals might feel individually discriminated against as Chalmers endorse gender equality goals and that this can lead to a feeling of that there is no use competing against a woman as a man. As have been discussed above, this does not necessarily mean that assessment procedures are unfair. As personal contacts seem to be very important to embark on a PhD there is further no reason to think that if such pre-decisions occur, it is not only restricted to gender. However, even if this then does not mean that actual unfairness happens, it is regretful. First, if it can prevent some men from applying, which is not good. Second, it sustains a counter-discussion about gender equality is pushed too hard, and to the expense of competence. This is a point that needs to be discussed.

As Chalmers has a goal of not recruiting more than 70 percent men, this most likely involves situations where women and men have similar merits, and the woman is selected. How can an organization cope with these situations without developing a “hidden” discussion about “hidden quotation”?

*Points of discussion*

- How increase the presence of minority groups without members of majority groups feeling (or actually being) individually discriminated against?

## Summary of discussion points, ownership and next steps

Table 5. Summary of discussion point, ownership, and next steps

Points of discussion	Organization ownership	Global/national
<i>Where is the fine line between setting high standards and becoming elitist?</i>		
<i>The homogenic milieu to whose benefit?</i>		
How to take advantage of the PhD students appraisal of fun in teaching?		
How to take advantage of the PhD students appraisal of fun in teaching?		
How to take advantage of the PhDs fun in doing research and no fun in project management and fun seeking?		
<i>Do you have to be good in all three tasks (teaching, research, project leadership) to be a successful academic?</i>		
Include obligatory appraisal talks in supervision		
Improve supervisor communication skills (coaching?)		
Create points of control to early detect cases where communication runs very bad		
How can the clarity of demands be strengthened yet, within the realm of the possible to control by the supervisor and without interfering with the capacity and will of the PhD students to work hard?		
How increase the presence of minority groups without members of majority groups feeling (or actually being) individually discriminated against?		

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## Appendix 1

The selection of respondents proceeded as follows. The three departments were selected as they were represented in all three advanced areas that funded the study. We identified all female doctoral students at each department and chose respondents randomly from two groups; junior doctoral students (about 18 months into their dissertations) and senior doctoral students (about 3–4 years into their projects). We started by selecting females, as they were in the minority. As the next step, we identified their main supervisors. According to the internal work environment survey conducted at Chalmers in the spring of 2016, 80% of doctoral students said that their main supervisor was most responsible for supporting their doctoral work. Continuing from there, we identified male doctoral students (junior and senior) having the same main supervisors and being in the same stages of their dissertations. This resulted in a total first selection of 35 doctoral students: 20 female (10 junior and 10 senior) and 15 male (6 junior and 9 senior) and 8 supervisors.

### Dropouts

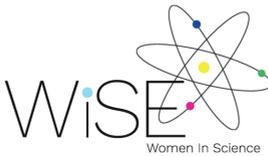
The respondents were contacted by the person responsible for gender equality at Chalmers and informed that they had been selected for a study within the program of gender mainstreaming and with the intent to improve the quality of supervision. Seven respondents from the original selection declined participation. These were one junior female, one senior female, two junior males, and two senior males. Hence, although more men than women declined, the numbers were small. About half of the invited respondents did not

respond, although we sent out reminders. Here it was clearly senior doctoral students who were overrepresented as non- responding.









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