Higher education and family formation

A story of Swedish educational expansion

Margarita Chudnovskaya

Academic dissertation for the Degree of Doctor of Philosophy in Sociology at Stockholm University to be publicly defended on Friday 13 October 2017 at 13.00 in Nordenskiöldsalen, Geovetenskapens hus, Svante Arrhenius väg 12.

Abstract

The subject of this dissertation is trends in family formation among highly educated men and women in Sweden. The highly educated have typically differed from other educational groups in their patterns of childbearing. This has particularly been the case for highly educated women, who used to be in the minority among the highly educated and who were much more likely to be childless than other women. The goal of this dissertation is to understand how the expansion of higher education has transformed the formation of childbearing unions among the highly educated group. The context for the dissertation is the dramatic expansion of higher education which has occurred in Sweden over the last half century. As the share of cohorts graduating from post-secondary education has grown, diversity among the highly educated has also increased. This dissertation draws upon rich Swedish administrative register data to answer questions about changes in the

behavior of the highly educated group, as well as emerging stratification within the group. This dissertation consists of

five studies and an introductory chapter.

In Study 1, we examine changes in geographical distances between young couples and their parents. We find that among younger cohorts, generations live further apart. The expansion of higher education contributes to these distances, though the introduction of regional colleges has mediated the impact of educational expansion to some extent. In Study 2, we consider how effective colleges are as partner markets. We follow one birth cohort (1970), and examine the likelihood that they form a childbearing union with someone who attended the same university at the same time. We find that colleges are an important potential meeting place for childbearing partners, and examine how the likelihood of partnering with a

fellow student is related to the college composition.

In Study 3, I assess changes in partner choice among the highly educated, by comparing the likelihood that highly educated men and women born in 1940-2, 1950-2, 1960-2, and 1970-2 form a childbearing union, and whether they do so with a highly or a lower educated partner. I find that female graduates are much more likely to enter unions, and to "partner down". Men's likelihood of forming a childbearing union hasn't changed across cohorts, but men from later cohorts are much more likely to find a highly educated partner than men from earlier cohorts. I show that partnership outcomes for graduates are related to social class background, university experience (degree length and institution type), and post-graduation income. In Study 4, we study unions with at least one highly educated partner, including men and women born in 1950-2, 1960-2, 1970-2, and 1980-2. We examine the extent to which educational (in)equality is mirrored in other measures of status such as social class background, income, and occupational prestige. We conclude that although the number of women "partnering down" in terms of education has increased dramatically, these unions are not necessarily characterized by female status-dominance more generally. In Study 5, I focus on highly educated men who do not form any childbearing union, studying men born in the years 1945-1974. I find that the consistent levels of childlessness among highly educated men may best be explained by changes in the composition of graduates in terms of field of study and post-graduation income.

Keywords: education, educational expansion, childbearing, union formation, educational homogamy.

Stockholm 2017 http://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-146038

ISBN 978-91-7649-944-3 ISBN 978-91-7649-945-0 ISSN 0491-0885



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HIGHER EDUCATION AND FAMILY FORMATION Margarita Chudnovskaya



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ISBN print 978-91-7649-944-3 ISBN PDF 978-91-7649-945-0 ISSN 0491-0885

Printed in Sweden by Universitetsservice US-AB, Stockholm 2017 Distributor: Department of Sociology, Stockholm University

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 With Martin Kolk. Published in Population, Space, and Place, Vol. 23(1), 2017.
- Study 2 Educational institutions as partner markets With Juho Härkönen. Manuscript.
- Study 3 Partner choice among the highly educated in Sweden Under review.
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Acknowledgements

I have many people who I would like to thank for helping me learn things, develop my ideas, and develop myself as a human being during my time as a doctoral student. First and foremost, I am very grateful to everyone at the Department of Sociology and at the Demography Unit for the welcoming and nurturing environment. Whenever I have been wandering the halls with questions about social status or register data, I have always found someone who was willing to help me. I have been able to present all of the parts of my dissertation within the department and have received useful feedback. Thanks to generous departmental support, I have also been able to get a lot of outside input by traveling to different workshops and conferences.

Juho Härkönen and Gunnar Andersson were my dissertation advisers. Juho, thank you for helping me decide the topic for my dissertation, for working with me on the study about partner markets, and for giving me helpful comments on my many drafts. Gunnar, thank you for making me feel so included, for inviting me to be part of SIMSAM, for connecting me with many other researchers, for your feedback on my work, and for always caring. Thank you to Kelly Musick and Janne Jonsson for being my opponents at my half-time and final seminars. You gave me a lot of concrete tips for improvement and useful points of reflection.

I would generally like to thank to everyone within the Demography Unit for making my time here so wonderful. I learned so much from all of you at the colloquium presentations and all of the workshops and conferences we have attended or organized together. I especially want to thank Betty, Helen, Sven, Eleonora, Sunnee, and Gerda.

Thank you to the Ph.D. students past and present for the intellectual exchange, fun, and salmon lunches: Amber, Andrea, Anton,

Erik, Hernan, Kati, Kieron, Linda, Linus, Petter, Per, Rebecca, Rosa, Roujman, Simon, Sofiya, Thomas and Tina. Ari, thank you for sharing my office in this last stage of the Ph.D., we had the perfect balance of quiet work and complaining about things together. Martin, thank you for helping me get started with Sweden, with SQL, and for being the co-author for my first publication. I would like to thank everyone else who has been part of the Ph.D. student council, the organizing committee for PopFest and the Sorensen Conference, and all the members of the beer committee.

I am also grateful to everyone in the administration at the Sociology department who helped me navigate the confusing world of paperwork and formal procedures, especially Maria and Anna-Carin for your patience with me.

Thank you to all the students at Nuffield College, Oxford who made my exchange productive and pleasant and to Janne for hosting me. Ridhi, thank you for being an amazing co-author, and for all of the nice times and interesting discussions we have had.

I want to thank my friends and family for helping me feel well during these last five years. Thank you to everyone in SDS for bringing the fun and friendship to my life, all the debates and fun evenings and all the trips. Thank you to Petra and Robert, Maryam and Yamani for being my family in Stockholm.

Klara, I am so grateful to have sat next to you at that workshop in Turin and to have you as a colleague and as a friend for the rest of my life. You are always the exactly perfect combination of humor and wisdom.

Thank you to my parents, Sergey and Elena, for supporting me in many different ways through all of the many steps of my educational process over the many years.

Laura, you are the best sister anyone could ever imagine. You have always supported me in everything I do, you have given me so much affection, and you have always been proud of my smallest achievements. You help me get excited about and celebrate the good things that happen to me. I have felt all your love even though you are on the other side of the world.

Jesper, thank you for being the truest friend I have ever had. Thank you for just being exactly the person that you are. Without your love, and all of the fun times we have, I don't really know how I would have made it through the difficult times at work and in life.

Meradjuddin, nothing I can write will ever be enough to tell you how grateful I am to you. You are the best. Thank you for taking care of me during these really stressful months of work this summer. Thank you for absorbing an amazing amount of sociology just so that I could discuss all of my dissertation problems with you at length. Thank you for loving me all the time and for making me feel completely secure and at home in the world. Our hands fit perfectly together and so do our hearts.

The subject of this dissertation is trends in family formation among highly educated men and women in Sweden. The highly educated have typically differed from other educational groups in their patterns of childbearing. This has particularly been the case for highly educated women, who used to be in the minority among the highly educated and who were much more likely to be childless than other women. The goal of this dissertation is to understand how the expansion of higher education has transformed the formation of childbearing unions among the highly educated group. The context for the dissertation is the dramatic expansion of higher education which has occurred in Sweden over the last half century. As the share of cohorts graduating from post-secondary education has grown, diversity among the highly educated has also increased. This dissertation draws upon rich Swedish administrative register data to answer questions about changes in the behaviour of the highly educated group, as well as emerging stratification within the group. This dissertation consists of five studies and an introductory chapter.

In Study 1, we examine changes in geographical distances between young couples and their parents. We consider two contributions to changes in distance: increased graduation from higher education among young adults, and the introduction of new colleges throughout Sweden. We find that among younger cohorts generations live further apart. The expansion of higher education contributes to these distances, though the introduction of regional colleges has mediated the impact of educational expansion to some extent. In Study 2, we consider how effective colleges are as partner markets. We follow one birth cohort (1970), and examine the likelihood that they form a childbearing union with someone who attended the same university at the same time. We find that col-

leges are an important potential meeting place for childbearing partners, and examine how the likelihood of partnering with a fellow student is related to student body composition, including size, sex ratio, age distribution, social class composition, and the percentage of foreign-born students at the university.

In Study 3, I assess changes in partner choice among the highly educated, by comparing the likelihood that highly educated men and women born in 1940-2, 1950-2, 1960-2, and 1970-2 form a childbearing union, and whether they do so with a highly or a lower educated partner. I find that female graduates are much more likely to enter unions, and to "partner down". Men's likelihood of forming a childbearing union hasn't changed across cohorts, but men from later cohorts are much more likely to find a highly educated partner than men from earlier cohorts. I show that partnership outcomes for graduates are related to social class background, university experience (degree length and institution type), and post-graduation income. In Study 4, we study unions with at least one highly educated partner, including men and women born in 1950-2, 1960-2, 1970-2, and 1980-2. We examine the extent to which educational (in)equality is mirrored in other measures of status such as social class background, income, and occupational prestige. We conclude that although the number of women "partnering down" in terms of education has increased dramatically. these unions are not necessarily characterized by female statusdominance more generally. In Study 5, I focus on highly educated men who do not form any childbearing union, studying men born in the years 1945-1974. I find that the consistent levels of childlessness among highly educated men may best be explained by changes in the composition of graduates in terms of field of study and post-graduation income.

Sammanfattning

Ändamålet med denna avhandling är att undersöka trender inom familje formation hos högutbildade män och kvinnor i Sverige. De högutbildades familjebildningsmönster har vanligtvist skilt sig utbildningsgrupper. andra Skillnaderna familjebildningsmöster har varit mest exemplariskt de högutbildade kvinnorna, vilket brukade vara i en minoritet bland de högutbildade och var mycket mer benägna att vara barnlösa i jämförelse med kvinnor från andra utbildningsgrupper. Målet med denna avhandling är att tydliggöra och förstå hur expansionen av högre utbildning i Sverige har förändrat familjebildning inom den högutbildade gruppen. Ramverket för avhandlingen är den dramatiska expansionen av högre utbildning som skett i Sverige över de senaste decennierna. I och med att andelen kohorter som har högre utbildningar har ökat, så har mångfalden med de högutbildade också ökat. Avhandlingen bygger på svenska administrativa registerdata för att svara på frågor förändringar i den högutbildade gruppens beteende, samt växande stratifiering inom gruppen. Denna avhandling består av fem studier och ett ett introduktionskapitel.

I Studie 1 undersöker vi förändringar i intergenerationell närhet mellan unga par och deras föräldrar. Vi betraktar två bidrag till förändringar i avstånd: mer högutbildade unga vuxna, och flera nya högskolor över hela Sverige. Vi finner att när yngre kohorter är mer utbildade, lever generationer längre ifrån varandr, även om införandet av regionala högskolor minskar detta avstånd något. I Studie 2 undersöker vi hur effektiva högskolor är som partnermarknader. Vi följer en födelsekohort (1970) och undersöker sannolikheten för att dem skaffar barn med någon som pluggade på deras högskola samtidigt som dem. Denna studie visar att högskolor är en viktig potentiell mötesplats. Vi granskar

också hur sannolikheten för att hitta en partner i högskolan relateras till högskolanssammansättning, inklusive storlek, andel manlig studenter, åldersfördelning, socialklassammansättning och andelen utländska studenter vid högskolan.

I studie 3 undersöker jag förändringar i partnerval bland de högutbildade, genom att jämföra sannolikheten för högutbildade män och kvinnor födda 1940-2, 1950-2, 1960-2 och 1970-2 för att bildar en barnfamili, och huruvida de hittar en högutbildade Resultaten visar på att kvinnliga kandidater bildar barnfamilj med högre frekvens än män, samt att de med högre frekvens hittar en partner med lägre utbildning. Sannolikheten för högutbildade män att skaffa barn har inte förändrats, dock så är de mycket mer benägna att hitta en högutbildad partner. Resultaten visar på att partnerval för de högutbildade är relaterade till faktorer såsom; social klass, inkomst möjligheter och yrkesprestige efter avslutad utbildning. Samt universitets faktorer såsom, längd på utbildningen och inom vilket institution de utbildade sig. I Studie 4 studerar vi förhållanden med minst en högutbildad partner, för män och kvinnor födda 1950-2, 1960-2, 1970-2 och 1980-2. Vi undersöker i vilken utsträckning (o)jämlikhet i utbildning speglas i andra former at ojämlikhet som social klass bakgrund, inkomst, och yrkesmässig prestige. Vi drar slutsatsen att även om antalet kvinnor som har en partner med mindre utbildning har ökat dramatiskt, så präglas inte dessa förhållande nödvändigtvis av att kvinnan är status dominant överlag. I studie 5 fokuserar jag på barnlösa bland högutbildade män födda i åren 1945-1974. Den konstanta nivån av barnlöshet bland högutbildade män kan bäst förklaras av förändringar i sammansättning i den högutbildade grupp när det gäller val av studiefält och inkomst.

Introduction

Contemporary Sweden is a society where most individuals could enrolling in higher education. When people finish gymnasium, continuing education is a common option: among cohorts born 1982-1996, more than 40% started some form of post-secondary education by age 24. In 2017, about 4% of the population (400 000 people) were enrolled in a post-secondary course. The size of the educational system makes it accessible for most who wish to study, and the state subsidy of students makes higher education financially feasible. The transformation of higher educational systems from small and exclusive to diverse and inclusive in Sweden is similar to that of many countries around the world since the 1950s. The expansion of higher education has had a multitude of impacts on economies and societies. This dissertation contributes to our understanding of the effects of educational expansion by examining changes in the patterns of family formation among the highly educated in Sweden.

This demographic perspective on educational expansion builds both on a long tradition of demographic research which identifies education as a key variable for understanding population change, and of sociological research which identifies education as a key variable of social status distinction. The primary goal of this dissertation is to document trends in the likelihood of the formation of childbearing unions among highly educated men and women, and patterns of assortative mating. An additional contribution of this dissertation is to provide insights into the evolving role of higher education as a status signifier.

In this introductory chapter, I discuss how researchers have connected higher education to partnership formation, the theoretical framework of the "partner market" and the partner search process, and how educational expansion is likely to affect the formation of childbearing unions. I also provide context about Sweden that is necessary to understand the studies, discuss the data and variables used in the studies, and summarize the studies included in this dissertation.

Higher education and partnership formation

Throughout this dissertation, I refer to "family formation", "union formation" or "partnership formation," and what I am referring to is the formation of childbearing unions. This dissertation contributes to the very large literature on the relationship between higher education and the transition to parenthood (some relevant studies from the last fifteen years include Balbo et al. 2013, Begall and Mills 2012, Berrington et al. 2015, Brand and Davis 2011, Hoem et al. 2006, Kravdal and Rindfuss 2008, Kreyenfeld and Konietzka 2008, Lappegård et al. 2011, Lappegård and Rønsen 2005, Martin-Garcia 2008a, Martin-Garcia 2008b, Michelmore and Musick 2014, Neels and De Wachter 2010, Nisen et al. 2014, Oppermann 2014, Tesching 2012, Van Bavel 2010, Van Bavel 2014, Wiik and Dommermuth 2014, Wood et al. 2014). I focus specifically on the formation of childbearing relationships without differentiating between cohabiting and marital unions, or studying union transition events, though education is also an important factor for such studies (Jalovaara 2012, Martin-Garcia et al. 2017, Perelli-Harris et al. 2010., Thomson and Bernhardt 2010, Thornton et al. 1995, Vergauwen et al. 2017).

This focus is motivated by several reasons. First, I study trends over time and thus need a consistent social reference point, which can be studied with the data material available. The prevalence of marriage, its social meaning, and the sequencing of child-birth/marriage in Sweden have changed dramatically over the last decades. The prevalence of childbearing has not changed to the same extent, and the timing of childbearing among the highly educated has also remained quite constant.

Childbearing unions are also a good focus of study due to their permanence and their significance from a societal and individual perspective. While romantic relationships of different types also have important consequences for the lives of individuals, parenthood is an irreversible commitment. Though individuals may choose not to live together as parents, they nevertheless initially choose either to have a child (or to go ahead with an unplanned pregnancy). This decision can be interpreted as the fact that at that point in their joint life, they felt comfortable making a commitment not only to their partner but also to having that partner as a parent to their child. The study of all cohabiting unions with and without children would not capture the same type of unions—it is also impossible with Swedish register data.

Furthermore, childbearing partnerships have consequences for the transmission of inter-generational inequalities and are thus interesting from the perspective of social reproduction. The focus on childbearing is further motivated later in this chapter in the data and variables section. Below, I review the literature on the relationship between higher education and the likelihood of partnership formation, discuss theoretical explanations of the partner search process, and summarize relevant research on higher education and assortative mating.

Higher education and the likelihood of partnership formation

Education is a key variable in studies of partnership formation and one of the most important determinants of childbearing, particularly among women (Martin-Garcia 2008). Demographers use education directly when they examine differences in the educational gradient of the timing and likelihood of union formation and fertility transitions. Additionally, education is often used as a control variable with the understanding that it is an important factor to account for. At the same time, understanding the relationship between higher education and union formation is complex because this relationship is highly dependent upon the broader institutional context, as can be seen in comparisons across (Wood et al. 2014) and over time (Jalovaara et al. 2017, Kravdal and Rindfuss, 2008).

For women, higher education is associated with later first births and a higher rate of childlessness, though this relationship has become less negative over time (Blossfeld and Huinink 1991, Jalovaara et al 2017, Kravdal and Rindfuss 2008, Wood et al., 2014). Kravdal and Rindfuss (2008) lay out four ways that education has been linked to fertility outcomes in literature: through "balancing roles, affording children, using knowledge gained in school, and finding a partner." The sum balance of these different pieces is that highly educated women have had higher levels of childlessness.

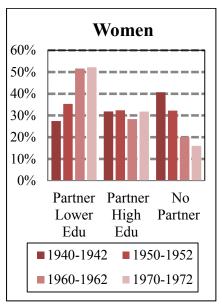
Highly educated women postpone their union formation time until after education, due to the difficulty of combining parenthood and studies (Bhrolcháin and Beaujouan 2012, Blossfeld and Huinik 1991). After education, depending on the country and time context, women often struggle with combining work and parenthood. Female graduates often have higher career ambitions and commitment to their careers, and higher opportunity costs and career penalties for time out of the workforce compared to women with lower education. Postponement related to education and career demands may lead to lower levels of childbearing, although women from recent cohorts appear to "catch up" their fertility despite later ages at childbearing.

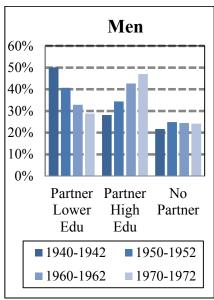
Highly educated women have an advantage in affording children due to their higher earnings, but they may also limit childbearing due to their higher aspirations for the living standards of their children. Economic demographers refer to this as the quantity-quality trade-off in childbearing: highly educated parents may limit the number of children they have in order to devote more resources to each child and ensure the inter-generational transmission of socio-economic status (Becker 1991). Higher education gives women analytical thinking skills, which may mean they are more methodical about planning their family size. Even when fertility intentions are similar, highly educated women may be more likely to prevent unwanted pregnancies than lower educated women, resulting in lower fertility (Musick et al. 2009).

Finally, in many contexts, highly educated women have had a difficult time finding a partner. In societies with a higher degree of gender specialization, highly educated women who are career-oriented would be less desirable as partners, and may be less in-

terested in forming partnerships (Becker 1991). The model of gender specialization has largely given way to dual-earner models in many advanced economies, particularly in the Nordic countries. In a dual-earner framework, women's household contribution is seen as an asset in the partner search, and highly educated women thus have an advantage in partnership formation (Oppenheimer 1994, Sweeney and Cancian 2004).

Figure 1: Share of post-secondary educated men and women by birth cohort and partnership type





Overall, higher education seems to play a negative role in the transition to parenthood among women, but the strength of this relationship has weakened over time. In more gender egalitarian societies in the Nordic countries, highly educated women have a lower completed fertility than other groups, but their rates of childlessness have decreased over time (Jalovaara et al. 2017). Women's resources may be more important in the partner search, and women are increasingly able to balance family and work commitments, find partners, and transition to motherhood despite postponement. As Figure 1 shows above, for Swedish women born

between 1940-1972, the share of highly educated women with no childbearing partner by age 40 has decreased dramatically.

The relationship between higher education and partnership outcomes has been traditionally much less examined for men (Kravdal and Rindfuss 2008), although recent research has sought to map out this relationship more thoroughly (Tanturri et al. 2015, Nisen 2016, Trimarchi and Van Bavel 2017). Education is a positive status asset for men, and thus typically corresponds to lower childlessness and higher rates of partnership formation (Tanturri et al. 2015). Postponement is less of an issue for men, as they are able to form families at later ages due to lesser biological and social constraints. Men also do not face the issues of balancing their family and work commitments to the extent that women do, but rather benefit from the income advantages and partner market advantages that higher education brings. Generally, the status advantages of higher education thus seem to contribute positively to union formation among men. In the Nordic context, men from the 1940-1970 birth cohorts with a higher education have had higher completed number of children and lower childlessness than men with medium or low education (Jalovaara et al. 2017). However, many highly educated men remain childless. As shown in Figure 1 above, for Swedish men born between 1940 and 1970, childlessness has remained relatively stable at around 21% of all men.

Though the general relationship between education and fertility matters for understanding union formation, the impact of education on childbearing outcomes is heterogenous, and researchers have increasingly shown that education matters differently for different groups. Differences within the educated group, and trends in these differences, are discussed below in the section "Educational expansion and partnership formation".

Partnership formation and the partner search process

Four of the five studies in this dissertation focus on partner characteristics, and thus rely on an implicit model of partner choice. To understand the role of education and other status markers in family formation, it is helpful to consider partnership formation as the result of a partner search process (Blossfeld and Timm 2003, Blossfeld 2009). In this section, I lay out the demographic model of the partner search process: that individuals form unions by balancing their individual preferences for partner characteristics with the constraints of the partner market. This is the micro-level mechanism that lies behind individual partnership outcomes.

The partner search process takes place in "partner markets": social environments such as neighborhoods, workplaces, schools, and through social networks formed through work, organizations, and families. The settings around individuals have a lot of influence on their social contacts, and exposure to different social settings has consequences for partnership formation (Belot and Francesconi 2013, Huckfeldt 1983, Kalmijn and Flap 2001). The characteristics of potential partners and the nature of interaction one has with them is limited by the context in which these potential partners are found (Blau 1977, Blau, Blum, and Schwartz 1982, Kalmijn 1998, Schwartz 2013).

Certain settings gather attractive potential partners to a greater degree than other settings and may thus be more conducive to the partner search. Social settings also vary in the degree to which they promote meaningful social interaction which promote the formation of social bonds. For some individuals, their workplace and professional networks may be the prime source of social contact and opportunity for meeting a partner, while others may be involved with family and community organizations and find their partner in such settings (Kalmijn and Flap 2001, Lampard 2007). It is difficult to isolate specifically the environments around individuals which matter for partner search, but much research has focused on the role of educational institutions and programs (Bičáková and Juraida 2015, Nielsen and Svarer 2009), and work-

places (Ohlsson-Wijk 2015, Svarer 2007, Åberg 2003), as well as geographical areas such as neighbourhoods, cities, and labor markets (Browning and Olinger-Wilbon 2003, Fosset and Kiecolt 1991, Gautier et al. 2010, Guzzo 2006, Lichter et al. 1992, Lichter et al. 1995).

This dissertation explicitly studies the functioning of educational institutions as partner markets. More generally throughout the dissertation, it is important to note that partnership outcome is conceptualized as the outcome of exposure to social spaces which provide a pool of potential partners. The characteristics of the partner markets available to an individual guide their ability to meet different types of partners. For example, someone who is working in law and spends most of their time within their professional network is unlikely to meet a potential partner who has a lower educational level. Within these various social environments, individuals conduct their partner search (whether actively or passively).

Classic demographic and economic theory describes the partner search process as analogous a job search process (Becker 1981, England and Farkas 1986, Mortensen 1988, Oppenheimer 1988). This stylized model of the partner search is that individuals have preferences for partner attributes, and that they evaluate individual candidates according to these preferences. Individuals must balance their desire to form a union against their uncertainty over the other opportunities within the partner market. Where the partner market does not contain sufficiently desirable candidates, individuals may choose to opt out of union formation or adjust their preferences for a partner (Akers 1967, Lewis and Oppenheimer 2000, Lichter et al. 1992). Those individuals who are in "high demand" have better outcomes due to their favorable position in the market (Abramitzky et al. 2011, Choo and Siow 2006). For example, in a situation where men would outnumber women, women would have an advantage in the partner search and could be more "choosy" among potential candidates, and maximize the qualities they prefer the most.

Most individuals probably do not experience their partner choice as the result of a comparison of suitors to a checklist of desired qualities. The partner search process does not have to be as formalized, or as active and conscious as the model above describes it. What is important, however, is that individuals have preferences for partner qualities, and that they are constrained by the partner markets where they search. Preferences for partner qualities may be quite weak or quite strong, but the interaction between the preferences and the constraints drives partnership outcomes. Most people do encounter at least a few potential romantic partners in their lives, and consciously make decisions in this regard. Given the importance of romantic partnerships in our society, it is a topic to which most people devote considerable mental and emotional resources. An individual's choice of partner has major consequences for them—in the case of childbearing unions, even if the union is dissolved, the shared parenthood is forever. Additionally, partnership choices are often scrutinized directly or indirectly by families, friends, and society at large.

Studies of assortative mating suggest that people do not end up randomly partnered with partners of specific characteristics. Individuals prefer partners who are similar to them (e.g. relationships within the same religious group, social class, ethnicity), or people who have things to offer (i.e. resources such as income, social class, and education) (See Blossfeld 2009 and Schwartz 2013 for reviews). The aggregation of individual partnership outcomes is thus indicative of social boundaries. By studying trends in partnership outcomes, we can infer social equivalencies and hierarchies.

There are two broad challenges with studying union formation from the perspective of marriage markets: difficulties in identifying the relevant partner market, and separating partner preferences from the constraints of the market. The identification of the relevant partner market is difficult because we don't know where people spend most of their time, and even if data sets of workplaces/schools/organizations exist, we don't know how people relate to those around them. We can use survey data to find which partner markets are more relevant, draw on theories or data sets of what places may be conducive for buildings social relationships, and rely on administrative data to pinpoint precise geographical coor-

dinates for neighborhoods and places of work and study. But using controls for the composition of local partner markets may nevertheless be imprecise, and it is difficult to estimate the extent to which e.g. changing sex ratios among the highly educated affect the actual exposure to potential partners for highly educated men and women in a variety of geographical and social contexts.

Additionally, it is difficult to adjudicate the relative strengths of preferences and constraints in partner choice. The theory of partner market constraints as first articulated in the "marriage squeeze" literature is based on the idea that when partners of a desired age are not available, fewer unions are formed (Akers 1967). Subsequent research has debated the extent to which changes in the size of different age groups would lead to less union formation (Veevers 1988) or in changes for the preferences on partner's age (Bhrolchain 2001). The extent to which partnership outcomes depend on constraints in the partner market or on individual preferences remains a difficult question to examine. There has been some attempts to use mathematical demography to disentangle the contributions of partner availability and preferences (Schoen 1981, Qian and Preston 1993), though Schoen's model may be erroneous (Matthews 2012). Sociologists use log-linear modeling in studies of assortative mating to study differences in changes of available partners from assumed strength of preferences for such partners (Kalmijn 1991). Such models are a standard for analyzing trends in assortative mating, though they only study the composition of those unions which have been formed, rather than possible selection into unions. Recent studies with an agent-based modeling methodology appear to be a successful way to model the impact of preferences on partnership outcomes (Grow and Van Bavel 2015). In this dissertation I have largely tried to side-step these issues but rather to focus on the outcomes as a product of changes both in preferences and in partner availability.

Higher education and assortative mating

Patterns of partner choice are important to study because they both mark and create social boundaries. Educationally assortative mating —the extent to which members of different educational groups tend to partner with each other—has been a major focus for sociologists in recent decades (some relevant examples include Blossfeld 2009, Blossfeld and Timm 2003, Domanski and Przybysz 2007, Kalmijn 1998, Katrňák et al. 2012, Katrňák et al. 2007, Mare 1991, Palos and Cortina 2006, Qian and Preston 2003, Rosenfeld 2008, Schwartz and Mare 2005, Smits and Park 2009, Smits et al. 1998). Educational homogamy research focuses on the mechanisms that drive patterns of educational homogamy, measuring the extent of homogamy between different groups, and studying the implications of educational homogamy for other forms of social inequality.

The study of educational homogamy has the objective of capturing the strength of social boundaries between different educational groups, referring to Weber's ideas of social boundaries and status group closure, which posits that higher rates of social exchange between groups reflect a more open society (Weber 1978, Blossfeld 2009).

Given that education is an important status attribute, it has been important to show the extent to which individuals from different educational groups have been isolated or open as a social group. Educational homogamy is driven both by preferences for highly educated partners for similar partners and by the availability of such partners (Kalmijn 1998, Rockwell 1976). Highly educated partners are desirable for several reasons, both by highly educated and lower educated individuals. Highly educated individuals may be valued as partners due to their earnings capacity, professional standing, or social connections. They may also be valued for the cultural capital and knowledge acquired through university studies.

In a 1991 paper, Robert Mare described the increasing boundaries between different educational groups in the 1930s-1970s in the United States, and argued that studying changes in levels of assortative mating was important for understanding social change. Mare's results showed that the highly educated (those with 16+ years of schooling) had particularly low odds of crossing an educational barrier—that the highly educated were much more

likely to marry within their group. This finding has been generally supported in educational homogamy research: educational homogamy tends to be higher at extreme ends of the educational distribution: those who have the lowest and the highest education (see Blossfeld 2009 for a review).

Trends and patterns in educational assortative mating in Europe have been thoroughly documented (Blossfeld and Timm 2003, Birkelund and Heldal 2003, De Hauw et al. 2007, Domanski and Przybysz 2007, Katrňák et al. 2006, Palos and Cortina 2006). Throughout the 20th century, secondary education expanded followed by post-secondary education. These expansions have had mixed consequences for educational homogamy. Educational homogamy declined as populations became more heterogenous with regard to education, but increased to the extent that people at higher educational levels were more able to find similarly educated partners. Sweden saw a decline in educational homogamy over the time of educational expansion (Henz and Jonsson 2003), similar to patterns observed in Norway over the time period (Birkelund and Heldal 2003) but not to other countries like the United States (Schwartz and Mare 2005).

As higher education has expanded, opportunities for educational homogamy among the highly educated have increased, but this has been tempered by a gender imbalance in higher education (discussed below in the section on educational expansion). In this dissertation, I have contributed to the study on trends in educationally assortative mating among the highly educated. I have focused on differences in partner choice among the highly educated, and have argued that differences in partner choice among the highly educated are meaningful because they indicate social divisions within this increasingly heterogeneous group. I have also studied gender differences in partner choice: whereas Swedish men are increasingly more likely to choose women with higher education, women are increasingly more likely to "partner down".

Educational expansion and partnership formation

In the section above, I have outlined ways in which higher education matters for partnership formation. However, this relationship is not fixed, but depends on the composition of the highly educated population and the nature of the educational system. The expansion of the higher educational system changes the way in which the group of highly educated men and women behave. In this section, I address how expansion creates population level change in demographic behaviour, how the reversal of the gender gap in higher education transforms partner markets, and how educational expansion leads to greater diversity among graduates.

Expansion in the size of the highly educated group creates population level change

The expansion of higher education means that highly educated men and women make more of an impact on total fertility rates. Thus it becomes more important to understand how the highly educated group behaves, and the extent to which their behavior differs from other groups. In the first demographic transition, the expansion of education plays a major role in fertility decline (Caldwell 1980). The expansion of post-secondary education has occurred during a time of fertility decline and the postponement of parenthood. The expansion of higher education is a contributing factor to postponed parenthood in Europe (Neels and De Wachter 2010, Bhrolcháin and Beaujouan 2012). Recent evidence suggests that higher educational attainment has not contributed to increasing childlessness due to changes in the educational gradient of childbearing in Europe (Beaujouan, Brzozowska and Zeman 2015). However, educationally-related postponement and opportunity costs for childbearing among highly educated women have been factors contributing to lower levels of fertility. Educational expansion is thus one piece of the puzzle in understanding recent fertility changes.

This dissertation makes a contribution to the study of the compositional effect of higher educational attainment at the population level. In Study 1, we consider changes in family geography as a consequence of greater educational attainment. Because highly educated individuals tend to move further away from their families of origin than other educational groups, educational expansion has a population level impact on inter-generational proximity. Young adults and their parents are less likely to live within the same municipality when higher education is more common—a pattern that has implications for mutual assistance and the quality of family relationships.

The increasing size of the highly educated group also matters for patterns of assortative mating and the probability of union formation, by enabling highly educated men and women to find similarly educated partners (Blossfeld 2009). According to the structural theory of partnership formation, members of smaller groups are more likely to partner outside the group (Blau 1977; Blau, Blum and Schwartz 1982, Stier and Shavit, 1994). The larger a group is numerically, the more likely that individuals are able to find an attractive partner who belongs to the group. Highly educated men and women are more able to find a similarly educated partner, and homogamy among the highly educated has been increasing over time (Schwartz and Mare 2005, Blossfeld 2009). Other factors are also driving patterns of assortative mating, such as the progress of women in the public sphere which has brought an increased emphasis to women's economic standing in the partner search process (Sweeney 2002, Sweeney and Cancian 2004). However, the increasing size of the highly educated group has also played a key role in the rise of educational homogamy among the highly educated.

Reversal of the gender gap in higher education transforms partner markets

A major feature of the expansion of higher education has been the shift from the under-representation of women to the overrepresentation of women among graduates. Women outnumber men among post-secondary graduates in nearly all OECD countries (Vincent-Lancrin 2008), and in Sweden this imbalance has existed for decades (Universitetskanslersämbetet, 2016). This gender shift transformed the partner market for highly educated men and women. The increasing participation of women in higher education enables greater rates of educational homogamy among the highly educated.

Highly educated men now have a much greater opportunity to find a female partner with a similar level of education, where previously such opportunities were limited. In recent times, the constraint on the level of homogamy has been the supply of male graduates. Female graduates have found it increasingly difficult to find a partner with an equal level of education, challenging gender norms of female educational hypergamy ("partnering up"). According to the logic of the partner market approach, the sex ratio imbalance could affect partnership formation in two ways: increasing levels of singlehood and childlessness among women or a change in educational assortative mating patterns (Van Bavel 2012). Previous research suggested that women may opt out of the partner search process if their partner preferences were unsatisfied (Lichter et al 1992, Lichter et al. 1995, Raymo and Iwasawa 2005). Recent research, however, shows that around the world, where women have an educational advantage, levels of female educational hypergamy ("partnering up") have declined, while rates of female educational hypogamy ("partnering down") have increased (Esteve et al. 2016, De Hauw et al. 2017).

The gender reversal in Swedish higher education is a focus in Studies 3, 4, and 5 in this dissertation. Study 3 examines changes in the partnership outcomes for men and women over the period of the educational expansion. I find that, as elsewhere, highly educated women are likely to "partner down," and have been less likely to remain single. Meanwhile highly educated men are more likely to find a highly educated partner.

The share of unions where women have a higher education than their male partner has increased in several countries over the last decades. However, it remains unclear whether this development is accompanied by an increase in women's status relative to their partners more generally. A recent study comparing 27 European countries suggests that the increase in the share of women "partnering down" is associated with a rise in female breadwinners (Klesment and Van Bavel 2017). In Study 4, we contribute to the existing literature on female educational hypogamy by studying relative status within unions according to multiple dimensions including education, income, occupational prestige, and social class background. Our results suggest that we should be cautious when equating the emergence of unions where women "partner down" with unions where women are status-dominant.

In Study 5, I examine why the potentially increased "demand" for highly educated men has not been accompanied by lower rates of childlessness in this group. I study differences in childlessness based on field of study, sex composition of higher institutions, and income post-graduation. I conclude that compositional changes in the highly educated group in terms of study field are a possible explanation for persistent childlessness.

Educational expansion leads to increased diversity among graduates

Diversity among graduates has been a focus for sociologists and demographers over the last decade, and this dissertation contributes to findings in this area. As more individuals achieve higher education, the average characteristics of a degree-holder change. This change in the composition of graduates matters insofar as these compositional factors are also related to preferences and constraints in the partner search process.

One element of diversity among graduates is family orientation. Multiple studies have shown that the field of study pursued by women is related to their fertility outcomes. Lappegård and Rønsen (2005) first showed the importance of considering the field of study and argued that field of study was likely to be related to fertility transitions. A study by Hoem, Neyer and Andersson (2006) used Swedish register data to show differences by educational field in childlessness among Swedish women. This study showed the extent to which both field and level of education mat-

ter. Multiple studies have since demonstrated the importance of the field of study for fertility outcomes (Begall and Mills 2012, Martín-García et al. 2017, Michelmore and Musick 2014, Oppermann 2014, Tesching 2012, Van Bavel 2010). Field of study is an important predictor of fertility because it captures information about future career prospects (such as work-family balance), as well as family orientation. In a study using European Social Survey data, Van Bavel (2010) highlighted the differences in attitudes towards gendered family roles across different study fields, and the implications of these differences for the postponement of fertility.

These studies generally find that teaching and health care are fields that are dominated by women, and fields whose graduates are more likely to become parents and to have children younger. Given that educational expansion in many countries is also related to changes in the size of different fields of study, educational expansion amplifies the differences among graduates. For example, in Sweden, teaching and health care have been fields that have seen massive expansion, and female graduates from these fields tend to have more children than graduates from other fields. I contribute to differences between different fields of study by focusing on childlessness amongst men, which has received less research attention (Bledsoe et al. 2000, Forste 2002), though recent research has more closely examined the role of study field in the transition to fatherhood (Lappegård et al. 2011, Martin-Garcia 2009, Martin-Garcia et al. 2017, Oppermann 2014). I find that men with degrees in the technical field are more likely to remain childless than other men. The increasing share of all men graduating with degrees in the technical field has contributed to persistently high levels of childlessness among men.

A further element of diversity is in terms of graduates' social and economic status. Social class background is one variable that is a strong predictor of higher educational attainment as well as a predictor of family formation (Blossfeld and Timm 2003). Social class background may be a relevant indicator of resources available to individuals from their parents, both in terms of financial and social support. The effect of education on fertility is to some

extent mediated by individuals' social class background (Brand and Davis 2011, Nisen et al. 2014). Educational expansion has aimed at equalizing access for different social classes to higher education (Berggren 2008, Erikson & Jonsson 1996). However, these efforts have been somewhat mediated by changes in the class composition of the Swedish population and remaining class inequalities. The descriptive statistics in this dissertation suggest that for the cohorts studied, there has not been much diversification in class of origin as most students have upper or lower service class backgrounds. Nevertheless, in the extent to which educational expansion has created a more class-diverse educational system, this diversity of backgrounds must be taken into account when considering diversity in childbearing outcomes among graduates.

The income of graduates matters for their childbearing outcomes. As is recognized in demographic literature, income has an enhancing impact on fertility (because individuals have the resources required) as well as a hindering impact on fertility, particularly for women (because individuals have higher opportunity costs for foregoing full-time employment or focusing less on their careers). Higher education is a pathway into many professions where salaries are high (e.g. law and medicine) and a necessary credential for competitiveness in many other fields. However, economic returns to graduates differ (Gerber and Cheung 2008). Educational institutions matter, and graduates from elite institutions earn more money—particularly in countries like the United States. The field of study is related to differences in starting salary and in salary growth (Hansen 2001, Kalmijn and van der Lippe 1996, Van de Werfhorst 2002)—which are factors that have been related to the transition to childbearing (Van Bavel 2010). In Study 3, I consider how differences in income (as predicted by field of study) are related to the likelihood of entering a childbearing union, and of educational assortative mating, and how the relationship between income and union formation has changed over time. In Study 5, I focus on highly educated men and consider the extent to economic returns to education may have changed, and

whether this contributed to persistent levels of childlessness for male graduates.

In addition to differences in income, I note that there are also differences in educational experience. Educational experiences are likely to be tied to partnership outcomes because they affect the "partner market" available to different graduates. For example, graduates from elite institutions, or larger institutions, or longer programs, may be more likely to have a social network that is dominated by other graduates, and thus to find a highly educated partner. To the extent that educational experiences shape partnership outcomes, educational expansion should create change because it has led to a diversification in educational experiences. In this dissertation, I highlight differences between "traditional" and other educational institutions in Sweden. Additionally, level of study within the post-secondary system matters: I study differences between those who attain degrees between two and five years in length. In Study 3, I examine the changing relationship between these educational experience variables and partnership outcomes.

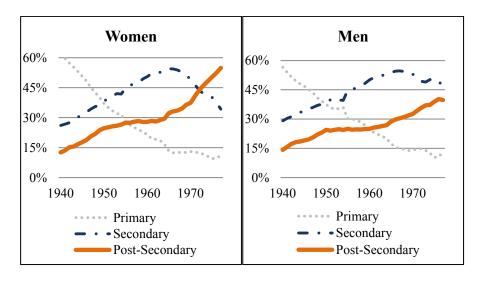
In this section, I have summarized how educational expansion can be linked to changes in partnership formation. In order to contextualize the studies in this dissertation, I review the nature of educational expansion in Sweden in the following section.

The Swedish context

Educational system and educational expansion

Higher education is immensely popular in Sweden: institutions are operating at full capacity, with record numbers of applicants in recent years (Universitetskanslersämbetet 2017). Tertiary education is free and government subsidies and loans cover living expenses for up to six years (Deen 2007). Periods of education are often interspersed with periods of work, and thus tertiary education continues over a longer period than in other countries. It is also relatively common in Sweden to re-enter the post-secondary educational system at a later age, so there is a greater age range among students. Figure 2 shows how the graduation rates among cohorts of men and women have increased over time as the educational system has expanded.

Figure 2: Cohort trends in highest educational level attained by age 35 for Swedish-born men and women.



Tertiary educational expansion has been an explicit aim of Swedish policy in the last decades and the government has opened new institutions in order to increase access to education. In the mid-1940s, Sweden had two universities, two university colleges ('university colleges' are typically smaller and less research oriented than 'universities' in Sweden), and some institutions for professional training (for example medicine, teaching, engineering, nursing, and business). A major educational reform occurred in 1977 when the government decided to expand access to higher education by creating new institutions and upgrading professional programs within e.g. teaching and nursing. Seventeen new university colleges opened in the late 1970s, but the expansion process took time, and the number of students enrolled began to grow in the 1990s (Högskoleverket 1998, Andersson et al., 2004). Currently, there are 16 universities and 14 university colleges in Sweden, 5 art schools, and 14 additional institutions which have the right to grant degrees up (Universitetskanslersämbetet 2017). Nearly all of the universities and colleges are state-run, with the exception of a few smaller schools, such as the Stockholm School of Economics or Chalmers Technical College.

Diversity has been an explicit policy of Swedish educational expansion. As enrollment has expanded, tertiary education has become more available to people from diverse class backgrounds, though socioeconomic inequalities in access to tertiary education persist (Berggren 2008, Jonsson 1996). Educational expansion also has a regional dimension. An aim of the expansion was to make education more accessible to those who lived in less densely populated areas (Andersson et al., 2004, Premfors, 1984). By opening post-secondary institutions away from traditional university cities, the government tried to ensure that young adults could have an opportunity to attend a university or college closer to their hometowns (Premfors, 1984). In addition to opening new colleges throughout the country, the number of institutions has shifted throughout the educational expansion process as colleges were established, or as institutions have been consolidated together, particularly previous schools for health and social care or teaching that have been incorporated into colleges. There are a few institutions in Sweden which have an elite status (such as the Stockholm School of Economics, or Karolinska Institutet), but generally, it is difficult to rank the Swedish colleges by quality. Throughout this dissertation, I have distinguished between universities formed prior to the 1977 reform, which have stronger student and institutional traditions, more recognition factor, and generally a larger and more diverse study experience. Most of the new university colleges incorporated existing schools for teaching, social care, or nursing when they were founded, and it was some time before they expanded their offerings to include multiple fields (Högskoleverket 1998). Although some university colleges continued to be rather focused on one area such as nursing or teaching by the mid-1990s, many of these colleges became quite diverse in terms of study field (Högskoleverket 1998).

Critical perspective on educational expansion

One of the questions of educational expansion is the extent to which the expansion constitutes a 'real' expansion, or simply a 'nominal' expansion achieved by relabeling. Educational expansion certainly implies elements of both.

For example, nursing is a very significant field in Swedish postsecondary education, particularly for women. The Swedish nursing curriculum has been updated over decades (Kapborg 1988), and this process gives a good insight into the stepwise nature of educational expansion. In 1962 a committee was appointed to examine nursing education, in 1966 a new educational program was started where nursing students were officially classified as students rather than ward personnel. In 1977, vocational nursing education was reclassified as higher education. Starting in 1982 a new program was developed with a more academic focus, and based on EU directives the nursing program was expanded from two to three years during the 1990s. All combined, nurses have at least four years of education, including post-secondary education in combination with nursing-focused upper-secondary education. From 1977, however, nursing education has been classified and administrated with all post-secondary education. This implied a huge 'increase' in the number of post-secondary students in 1977, due to the re-classification of nursing degrees.

The expanded nursing education focuses not only on medical specialization but also on ethics of care, patient-nurse relationship dynamics, and other aspects significant to the profession. Nursing education in Sweden and other Scandinavian countries includes units from nursing science but also from other disciplines such as Humanities, Social Science, and Communication (Råholm et al. 2010). In the Norwegian case, Karseth (2004) has described the shift towards longer nursing education as bringing greater economic, administrative and professional independency for the nursing profession. In the post-educational expansion world, professionalism is the key and "being a 'knowledgeable-doer' is not enough anymore" (Kapborg 1988).

However, universities in Sweden have generally had freedom to design their own curricula, raising questions about the standards of different programs (Kapborg, 1988, Råholm et al. 2010). Despite the fact that some vocational post-secondary educations include some additional general post-secondary coursework, the focus of these programs and the experience of these students is different from those students studying towards general focus degrees in, for example, the natural or social sciences.

Within the context of this dissertation, I treat all post-secondary educations as similar. Despite the fact that educations differ in rigor and in social status, generally the identification of graduates with being degree-holders seems to me the most important issue. These individuals consider holding a post-secondary degree as part of their status, and thus their partnership outcomes are relevant to study in this context. Despite this decision, it is important to consider the nature of educational expansion and the changes to the value of a post-secondary degree more generally as a consequence.

An additional critical point is on the gendered nature of educational expansion. The Swedish higher educational system is imbalanced in terms of gender composition, and women are overrepresented compared to men. Among the 1991 birth cohort, by age 24, 51 percent of women started any post-secondary studies,

compared to 36 percent of men (Universitetskanslersämbetet 2017). The gender disparity has grown larger over time, but more women than men have been enrolled in post-secondary education since the 1977 reform. To some extent, this gender disparity is driven by the fact that women-dominated degrees such as teaching and nursing are now re-labeled as higher education (see the discussion above). However, women are over-represented in most study fields, with the exception of career programs like law, medicine, and business administration, which are gender balanced, and some programs such as civil engineering, which are maledominated (Universitetskanslersämbetet 2017). The Swedish higher educational authority is committed to equality between men and women, but it is unclear the extent to which the overrepresentation of women is perceived to be an issue or whether steps should be taken to address it (Universitetskanslersämbetet 2016). Women are more likely to enrol in courses, more likely to complete the courses they enrol in, and more likely to graduate than men.

Gender and family context

The Swedish society is distinguished by an emphasis on gender egalitarianism which is crucial for understanding family formation trends (Oláh and Bernhardt 2008). Women in Sweden have a high employment rate, and since the 1970s their labor force participation rate has been among the highest in the developed world. However, Swedish women are more likely to work part-time and to take family-related leave than men. Additionally, there is very pervasive sex segregation within the labor market, with some occupations being dominated by women and others by men. This sex segregation is also prevalent in the educational system. Despite this segregation, Sweden is a global leader in gender equality, and has a high participation of men and women in education and the labor market. Over the second half of the twentieth century, it has become increasingly possible for women to combine employment and family obligations. Parental leave is generous both in terms of

time and in the amount of salary replaced and childcare is generally available and affordable.

Throughout the dissertation, this gender egalitarian context is important to keep in mind, as I do not place too much emphasis on gender differences, e.g. on differences in men and women's preferences for partners. Gender differences may play a larger role in societies with a more gender-traditional socio-political structure, where women's resources matter less than men's, or where women have a difficult time combining employment and family domains.

Additionally, an important piece of context is the relative stability in Swedish family formation (Andersson et al. 2009). This dissertation focuses on changes in the likelihood of men and women to form childbearing unions. While there have been changes between different educational levels, overall the picture of childbearing in Sweden over the period studied has been rather stable. The period cohort fertility rate between the years 1960-2005 has ranged from 1.5 to 2.5 children per woman, but the cohort fertility rate for women has been steady within the 1.9-2.1 range (Andersson et al. 2009). The median age of first childbearing has increased somewhat, for women from 24 to 28 between cohorts born in 1935-1969 (Andersson et al. 2009). However, for highly educated men and women, the age of first childbearing has remained rather stable at around 30-32. Thus the changes documented in this dissertation are occurring in a relatively stable family context.

Data and Variables

The data material in this dissertation comes from the STAR collection of administrative registers supplied by Statistics Sweden to SUDA/SOFI at Stockholm University as part of SIMSAM, the Swedish Initiative for Research on Microdata in the Social and Medical Sciences. These administrative registers cover the entire population of Sweden, and individuals can be traced between different registers by an identification number. This identification number was introduced in Sweden in 1947-1948. Population registers were digitized in the late 1960s, including data going back to 1960 from the 1960 census. The current limit on the register data available through these projects is the year 2012. The wealth of the register data is amazing, and though much of the statistical analysis in this dissertation is relatively simple, the data work underlying it is incredibly complex.

The ability to compare all graduates in any birth cohort over decades makes it possible for me to study the educational expansion process in a detail that would be very difficult to match with a survey data set. The nearly complete coverage of the register data means that I can follow up all graduates within a birth cohort, have a nearly complete record of their childbearing partnerships, information on their class background and their partners' class backgrounds. This makes it possible to study older cohorts, where the share of graduates is much lower than among current cohorts. Digitized census and yearly income information also makes it possible to study older cohorts and to consider their socioeconomic position at the time of union formation, rather than at an older age. The ability to observe the entire population and to link the entire population to their educational history means I can generate predicted values of income and occupational prestige to complement the observed information on the study cohorts. I am also able to differentiate amongst graduates of different institutions and thus compare traditional universities to new institutions—a variable that is seldom found in survey data sets, but highly important when considering educational expansion.

In this section I will discuss the different registers that are used in this dissertation, the construction of variables, and the analytical decisions I have made. I will also discuss the statistical methods that are used in the dissertation.

Variables and Registers

Key demographic information

The first step in all of the studies was to define the study population and to restrict it based on demographic information. I have used the background register to identify the initial study population by restricting it on the desired birth years and sex (where relevant), as well as to identify the country of birth. I have used the migration registers and the mortality registers to further narrow the study population. Typically, I have chosen to limit observations to those individuals who were either born in Sweden or arrived prior to age 15, as well as to those who survived until the age of 40. The migration selection means that a significant share of the Swedish population is excluded from the study, but this allows me to make sure that all individuals within the study are continuously covered by the registers in terms of their educational and childbearing histories.

I have used the multigenerational register to connect individuals to their relatives. I have used this register to connect individuals to their parents in order to then follow up on their parents' socio-economic characteristics. I also use the multigenerational register to observe the first biological child born to individuals, and thus observe the childbearing partner. The multi-generational register contains information on both parents in the vast majority of cases, as less than 5% of births are to un-partnered mothers (Thomson and Eriksson, 2013). This register thus provides highly accurate and nearly complete coverage on childbearing partnerships. I also use the multi-generational register to identify individuals' partners' parents in order to observe the demographics and status background of individuals' partners.

Socioeconomic indicators

Throughout the dissertation, I use information on socioeconomic indicators. There are three indicators that I consider: socioeconomic class, income, and occupational prestige. These are constructed using data from multiple sources.

Socioeconomic class background is used for individuals in the study, as well as for their partners. I identify individuals' parents using the multigenerational register, and then, using their mother's and father's ID numbers, link their records to census data. In Sweden, there was a guinguennial census from 1960-1990. The censuses had different ways of measuring socioeconomic status. For the 1960 and 1970 censuses, class information is based on the mothers' and fathers' occupation and education levels. I use code written by Jan O. Jonsson and Martin Hällsten to transform these codes into class variables. For the 1980, 1985, and 1990 censuses, I work with the SEI ("socioeconomisk indelning") variable. In some studies. I transform the SEI indicator into class variables. I use a seven-class division based on the Erikson Goldthorpe class schema (1992). The seven classes are: upper service class, lower service class, routine non-manual workers, small employers and the selfemployed, lower grade technicians, skilled working class, and unskilled working class. This is a rather fine-grained division which captures differences in individuals' backgrounds and the resources they may have access to via their parents. I measure social status in the census closest to when individuals are aged 10-15 (but in some cases at age 20 to supplement missing data or as a sensitivity test), to best capture environment prior to the start of uppersecondary school and continued education.

The censuses have quite high coverage, but some individuals' parents are missing from the census, or do not have reported occupational or class status. Particularly in earlier censuses, this may be due to the fact that many individuals had rather irregular employment. Most women who are missing occupational status have as their occupational status "homemaker". Most men who are missing occupational status are on leave for unspecified reasons, health reasons, or studies. Other individuals may not have par-

ents in the census if they are born outside of Sweden—this is particularly the case for partners of my study population, who are not restricted by the same immigration criteria as the study population. Throughout the thesis, I include individuals' whose class background is "missing" in the analysis, and differentiate them in multivariate analysis.

Income is another major status variable in my studies. Income information is available in the registers starting in 1968 from the Income and Taxation registers. From 1990, the income information is taken from the LISA register (the Longitudinal Integrated Database for Social Insurance and Workplace Studies). The way that the income measure is determined has changed throughout the years. I always use the "Disposable Income" variable. This variable measures the total disposable income individuals receive, including social transfer payments, although the way the variable is constructed and which payments are included varies throughout the years. My aim with the income variable is to capture individuals' spending abilities. While a work-income measure better captures economic returns from employment, I am more interested in the general economic position of individuals in terms of their limits and possibilities, and here the disposable income measure is more appropriate. I use the income variable from one or two years prior to the birth of the child, as this is my most consistent estimate for the "union formation."

As mentioned above, the composition of the "disposable income" variable varies throughout the years, and this thesis draws upon income information from the start of the IoT register to the end of the currently available register data (2012). In order to allow for comparison over time, I have generally aimed to avoid analysing the income amounts in Swedish kronor, but have rather sought to transform incomes into yearly distributions. I create, for example, yearly distributions of all working age adults, or all men and all women, and compare the study individuals' incomes in that year with the income distribution in that year. Thus the study of income in this thesis focuses on individuals' relative position to others, rather than on the absolute level of means available to them. This analytical approach also fits with the goal of the dis-

sertation, which is to address stratification and inequality among highly educated men and women and within unions.

I also work with a "predicted income" generated from calculating the average incomes of graduates from any specific program of study. This variable is constructed by linking the entire working population within a specific age to their academic records, to calculate the average disposable income within a specific calendar year for all graduates from each available program of study. I then compare these programs to each other, once again generating a relative measure of economic status. The construction of such a variable allows me to work around the endogeneity issues in childbearing and income, and is possible only because of the wealth of the register data.

The third measure of status used in the dissertation is occupational information, which is used in the study on relative status within unions. There, I draw on occupational registers and convert Swedish SSYK codes or ISCO codes to the SIOPS prestige scale using code written by Erik Bihagen. The SIOPS prestige scale is the best scale for this study because it estimates the general social prestige of different occupations, but unlike other prestige scales, educational level and partnership formation are not a basis for this scale. The occupational codes are quite challenging to work with, as there are different systems for collecting these codes in the censuses and in the yearly registers. Prior to 1990, occupational information was collected for all individuals in the census. From 1996 onward, occupational information is available yearly for all workers in the public-sector, and in companies with more than five hundred employees. Other companies are randomly sampled, so much occupational information for workers in the private sector is missing, and the reliability of this data is not as high as of the other registers. In this thesis, I have worked with the missing data by using a simple imputation model, by estimating occupational positions based on individuals' sex, age, educational level, educational field, and work sector.

Educational information

The key dependent variables in this study come from educational information, and here I have used data from the multiple registers covering post-secondary enrolment and post-secondary graduation. There are four enrolment registers (1977-1993, 1993-2004, 2004-2007, 2008-2012) and four graduation registers (1962-1977, 1977-2004, 2004-2007, 2007-2012). The information I use from these registers is the year and term of enrolment/graduation, the code of the institution, and the code of the program of study. Institutions change codes over the time period as institutions close or open or consolidate, and programs of study are introduced and cancelled over the decades. All individuals who register for studies for a term appear in the enrolment register, but they may not attend all the courses throughout the term. The enrolment register is used in the study of universities as partner markets.

In the other studies, I use the graduation register. To appear in the graduation register, Swedish students have to complete their education and to apply for graduation. Many Swedish students do not complete enough points for a degree, or complete a degree but do not apply for graduation. This group includes students who are very talented, and secure a job prior to completing their degree officially (for example, foregoing the thesis requirement). This also includes students who never manage to complete the official requirements of their degree, and whose job does not necessitate it (unlike e.g. medicine or teaching).

The LISA register includes educational information from Statistics Sweden, and classifies some individuals as having a post-secondary degree even if they have never graduated, because they have earned enough points to have received a degree. I have performed some sensitivity analyses including these students who have completed enough points for a degree but have not graduated, but the studies in this dissertation use the graduation register as a basis for the analyses. This is because the graduation register connects the students to the university where they completed their degree, and lists the program from which individuals have graduated, and the year within which they completed their studies. The group who eventually transition to having enough points for a degree is a more heterogenous group in terms of their educational

histories and timing of their education. In some sense, people who have not completed a degree do experience much of the same that people who do complete a degree—moving to attend university, accessing social networks and so on. However, the people who do not complete a degree are more likely to have on- and off-study periods with longer breaks, enrol in multiple programs across different universities. Although they are exposed to the university environment they do not manage to complete their degrees—which for some represents some lower attachment to the university or less ability to complete coursework, while for other represents a high level of employability. Comparing the group of those who have officially received a degree and those who technically have is a complex project and an important and interesting future avenue of study.

One variable used in this dissertation is the institutional code. In several of the studies, I distinguish between "traditional" universities and "newer"/"other" institutions. The latter are institutions which were opened or upgraded in or after 1977 as part of the official educational expansion program in Sweden. These institutions are smaller, newer, and many of them were geared to short degrees for newly-upgraded vocational tracks such as nursing. However, this group also includes new universities and colleges opened throughout the country for accessibility.

Throughout this dissertation I also analyse the major program of study. This is a very detailed variable: over the 50 years of graduation records, there are nearly 3500 different major programs. While these major programs can be aggregated into about 100 larger groups (Teaching degree, Master's degree – humanities and theology), I preferred to work with the fine-grain differences. These distinctions in the major program generally reflect differences in the length of the education, but also in the specialization. For example, the degree distinguishes between studies in space technology who read 80 points and those who read 120 points, or teachers who focus on sports teaching, teaching dance, language, and so on. However, I also worked with more broad distinctions among graduates, for example in distinguishing graduates by length of degree.

Analytical Decisions

Cohort perspective

Much of the dissertation deals with developments over time to study the consequences of educational expansion. To study trends over time, I have chosen to use cohorts, and to follow them until the end of their reproductive years (or until the year 2012 for the youngest cohorts). I select cohorts based on the availability of the data used in the study, and with the intention of capturing change over time. The positive thing about using a cohort approach is that everyone in each sub-population studied experienced the educational expansion process in the same way, in terms of the institutions for education as well as the social perception and economic opportunities for graduates. In two papers, I study cohorts born 10 years apart, which gives a simple overview of the changes that happened over time because we can intuitively link the cohorts to the conditions they experienced. The 1940 and 1950 cohorts mostly entered higher education pre-1977 reform, and the 1960, 1970, and 1980 cohorts experienced different levels of female dominance. Because many of the studies are focused on graduates specifically, I could have also based study populations on the year they graduated. I chose not to do this because there would be more age and life-stage heterogeneity in the sample, but the cohort approach now hides the fact that members of the cohort attended college at different ages in their lives and thus have had quite different educational experiences.

Use of childbearing partnerships

All of the unions studied in this dissertation are first childbearing unions. I study first childbearing partnerships as these occur earliest in the life course, and this is the time when educational merits would be more important than other accumulated life experience. Data constraints drive the focus on childbearing unions, but it is also well motivated by theoretical considerations. As explained throughout the dissertation, childbearing unions are a good focus for study because they are an irrevocable commitment

to another person. Marriage in Sweden is 'optional' for some populations, and the importance of marriage has changed during the time period studied, making it difficult to compare married couples over time. Dating or casual relationships are interesting for different reasons than childbearing unions—they are more like friendships in that they reflect significant social contact, but they have less lasting consequences for social inequality. However, my inability to observe cohabitating unions means that when I write about people who remain 'unpartnered', I do not know if the men and women are in fact living with a partner or have not made the transition to childbearing. Recent research from other countries suggests that remaining without a partner is a major contributor to childlessness, particularly among men (Jalovaara and Fasang 2017, Trimarchi and Van Bavel 2017). Additionally, I only analyze heterosexual partnerships and my assumptions of the partner search conditions for individuals are based on heteronormative assumptions of preference exclusively for the opposite sex. Given that the vast majority of men and women enter a heterosexual childbearing partnership, analyzing this outcome as the "union formation" outcome is a reasonable choice, particularly given the data constraints, but this is also a limitation of this dissertation.

Use of all post-secondary degrees

In my dissertation I refer to it as "higher" education, "postsecondary", and occasionally to "college/university". In many cases, researchers differentiate between "lower tertiary" and "upper tertiary". I do make such a distinction in some cases, when controlling for the length of the degree. However, when I study graduates I study all individuals, including those with a shorter post-secondary education in my dissertation. The upgrading of shorter degrees has been a big part of educational expansion. In many cases these degrees were made longer and more academic, with a specific aim of upgrading the status of some professions. For example, studying to become a preschool teacher has required increasingly more points of theoretical courses and historical perspectives on pedagogy. Additionally, while some new, shorter, degrees are clustered on separate campuses, in many cases educa-

tional expansion has also included the consolidation of smaller vocational schools into larger regional institutions. In everyday conversation, some individuals differentiate these degrees from other "more real" degrees, but often political and sociological consideration of higher education necessarily includes vocationally oriented degrees, regardless of length. By including these shorter degrees, and the graduates of shorter degree programs, I am introducing more heterogeneity into the group of "graduates", which may have a higher status if the focus was only on longer degrees.

Status measured prior to union formation

In this dissertation, I consider individuals among the group of "graduates" if they completed their degree prior to the birth of their first child—though many men and women in Sweden continue their education after their transition to parenthood. This was particularly the case among women in the older cohorts, who retrained following the expansion of higher education. However, for the purposes of this dissertation, I am interested in examining the social status of men and women in their conditions of the "partner search". Therefore, I measure education and other status variables in the time prior to the "union formation" as I can observe it. In some cases, I may be observing men and women who have been in a committed relationship for a number of years and choose to transition to parenthood—in other cases I observe men and women who decide to continue with childbearing in a rather recent relationship. Measuring status in the year prior to the birth of the child is the best solution given the research aims and the data constraints.

Methods

Much of the analytical work in this dissertation is done in setting up the data material, and I present a mix of descriptive results and regression results, as well as a decomposition analysis. In the different papers, I have many descriptive findings, showing for example changes in the intergenerational proximity, identifying the percentage of men and women who "overlapped" with their partner in university, trends in the share of men and women who partnered "down" or equally in terms of education, the income correlation within different types of unions, and trends in childlessness for men from different educational programs.

In the first paper, I also use Kitagawa decomposition to isolate the changes in the size of groups from changes in the behavior of different groups (Kitagawa, 1955). In other studies, I use binomial logistic regression to study binary level outcomes: the likelihood of forming any union rather than no union, partnering with a highly educated partner rather than a lower educated partner, finding a partner in university or not finding a partner in university. I study the probability that a union is ever formed, and don't have a time-varying control for age or years since graduation. This approach differs from an event-history analysis approach, but it also allows me to analyze the probability of ever making a union transition, rather than the intensity of the transition into the union form. Additionally, although there are some recognized potential issues with using logistic regression (Mood, 2010), I avoid comparing coefficients across models. I have modeled some results with linear probability models to assess possible issues, and I use multi-level linear probability modeling in Study 2. I have also foregone log-linear models, which are a staple of educational homogamy research. The idea of these models is to control for changes in the distribution of education in a population, to address how the strength of preferences between different groups vary over time as the size of educational groups change. However, my aim here is not to control for the changes in the size of the educational groups, but to reflect this educational expansion. It is true that the expansion of higher education means that more educationally homogamous unions can be formed among the highly educated, but my aim here is to show the extent to which this is the case, rather than to disentangle the changes in partner preferences and constraints. However, that question is an interesting topic of research and would be something for future contributions.

Study 1: Educational expansion and intergenerational proximity. This study is co-authored with Martin Kolk. This study is about trends in the intergenerational proximity between young adults and their parents in the years 1980-2010. We measure the geographical distance between the municipality where young adults live at the time of the birth of their first child and the municipality where each of the partner's parents live. The thirty year period studied coincides with a major educational expansion, and we specifically consider how this process relates to changes in intergenerational proximity in two ways: through the increased share of couples who have at least one tertiary-educated partner, and through the introduction of regional institutions of higher education. Individuals with higher education tend to be more geographically mobile, and our study shows that the increased educational attainment in Sweden corresponds to greater intergenerational distances. Regional institutions were opened throughout Sweden as a specific policy to make education more accessible to populations who were less likely to attend university colleges and we find that the expansion of these educational institutions corresponds to greater intergenerational proximity. The conclusions of this study are thus twofold: generally, educational expansion led to further distances between generations—but the introduction of regional colleges moderated this effect significantly.

Study 2: Educational institutions as partner markets. This study is co-authored with Juho Härkönen. One of the main explanations for educational homogamy is that people meet each other during their studies. This paper examines the extent to which men and women from one birth cohort (1970) formed a childbearing union with an opposite-sex partner who was enrolled simultaneously with them in college. By estimating the share of men and women who overlapped with their partner in education, we reach an upper-bound estimate of the share of unions that could have potentially been formed due to meeting in college. Additionally, we examine how the composition of the student body is related to the

likelihood that men and women find a partner in college, and to the likelihood that they form a union with a highly educated partner. We examine composition factors known to be related to partnership formation: school size, sex ratio, student age and Swedish origin, as well as the size of the surrounding municipality.

Study 3: Partner choice among the highly educated in Sweden. This is a single-authored study. In this study, I explore trends in partnership formation for highly educated men and women bon in 1940-2, 1950-2, 1960-2, and 1970-2. I show trends in the likelihood that highly educated men and women remain unpartnered, form a childbearing union with a highly educated partner, or form a childbearing union with a lower educated partner. I consider how the likelihood of these outcomes varies among highly educated men and women from different class backgrounds, with different educational experiences (in terms of degree length and institutions type), and with different socio-economic outcomes (income and occupational prestige). This analysis underscores the social divisions within the highly educated group. Additionally, I examine how the likelihood of forming a partnership with a highly educated or lower educated partner has changed across cohorts, to address the consequences of the changing gender imbalance among graduates.

Study 4: Is the end of educational hypergamy the end of hypergamy? Evidence from Sweden. This study is co-authored with Ridhi Kashyap. Women have historically "partnered up" in terms of education—partially due to social norms dictating female hypergamy, and partially due to the barriers women faced in acquiring their own educational credentials. The educational expansion process has lifted the latter constraint, leading to an overrepresentation of women in higher education and a significant increase in the share of unions where women "partner down" educationally. In this paper, we examine the meaning of this new trend by considering the extent to which female educational hypogamy represents status hypogamy more generally. Now that women have become more likely to be the educationally-dominant partner in the union,

are they generally more likely to be the status-dominant partner in the relationship? We compare unions with a highly-educated male and a lower-educated female partner, unions with a highly-educated female and lower-educated male partner, and unions where both partners have a high education. Using rich data from the Swedish registers, we consider relative status in these unions along three dimensions: social class, income, and occupational prestige. We find that the decline of female educational hypergamy does not entail the end of female hypergamy more broadly. We also compare status between the different union types, and find that unions where both partners have a higher education are relatively advantaged compared to other union types.

Study 5: Childlessness among highly educated men in Sweden.

This is a single-authored study. This study offers a preliminary examination of childlessness among highly educated men. In the context of the expansion of higher education and the overrepresentation of women among graduates, highly educated men have greater access than ever to potential highly educated partners. However, despite these changes, I find that the level childlessness among highly educated men has not changed across cohorts born 1945-1974. To assess potential explanations of this trend, I examine differences among highly educated men by field of study, sex ratio at higher educational institution, and postgraduation income. When these factors are taken into account, the likelihood of childlessness for men decreases across cohorts. This finding suggests that persistent childlessness is the consequence of compositional changes among highly educated men, particularly changes in the income of graduates and the growth in the share of graduates from the technical field.

Reflections

The goal of this dissertation is to show how dramatic the educational expansion process has been and how it has transformed family formation patterns among the highly educated. Sweden in the 1960s was a society where less than 15% of the population graduated from post-secondary studies, and where men were overrepresented in higher education. In the 2010s, over 30% of people receive a post-secondary degree by age 35, and women outnumber men. Using long-term administrative register data I have traced the changes in family formation behavior during this period of educational expansion.

This dissertation contributes a number of empirical findings to our understanding of the relationship between higher education and family formation. First, I document changes at the population level. Female graduates from younger cohorts are much less likely to be childless than women from older cohorts, and much more likely to partner with a man who has lower education than them. Male graduates from younger cohorts are much more likely to find a highly educated female partner than men from older cohorts, but men are not any more likely to enter a childbearing union than men from older cohorts. Male and female graduates tend to live further away from their parents at the time of union formation, and educational expansion has contributed to rising intergenerational distances on average.

The second theme of this dissertation is the differences within the highly educated group. The expansion of higher education brings greater diversity to the group of the highly educated. I show that differences in social class background, the type of institution attended (traditional/other), the length of the degree studied, and the income of graduates are related to the likelihood that they will enter a union, or find a highly educated partner. Additionally, I show that differences in the educational environment are related to the likelihood that men and women will find a partner in college and to the likelihood that highly educated men will ever form a childbearing union.

Finally, I contribute to our understanding of the way education matters as a status marker. This dissertation documents the

changes in the partner market as a consequence of educational expansion and the over-representation of women among graduates. The findings in this dissertation show that men increasingly choose highly educated female partners as the availability of such women increases. However, the share of highly educated men who remain unpartnered has not shifted despite the increasing availability of highly educated women. This finding suggests that some men are either unable to find a partner (because they are less desirable as partners), or that these are men who are not interested in finding a partner with a higher education. For female graduates, this dissertation echoes some recent findings: women have responded to partner market constraints by shifting their partner choice behavior to increasingly partner with men who have lower education. This dissertation shows that these male partners are men who out-earn their female partners, even as they have lower education or lower occupational prestige. The findings for men and women together point towards the importance of considering education in relation to other status markers when studying the role of education in partnership outcomes. Particularly for men, it seems that higher education is generally desirable in association with the financial resources that education leads to, rather than in regards to the cultural or knowledge capital acquired through longer studies.

The studies included here contribute to our understanding of emergence of stratification within the highly educated group, as well as to the changing value of education as a status marker as a consequence of educational expansion. This dissertation is a starting point for many further questions about the changing role of higher education in our society. It would be useful to have more insights into the way that education is related to other forms of status, such as income or career trajectories. Such research could make it possible to address whether higher education is a sort of status in itself, or whether it matters specifically because it is an important factor for career and employment.

Additionally, this dissertation documents some differences within the highly educated group, which should be developed in future research. Throughout the dissertation I address differences

in institution type and I am curious about the differences between educational expansion achieved by the expansion of "traditional" universities, versus the increased accessibility offered by other institutions. Similarly, with regard to different types of degrees, I would like to study the extent to which individuals whose education was "upgraded" (e.g. teachers, nurses, engineers in the "högskoleingenjör" program) benefit from this upgrading compared to those individuals who were able to access degrees more traditionally associated with university studies.

Finally, much more can be added to the two classic issues of social class and gender inequality in higher education. With regard to social class inequalities, it would be interesting to further consider the extent to which social class background interacts with stratification within higher education—i.e. the "type" of higher education that students from under-represented class backgrounds enroll in. Throughout this dissertation I have noted that most graduates come from upper/lower-service class families, and that individuals from families with a non-upper-service class background seem disadvantaged in their patterns of partnership formation. It would be useful to explore these findings in greater detail and to document the extent to which educational expansion has led to lower barriers for enrollment and different study choices for students from different class backgrounds.

In terms of gender inequality, Sweden is highly gender unbalanced with regard to enrollment, choice of study field, and graduation. Women's over-representation has been the status quo since the initial expansion of the system in 1977, but women are increasingly more likely to enroll/graduate than men in most fields, not just traditionally female fields within teaching/caring. More research emphasis should be placed on understanding the greater rates of female enrollment and graduation, the gender segregation within fields or institutions, and the consequences of this gender disparity.

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