The Demography of Sweden's Transgender Population – Patterns, Changes, and Sociodemographics

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Abstract

Our study examines the prevalence of gender transitions in Sweden over time and documents the sociodemographic characteristics of people transitioning in different periods. We use national administrative data covering the transgender population from 1973 to 2020 and analyze two common events in a gender transition: the earliest diagnosis of gender incongruence and the change of legal gender. We have three main findings. First, the measured prevalence of both types of events is relatively low in all periods, although it has increased substantially since the early 2010s. Second, the recent increase in transition prevalence is most pronounced among people in early adulthood; in particular, young transgender men drive an increase in overall transition rates through 2018, followed by moderate declines in 2019 and 2020. Third, transgender men and women have substantially lower socioeconomic outcomes than cisgender men and women, regardless of the age at which they transition or the historical period.

Keywords: transgender, demography, prevalence, gender nonconforming, gender incongruence, Sweden, administrative data

Running head: The Demography of Sweden's Transgender Population

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Abstract

Our study examines the prevalence of gender transitions in Sweden over time and documents the sociodemographic characteristics of people transitioning in different periods. We use national administrative data covering the transgender population from 1973 to 2020 and analyze two common events in a gender transition: the earliest diagnosis of gender incongruence and the change of legal gender. We have three main findings. First, the measured prevalence of both types of events is relatively low in all periods, although it has increased substantially since the early 2010s. Second, the recent increase in transition prevalence is most pronounced among people in early adulthood; in particular, young transgender men drive an increase in overall transition rates through 2018, followed by moderate declines in 2019 and 2020. Third, transgender men and women have substantially lower socioeconomic outcomes than cisgender men and women, regardless of the age at which they transition or the historical period.

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Introduction

During the late 20th and early 21st centuries, transgender people have achieved greater societal recognition and acceptance, in addition to better access to gender-affirming health care (Schilt & Lagos, 2017; Stryker, 2017). Along with these developments, the number of people who consider themselves transgender has increased in many countries, first among people assigned male at birth and later among those assigned female at birth (Lagos, 2022).

Research on the demography of the transgender population remains scarce and fragmented. In many countries, little is known about prevalence trends and sociodemographic characteristics, such as age and birth cohort. Even less is known about the timing of common events in a gender transition, such as when people receive a diagnosis of gender incongruence or change their legal gender. It is plausible that such events now occur earlier in the life course and that the group of transgender people is more diverse compared to the past, when systemic barriers, including discrimination, were more prominent. These sociodemographic changes are poorly documented and understood (Badgett et al., 2021; Lagos, 2022; Witten, 2014). Gaining deeper insights into sociodemographic changes is important to ensure that health care professionals and policymakers better understand some of the factors influencing the support needed by the transgender population, who are at higher risk of discrimination, socioeconomic difficulties, and mental health struggles (Aldridge et al., 2022; Dhejne et al., 2016; Nolan et al., 2019; Schilt & Lagos, 2017).

We use high-quality administrative data to study the prevalence and sociodemographic characteristics of transgender people in Sweden from 1973 to 2020. The data enable us to provide one of the first longitudinal, population-wide counts of transgender people in the literature. We define the transgender population as all people observed with a diagnosis of *gender incongruence* (known as *gender dysphoria* or *transsexualism* when our data were generated) in the Swedish medical system between 1973 and 2020. The longitudinal structure of the data enables us to study two common events during a gender transition: the year people receive their first diagnosis and the year they change their legal gender. The second event involves a subset of those with a diagnosis. Our approach using diagnostic codes means that we cannot study transgender or non-binary people who never receive gender-affirming care. Rather, we capture a subgroup of the broader gender-diverse population and focus on the medical and legal aspects of a gender transition as opposed to changes in how people self-identify or express their gender. Our results should be interpreted as being representative of

people seeking medical care to affirm their gender identity and receiving a diagnosis of gender incongruence.

Our study complements and supplements previous studies that estimate the size of a country's transgender population using survey samples. Most previous articles exploring demographic trends (e.g., Ewald et al., 2019; Lagos, 2022; Meerwijk & Sevelius, 2017) are from the U.S. and use single-point-in-time measures when classifying people as transgender, whereas we study age, cohort, and period trends in more detail. We also examine sociodemographic characteristics such as civil status, household structure, education level, and labor earnings at the time of the first gender incongruence diagnosis or change of legal gender. Linking a comprehensive set of sociodemographic characteristics to a national transgender population at the time of these events has, to our knowledge, not been done previously.

Our analysis comprises two parts. First, we document age and cohort trends separately for transgender men (people assigned female at birth transitioning to male) and transgender women (people assigned male at birth transitioning to female). Consistent with previous studies, we find relatively large increases in the number of young adults seeking gender-affirming care or changing legal gender. Historically, the prevalence of these events was notably higher among transgender women than transgender men. This pattern reversed for the youngest cohorts in the mid-2010s, when the transition rate for young transgender men increased sharply relative to the more moderate upward trend over time for transgender women. The transition rate for young transgender men appears to have peaked around 2018, with no evidence of further increases in 2019 or2020. At the population level, the number of transgender men and women continues to grow steadily, but the total observed prevalence remains low—at most 0.5% per birth cohort for transgender men and 0.2% for transgender women at the end of our study period.

Second, we document the sociodemographic characteristics of transgender men and women who transition at different periods and ages, comparing them to similarly aged cisgender men and women (people without a diagnosis of gender incongruence). We find that transgender men and women are much more similar to one another than to cisgender men or women in the same age group, regardless of the period when they transitioned. Notably, transgender men and women both have substantially lower socioeconomic positions in terms of labor market outcomes than cisgender people, earning approximately 25–45% as much as cisgender men and 35–65% as much as cisgender women of comparable age. We also show that transgender

people are more often unmarried and childless. Our results are consistent with previous research and highlight the continued economic and social vulnerability of the transgender population.

Previous Research

Until recently, many studies on the demography of the transgender population were based on limited convenience samples (Carpenter et al., 2022; Schilt & Lagos, 2017). Improvements in data availability have now enabled researchers to study the population using health records, population-representative samples, and census data. The different types of data have resulted in two distinct approaches. One approach highlights the medical and legal aspects of gender transition and identifies transgender people using diagnostic codes, clinical notes related to gender-affirming care, or records of legal gender changes. The other approach highlights people's inherent sense of self and identifies transgender people using self-reported data on gender identity, irrespective of whether they (want to) transition legally, medically, or otherwise.

Several literature reviews describe the different approaches in detail and present prevalence estimates of the transgender population from a range of countries, such as the U.S., Sweden, the Netherlands, and Taiwan (e.g., Collin et al., 2016; Goodman et al., 2019; Lagos, 2022; Meier & Labuski, 2013; Zhang et al., 2020). The results vary considerably in terms of context, definition, and measurement. Generally, self-identifying as transgender or gender non-conforming on surveys or census forms is far more common than being diagnosed with gender incongruence, receiving gender-affirming medical care, or changing legal gender. For example, one cross-national review found that transgender people comprise just 0.017–0.033% of the population when identified using diagnostic codes or clinical notes, whereas approximately 0.4% of adults and 2% of adolescents self-report transgender identities in surveys (Zhang et al. 2020). England and Wales, and Canada included questions on gender identity in their 2021 censuses. In England and Wales, 0.5% of the population indicated that their gender identity differed from their sex assigned at birth (Office for National Statistics, 2023), while in Canada, the total prevalence was 0.33% (Statistics Canada 2022). Using Dutch administrative data, a publicly commissioned report found that 0.0138% of the Dutch population had changed their legal gender since 1960 (Kuyper, 2017).

Most studies on the prevalence of the transgender population examine differences by sex assigned at birth. Many have found a higher proportion of transgender women than transgender men, but the numbers have become more similar during the 2010s, particularly among younger generations (Collin et al., 2016; Goodman et al., 2019; Lagos, 2022). The gender difference is affected by how the population is measured. Indicative evidence suggests that transgender women are more likely to receive diagnoses and gender-affirming medical care than transgender men, while the ratios are more even in studies that rely on self-identification and include gender non-conforming or non-binary identities (Collin et al., 2016; Goodman et al., 2019).

Few studies have taken a demographic approach to the study of transgender populations, with a detailed focus on ages and birth cohorts. An exception is Lagos (2022), who examined birth cohort rates in detail with survey data from the U.S. and found large increases in the share of transgender men and women born after 1984, particularly for transgender men in the youngest cohorts. These cohort trends are consistent with other data indicating that the prevalence of transgender people is highest among adolescents and young adults. For example, Herman et al. (2022) used survey data to estimate the age profile of the self-identified transgender population in the U.S. and found that prevalence ranges from 0.3% among people above age 65 to 1.4% between ages 13 and 17. Recent census data from Canada reveal similar age patterns: among 15- to 34-year-olds, 0.2% identify as transgender men, 0.15% as transgender women, and 0.34% as non-binary, while the corresponding numbers are only 0.05%, 0.08%, and 0.05% among people older than 35 (Statistics Canada 2022).

In Sweden, the context of our study, the availability of national administrative data enables a more in-depth examination of populations, compared to countries like the U.S., where such data is non-existent or difficult to access. Yet, most knowledge about the demographics of the transgender population comes from government reports written in Swedish (National Board of Health and Welfare, 2020b) or limited data sets, such as applications for legal gender recognition (Dhejne et al., 2014) and survey data from Stockholm County (Åhs et al., 2018). Consistent with research from other countries, these studies indicate that wanting gender-affirming medical care is less common than wanting to live as or be treated as a member of a different sex. They also suggest that the ratio of transgender men to women has been increasing since the early 2000s (Dhejne et al., 2014; Åhs et al., 2018). There is, however, no evidence providing detailed insight into trends by birth cohort and stage of the life course.

Another notable gap in the literature is the lack of high-quality data on a comprehensive set of sociodemographic characteristics such as civil status, earnings, and education level. One exception is Geijtenbeek and Plug (2018), who used administrative data from the Netherlands to study the outcomes of transgender people who changed their legal gender. Drawing a random sample of the full population for comparison, they showed that transgender people earn significantly less than cisgender men but slightly more than cisgender women. Transgender people are also much less likely to be married or to reside with children. In the Swedish context, a medical study by Bränström and Pachankis (2020) provides some sociodemographic data using administrative data on all people diagnosed with gender incongruence between 2005 and 2015. They report that the transgender population has significantly lower household earnings than the general population, but they do not provide a detailed analysis by age, gender, or transition period.

Most studies with a sociodemographic focus come from the U.S. and use survey data to compare the characteristics of the transgender and gender non-conforming (TGNC) population with those of the cisgender population (Badgett et al., 2021; Carpenter et al., 2020; Carpenter et al., 2022; Lagos, 2022). The findings indicate that TGNC people have markedly worse socioeconomic outcomes in terms of employment, poverty rates, and food security. Moreover, they are less likely to be partnered, and unlike people who changed legal gender in the Netherlands they are less likely to have a college degree (Geerdinck et al., 2011). There also seems to be an overrepresentation of TGNC people among non-Whites (Herman et al., 2022; Lagos, 2022), though this pattern may have reversed in the youngest cohorts (Lagos, 2022). Studies in social epidemiology have documented greater physical and mental health needs among transgender populations (McCann & Sharek, 2016), which may contribute to their worse socioeconomic outcomes.

With a few exceptions, prevalence counts and national-level estimates in previous research are extrapolations from smaller samples to the population level. Surveys have well-known issues of selective self-disclosure and error rates affecting small populations, which can be particularly severe among Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ+) minority populations (Collin et al., 2016; Cortina & Festy, 2014; Kreider & Lofquist, 2015). Census data based on self-identification are a promising new data source, although they have measurement-related issues such as large error rates when computing measurements for small populations and the fact that people may not want to disclose their gender identity in

government data. Dutch and Nordic administrative data form a partial exception and are the type of source we use in this study.

Swedish Laws, Policies, and Social Context

An international comparison reveals that Swedish society is relatively tolerant toward transgender people (European Commission, 2019; FORTE, 2019; FPES, 2021). Attitudes and laws have gradually become more inclusive over time (see Supplemental Text A–B for further details). Nevertheless, many transgender people still attest to regularly encountering ignorance, condescension, and outright hostility at work, in the health care system, and in public (Lindroth, 2016; SOU, 2017).

In 1972, Sweden became the first country to allow legal gender changes and provide gender-affirming care through the publicly funded health care system (SOU, 2017). Access to care is strictly regulated by national guidelines and typically involves lengthy evaluations and waiting times. The typical trajectory is described as follows (see Supplemental Text B for details): (1) get referred to a gender clinic and await a first visit; (2) undergo a psychological evaluation; (3) if diagnosed with gender incongruence, obtain a referral to specialists (e.g., an endocrinologist) and await a consultation; (4) if desired, start hormone therapy or other medical care; and (5) apply for legal gender change and bottom surgery (i.e., surgery on the reproductive organs) through The Legal Advisory Board at the National Board of Health and Welfare (2020a). People must be age 18 or older to be approved for legal gender change and bottom surgery, but in some cases, minors can receive puberty blockers and, after age 16, cross-sex hormone treatment (National Board of Health and Welfare, 2021).

Over time, gender-affirming care has become easier to access. The number of gender clinics providing specialized care to minors and/or adults has increased, and recent guidelines for diagnosing gender incongruence have included a less binary perspective of gender (National Board of Health and Welfare, 2015). The law on legal gender recognition has also become less stringent. Following the recognition of same-sex marriage in 2009, married people no longer have to get divorced before changing their legal gender. The requirement to be unmarried was formally removed in 2013, along with requirements to be a Swedish citizen, to be sterile, and to destroy any saved gametes (SOU, 2017). However, Sweden recognizes only two legal genders, and changing legal gender requires a medical diagnosis of gender incongruence.

Data and Methods

Our study uses administrative data covering all residents of Sweden from 1973–2020. The data are longitudinal, which enables us to follow people over time and determine the year they experienced specific events. We focus on two common events in a gender transition: the earliest diagnosis of gender incongruence and the change of legal gender.[1] To identify if and when people were diagnosed with gender incongruence, we use diagnoses recorded in the National Patient Register from the National Board of Health and Welfare (see Supplemental Text C for the exact International Classification of Diseases [ICD] codes). To measure if and when people changed their legal gender, we match all people diagnosed with gender incongruence to records of legal gender changes filed at the Swedish Tax Agency. Finally, we obtain sociodemographic information for the full population using taxation and other registers from Statistics Sweden.

For all analyses, we organize the data on an event basis. In a strict statistical sense, we use the term transgender to refer to people after their first gender incongruence diagnosis or legal gender change, depending on the event we analyze. We define a gender transition by either of these two events. Throughout the analysis, we refer to people who were assigned female at birth and later went through a gender transition as transgender men, and people who were assigned male at birth and later went through a gender transition as transgender women. Our categorizations may not align with how people would self-identify; for example, some may identify as non-binary or cisgender rather than as (transgender) men and women. However, we use these formulations for brevity. We use the term cisgender to describe people who have not received a gender incongruence diagnosis or changed legal gender. This implies that, in our calculations, people who have undergone a gender transition are counted as cisgender before they transition and transgender thereafter. This does not imply any judgment on transgender identities over the life course but is a consequence of the fact that we use transition events to identify our population. We provide additional detail on how our gender categories are created in Supplemental Text C.

[1] Using our diagnostic criteria, we cannot study changes in how people self-identify or whether people continue with gender-affirming medical treatments. Some people who transition medically and legally may later stop treatment and change their legal gender back to their sex assigned at birth. Dhejne (2017) found that the percentage of transgender people who did so decreased from 5.8% during 1972–1980 to 0.3% during 2000–2010. In our data, only 19 people changed their legal gender twice. We exclude the second transitions from our analyses.

Our population is restricted to people aged 15–65. People diagnosed with gender incongruence before age 15 enter the analysis once they turn 15, and we define that year as the year of their earliest diagnosis.[2] When analyzing legal gender changes and sociodemographic characteristics, we restrict the calculations to people aged 18–65 because minors cannot change their legal gender and we have sociodemographic data only for adults.[3]

The first part of our analysis uses three types of measures to describe the transgender population in Sweden: cumulative measures, transition rates, and cohort-based prevalence measures. These measures are calculated separately by event type (i.e., earliest diagnosis of gender incongruence or legal gender change) and sex assigned at birth (i.e., using people with the same assigned sex in the numerator and denominator). The cumulative measures count the number of people who have experienced an event up to and including each year. When calculating overall transition rates, the numerator counts the number of people who had an event during a specific year, and the denominator counts all people living in Sweden at the end of that year who never experienced the event between 1973 and the given year. We also calculate age-specific transition rates by restricting the counts in the numerator and denominator to people within a specific age span. In the cohort-based prevalence measure, the numerator counts the number of people born in a specific year who experienced an event before a certain age, and the denominator counts the number of people living in Sweden at the end of 2020.

The second part of our analysis compares the sociodemographic characteristics of transgender men and women with those of cisgender men and women. We study a person's birthplace (Sweden or abroad), municipality type (metropolitan or non-metropolitan area), civil status (in a legal union or not), presence of young children in the household, years of education, and annual labor earnings (see Table S.1 in the supplementary material for exact definitions). We calculate average characteristics separately for transgender men and women, as well as cisgender men and women, by age group. In order to capture different temporal, legal, and normative contexts, we also categorize our data into three historical periods: (i) the *early* period, 1990–2000 (the start of our socioeconomic data through the last year for which only inpatient records are available); (ii) the *pre-reform* period, 2001–2012 (the start of outpatient records until the end of the sterilization requirement); and (iii) the *post-reform* period, 2013–2020 (the year the sterilization requirement was abolished through the last year for which we

[2]This applies to 295 people in our analyses. We exclude 199 people who received a diagnosis but did not turn 15 by 2020.
[3]We exclude people who transitioned after age 65 (91 people for first diagnosis and 22 for legal gender change).

have data). For transgender people, we measure their sociodemographic data in the year of their observed transition. For the non-transgender comparison population, we include people in our calculations every year that they appear in the data within our period windows.

Context and Interpretation of Our Data

We want to stress that our results should be interpreted in light of the fact that we define the transgender population through administrative health records (see Collin et al., 2016 for further discussion). Most previous research on transgender demography uses survey data in which respondents self-report whether they identify as transgender. By contrast, we include all people diagnosed with gender incongruence within the Swedish medical system, typically during the initial steps of gender-affirming care. This enables us to examine an important but understudied aspect of transgender demography that differs from the previous literature in various ways.

Self-identification as transgender and utilization of gender-affirming health care are important and overlapping phenomena, but they may capture different parts of the community. Transgender and non-binary people who do not desire gender-affirming care or seek such care through the Swedish medical system are not part of our analyses. Compared to studies relying on self-identification, it is plausible that we capture a smaller share of non-binary people because gender-affirming medical care has historically focused on binary transitions. On the other hand, our definition captures people who receive a gender incongruence diagnosis but later decide not to undergo medical treatment or change legal gender, as well as people who transition medically but would not self-identify as transgender before and/or after the event. Our work thus differs from research focusing on how people negotiate and express their gender identity. However, for many policy questions (e.g., dimensioning health care), the population we identify is particularly relevant.

Administrative records of the type we use are free of many response biases in survey or census data. For example, biases related to fear of discrimination and other negative consequences can lead to underestimations of LGBTQ+ groups (Festy, 2007). However, administrative measurements are also shaped by the prevailing attitudes, guidelines, and norms in society and the medical system. Which people seek care and can receive a gender incongruence diagnosis has changed over time: there have been several changes in the labeling of diagnostic codes and in the praxis of the application of the codes by health care providers. Moreover, capacity constraints of the health care system may affect the timing of when people receive care. Further,

the use of a diagnostic code says little about the timing of any changes in people's gender identities. It is likely that many people diagnosed with gender incongruence identified as transgender or gender-nonconforming before their diagnosis.

Our approach, however, has several advantages over using survey data from a single period. Using longitudinal data enables us to document how the prevalence of gender transition, as defined by our events, has changed over time. Moreover, we have a well-defined numerator and denominator of transgender and cisgender people, which enables us to calculate rates and prevalence by age, period, and cohort.

Irrespective of the data used, studies examining trends in the transgender population are—in critical ways—affected by how transgender people self-identify and by how society has accepted and regulated access to gender-affirming care. Growing acceptance and diminishing discrimination in Sweden in general, and within the health care system in particular (Dhejne, 2017; FORTE, 2019), are thus a critical part of our results and are important for interpreting the trends we study. Later-born cohorts have had better access to health care and faced less discrimination, and the outcomes of such processes may affect our results. This mirrors similar societal processes in which transgender people have likely become increasingly comfortable disclosing their identity in surveys and censuses over time.

Results

Our results comprise two parts. First, we describe the overall transgender population in Sweden and trends by age and birth cohort. Second, we compare the sociodemographic characteristics of transgender men and women with those of cisgender men and women by age group and period.

Population Trends and Trends by Age and Birth Cohort

We begin by documenting an increasing trend in the number of transgender men and women in Sweden over time. We use two approaches: the cumulative number of transitions and the rate of transition, both per year and gender.

Figure 1A shows the cumulative number of transgender men and women identified in our data over time. From 1973–2020, we observe a total of 4,140 transgender men and 3,464 transgender women with a gender incongruence diagnosis. Restricting to the subset who have

changed legal gender, we observe 1,537 transgender men and 1,422 transgender women. The cumulative number of people who transitioned by a specific year increased slowly until 2000. There is a slight jump in diagnoses in 2001, which is the first year we observe not only inpatient records from hospitals but also outpatient records from specialized care providers. Thereafter, the population of first transgender women, and later that of transgender men, started to increase more rapidly. Transgender women outnumbered transgender men until 2016, when defining the population based on diagnoses, and until 2018, when defining the population based on legal gender changes.

To uncover changes in the rate of transitions over time, we compare the number of transitions per year to the size of the general population. The rates in Figure 1B show the yearly probability of transition by sex assigned at birth. A transition is a non-repeatable event, defined as the first time a person receives a gender incongruence diagnosis (darker lines) or changes legal gender (lighter lines). This approach enables us to give a period view of how and when transgender men and women received their diagnoses or changed their legal gender.

When defining a transition as the first diagnosis of gender incongruence, we find low and rather stable transition rates through 2000. At that point, our data begins to cover diagnoses from outpatient visits, and we identify a jump in the transition rate for transgender women and a less dramatic increase for transgender men. The transition rate for transgender women remained fairly stable over the next decade, then increased from 2011–2018. Transgender men had a lower transition rate than transgender women in the early 2000s, but their transition rate increased over time and finally surpassed the rate for transgender women in 2013. The transition rates for both groups peaked in 2018, followed by moderate declines in 2019–2020 that were larger for transgender men.

The rates expressed as a probability that a person receives a gender incongruence diagnosis in any given year are low, peaking just below 0.02%. The transition rates, when defined as changing legal gender, are even lower and display less variation over time; however, we observe a sharp increase in 2013, when the requirements for changing legal gender became less strict, and then again a few years later. Similar to rates based on diagnostic codes, we find a peak in 2018 for the rate of legal gender changes, but the declines in 2019–2020 are quite modest. The rate of legal gender changes in the last few years is slightly higher for transgender men than transgender women, and the gender gap is smaller than the corresponding gender gap in the rate of receiving a diagnosis.

Figure 1 about here

The overall pattern in Figure 1 hides a large variation by age. Figure 2 documents this age variation separately for transgender men and women. We combine several years for earlier periods to better visualize the rapid change from 2013–2020. For calculations covering multiple years, each person is counted in the denominator once per year that they have not transitioned. In panels 2A and 2B, a transition event is defined as receiving a first diagnosis of gender incongruence, while in panels 2C and 2D, it is defined as changing legal gender (note the different scales).

Panels 2A and 2B show that the transition rates based on earliest diagnosis are much higher for people under age 30 than for older adults, particularly for transgender men. While the rates increase over time for all age groups, the upward trend is starkest for transgender men aged 15–19. The increase for this group was particularly rapid from 2013–2016, but subsequently slowed down and reversed after 2018. For transgender women, we find an increase in younger age groups through 2014, but the rates are quite stable thereafter. Compared to earliest diagnoses, panels 2C and 2D show that legal gender changes tend to occur slightly later in life. The rates for legal change are highest at ages 20–29, though a non-trivial share of transitions also occurs at ages 18–19, especially among transgender men, and at ages 30–39. For both transition rates—defined as first diagnosis and legal gender change—the differences between age groups have widened over time, with transitions occurring earlier in the life course during later periods, particularly the 2010s.

The reversal in transition rates is relatively concurrent with the arrival of COVID-19 in Sweden in 2020. The pandemic had a big impact on the Swedish health care system, which may have limited people's access to gender-affirming care. To examine if pandemic-related period effects affected our measures, we analyze the rates at a 6-month level over the last few years for which we have data (2017–2020 for diagnoses and 2017–2021 for legal changes). Figure S.1 in the supplementary material shows that the reversal in diagnosis rates began before the pandemic, with the largest decline in the second half of 2019, and mostly affected transgender men in younger age groups. We conclude that the shifting rates are unrelated to COVID-19 and reflect other processes that have primarily affected the transition rates of younger transgender men (see Discussion). The results also show that the slightly lower rates for legal gender changes persisted in 2021.

Figure 2 about here

To understand the prevalence of our transgender measures for people born in different years, we also examining our data from a cohort perspective. In Figure 3, the yellow line shows the total prevalence of gender transition by birth year as observed at the end of 2020. The other lines show the prevalence of transition by different stages of the life course—that is, whether the person received a gender incongruence diagnosis or changed legal gender by a specific age. Overall, we find a slower monotonic increase by birth cohort, compared to the increase observed in period trends. Nevertheless, we find that each subsequent birth cohort is more likely to transition at a comparable life course stage.

For transgender women, Figure 3A shows that total prevalence per birth year is quite stable for the 1950–1985 cohorts, with only a moderate increase toward later birth years. For people born after 1985, the proportion approximately doubles and then declines modestly, as the latest cohorts are observed only at young ages. In younger cohorts, prevalence by age at diagnosis is increasing at a growing pace, implying that we underestimate the number of people who will ever transition. Nevertheless, total prevalence in these cohorts has already increased tenfold—from around 0.015% to around 0.15%—relative to the oldest birth cohorts. The cohort trends in legal gender changes, as shown in Figure 3C, exhibit a more stable pattern. However, we also observe increases in the latest cohorts. The estimates by age at legal change are not indicative of a decline but instead suggest a steady increase in prevalence by birth cohort for transgender women born after 1990.

For transgender men, Figure 3B indicates that transition prevalence is increasing rapidly over cohorts, with first diagnoses occurring at earlier ages. In the latest birth cohort, for whom we identify diagnoses only through age 18, we still find that the cohort prevalence is much higher than in earlier cohorts that we can follow through older ages. While cohorts born before the mid-1980s often received their first diagnosis after age 30, younger cohorts have shifted toward transitioning during early adulthood. The high prevalence observed in the latest birth cohorts could thus be more marked in the future, as some people born in the 2000s will receive a diagnosis in their twenties. However, this trend may be affected by the decreasing rates in young age groups seen in Figure 2. The cohort prevalence for transgender men increased from around 0.01–0.02% for those born in the 1960s and 1970s to around 0.5% among those born in 1999. The cohort trend for legal gender changes for transgender men, shown in Figure 3D, is less dramatic and shows a less steep increase for the latest cohorts.

The cohort shift from a majority of transgender women to a majority of transgender men (in first diagnoses) is clear from Figures 3A and 3B. For people born in the 1950s and 1960s, transgender women outnumber transgender men by several times, reaching parity for cohorts born around 1980. By contrast, transgender men outnumber transgender women by more than three to one in our latest cohorts.

Figure 3 about here

An important implication of our findings is that the type of prevalence measures used to estimate the size of transgender populations can vary significantly depending on the event type and age span used to calculate the numerator and denominator. Table S.2 illustrates this point using data from 2020. We show how the prevalence of the transgender population, as well as the ratio of transgender women to men, change across event types and a wide range of age definitions (e.g., everyone aged 18+, 18–65, etc.). Overall prevalence is about 2 to 2.5 times higher for diagnoses compared to legal gender changes and about 2.5 to 4 times higher when restricting to young adults. The ratio of transgender women to transgender men also varies considerably across definitions. For example, when using diagnostic data, the ratio of transgender women to transgender men is as low as 0.52 among young adults aged 18–25, but is closer to parity (0.86) among everyone aged 18+.

Sociodemographic Characteristics by Age Group and Transition Period

The second part of our analysis provides insight into transgender people's life circumstances at the time of transition and whether these circumstances have changed over transition periods. Table 1 documents the sociodemographic characteristics of people who transition in different periods and at different ages, as well as how they compare to cisgender people in the same age span. To ensure comparability across age groups and periods, we calculate the average sociodemographic characteristics of transgender people in the year of their first diagnosis (see Supplemental Text C for details). We note that factors related to the transition event may influence the traits that we study. All information is reported separately for transgender men and women, as well as cisgender men and women, by age group (ages 18–29 and 30–65).

To account for different temporal, legal, and normative contexts, we also divide our data into three period categorizations, as defined earlier: (i) the *early* period for years 1990–2000, (ii) the *pre-reform* period for years 2001–2012, and (iii) the *post-reform* period for years 2013–

2020. The categorizations are used both to delimitate those receiving a first diagnosis in the period window and for calculating the characteristics of their cisgender peers. Our approach largely captures an age-balanced comparison population within each period, but in our supplementary material (Tables S.3 and S.4), we standardize cisgender men and women against the ages of transgender men and women to get an exact age-matched sample. This standardization has a negligible impact on our results. Our supplementary material also includes a table that is equivalent to Table 1 but shows characteristics in the year of legal gender change instead of first diagnosis (Table S.5). The findings are broadly similar to those discussed below.

Table 1 about here

Overall, we find that transgender men and women exhibit more similarities to each other than to cisgender men or women. This holds true for all the sociodemographic characteristics we study. Across age groups and periods, we find substantial earnings differences between transgender and cisgender people, with transgender men and women having much lower earnings and higher proportions with very low earnings. For example, in the post-reform period, transgender men and women aged 30–65 earn 40–70% less than cisgender men and women of comparable age, and they are about 2.5 times more likely to have very low earnings. In the younger age group, the gap in earnings is even more pronounced.

Transgender people have slightly lower educational attainment than their cisgender peers, though the differences are smaller than for earnings. This contrasts with notions portraying transgender identities as being particularly common in university environments (as also discussed by Lagos, 2022). In a few age and period combinations, we do, however, find that transgender men and women have somewhat higher education than cisgender people.

For people who transitioned during the early period, we find that the foreign-born were overrepresented among transgender people relative to the Swedish-born. This is not the case in later transition periods, and among the most recent group of young transgender men, we find a slight overrepresentation of the Swedish-born. The early period also shows a substantial overrepresentation of transgender people living in metropolitan areas, but in later periods, we find no such differences.

Transgender men and women are much less likely than cisgender people to be in a legal union at all ages and transition cohorts. Differences have attenuated only moderately in later cohorts, even as a wider diversity of union formations became possible following the legalization of

registered partnerships in 1995 and same-sex marriages in 2009. Transgender men and women are also unlikely to live in a household with young children. A partial exception is transgender men aged 30–65 in the latest transition period, during which 9% live in a household with young children. The lack of family ties in the early and pre-reform periods may in part be a consequence of the requirements of sterilization and being unmarried for changing legal gender at that time.

Conclusion

Using national administrative data, we study the prevalence of gender transitions in Sweden from 1973 to 2020—a period of gradual legal advances, increasing societal acceptance, and a more accommodating health care system for transgender people. We present a multifaceted picture of the increase in gender transitions over time, documenting changes in trends by age, birth cohort, and historical period. Simultaneously, we compare trends for transgender men (people assigned female at birth transitioning to male) and transgender women (people assigned male at birth transitioning to female) across these dimensions.

Transgender people—particularly transgender men—receive their first diagnosis at increasingly younger ages. In earlier periods, we find a larger share of transgender women, which in the 2010s shifted to a larger share of transgender men. We also find a sharp increase in the rate of legal gender change in the 2010s, though smaller in magnitude than the increase in the rate of first diagnosis and occurring later in the life course. After 2018, we see a modest decline in overall transition rates and a stabilization in the transition rate for younger transgender men. Although the trends we find are broadly similar to those found in the U.S. over the same period, the reversal in the ratio of transgender men to women that we find has not (yet) been observed in the U.S. (Lagos, 2022). Additionally, the evidence we present of a slowdown and moderate reversal in new transgender transitions has, to our knowledge, not been found in other contexts.

Our data do not reveal whether the rapid increase in transition rates from 2013–2018, as well as the subsequent declines in 2019–2020, are driven by changes in demand for gender-affirming care or other changes within the health care system. In 2019, negative media attention towards gender-affirming care on public service television coincided with a decline in the number of minors referred to gender clinics (Indremo et al., 2022) and the declines in transition

rates among the youngest age group in our data. It is thus plausible that the decline in new diagnoses is driven by a decrease in demand for referrals to gender clinics or greater hesitation among physicians to refer young patients to the clinics. A dialogue with the gender clinics in Sweden revealed they had some staff shortages from 2019 onwards and at the same time awaiting decision to re-organize gender-affirming care. This could have led to increased waiting time for a first visit with fewer new diagnoses per year as a result.

Although we find an increase in transition rates, the number of people seeking and receiving gender-affirming medical care remains low. We estimate the overall prevalence of having a gender incongruence diagnosis to be 0.083% in 2020 when measuring everyone in Sweden aged 18 and above (see Table S.2 for different definitions). This is much lower than was found in a survey from Stockholm County (Åhs et al., 2018) where 0.5% of respondents wanted to receive hormones or surgery. Our overall prevalence is also lower than has been found in the U.S. at 0.5% (Herman et al., 2022), Canada at 0.33%, and England and Wales at 0.54% (Office for National Statistics, 2023; Statistics Canada, 2022). This suggests that our approach using medical records to define the transgender population captures a more distinct group than studies focusing on self-identification. We find the highest prevalence of 0.5% among transgender men in one of our latest birth cohorts, which is a lower number than that found for comparable cohorts reporting transgender identities (0.77%) in the U.S. (cf. Lagos, 2022) and in studies focusing on self-identification (Zhang et al., 2020; Zucker, 2017), but higher than in previous studies focusing on gender-affirming medical procedures or legal gender changes (Arcelus et al., 2015; Collin et al., 2016; Zucker, 2017).

In addition to analyzing demographic changes, our study is one of the first to use national administrative data to examine transgender people's life circumstances around the time of transition. Consistent with survey-based evidence from the U.S. (Carpenter et al., 2020; Carpenter et al., 2022), our results illustrate that the transgender population in Sweden is a group with markedly disadvantaged socioeconomic outcomes. Across all age groups and transition periods, we document substantial earnings gaps, with transgender men and women earning approximately 25–45% of the earnings of cisgender men and 35–65% as much as cisgender women of comparable age, with larger gaps at younger ages. The precarious situation of the transgender population is most likely reinforced by—and a result of—the challenges, negative attitudes, and systemic barriers that they face. Transgender people have faced considerable societal discrimination and adverse governmental policies and continue to suffer from well-documented minority stress (FORTE, 2019; Schilt & Lagos, 2017; SOU, 2017). The

adverse effects of the incongruence between their gender identity and assigned sex may be particularly acute around the time of medical transition, which could to some extent explain their low earnings in the year of diagnosis and the year of legal gender change. Transgender men and women also have much lower rates of marriage and childrearing than their cisgender peers. This can be explained in part by the previous requirement to be unmarried and sterile before changing legal gender. The lack of ties to children or a partner may contribute to the social vulnerability of many transgender people.

Importantly, our data and results are placed in the context of increasing societal acceptance. Additionally, access to health care has improved, and legal reforms that were historically adversarial toward transgender men and women have gradually become more accepting. This allows transgender people to receive medical care earlier in the life course, compared to previous cohorts who faced a less accommodating society and health care system. Our findings should not be interpreted as evidence of a shift in the prevalence of the underlying tendency toward gender incongruence in the population, either by life course stage or over time. Rather, our results should be understood quite narrowly as exactly what they measure: the number or rate of people who receive a gender incongruence diagnosis or change their legal gender for the first time. It is important to stress that when using medical records to define transgender people, we capture a subgroup of the broader gender-diverse population and focus on the medical and legal aspects of a gender transition as opposed to changes in how people self-identify or express their gender. Therefore, extrapolating our results to the full population of gender-diverse people in Sweden is not possible. This is particularly true for non-binary people, as discussed earlier.

Our results shed light on the changing composition of the transgender population seeking medical care and can be used to inform policy discussions in similar countries regarding, for example, dimensioning health care for transgender people. The low prevalence and poor socioeconomic position that we document highlights the vulnerability of transgender people as a small minority in society. We hope that these results can inform public and governmental debates, as transgender people have in some contexts become the focus of hostile debates in traditional and social media (Schilt & Lagos, 2017; SOU, 2017).

An important conclusion drawn from our results, given the rapid period shifts we observe, is that any single number on prevalence will be conditional on that specific time and context. Furthermore, given the large differences by age and event types, prevalence measures will be

influenced by definitions of both the numerator (who is transgender) and the denominator (whom we compare with, particularly which age groups). We therefore encourage researchers to report multiple dimensions of age, period, and cohort trends when studying transgender demography, and to be mindful of how changing denominators can affect prevalence measures. In addition, while our data provide novel knowledge on transgender demography, they should in the future be triangulated against other data sources measuring different aspects of transgender people's experiences.

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Figures and Tables

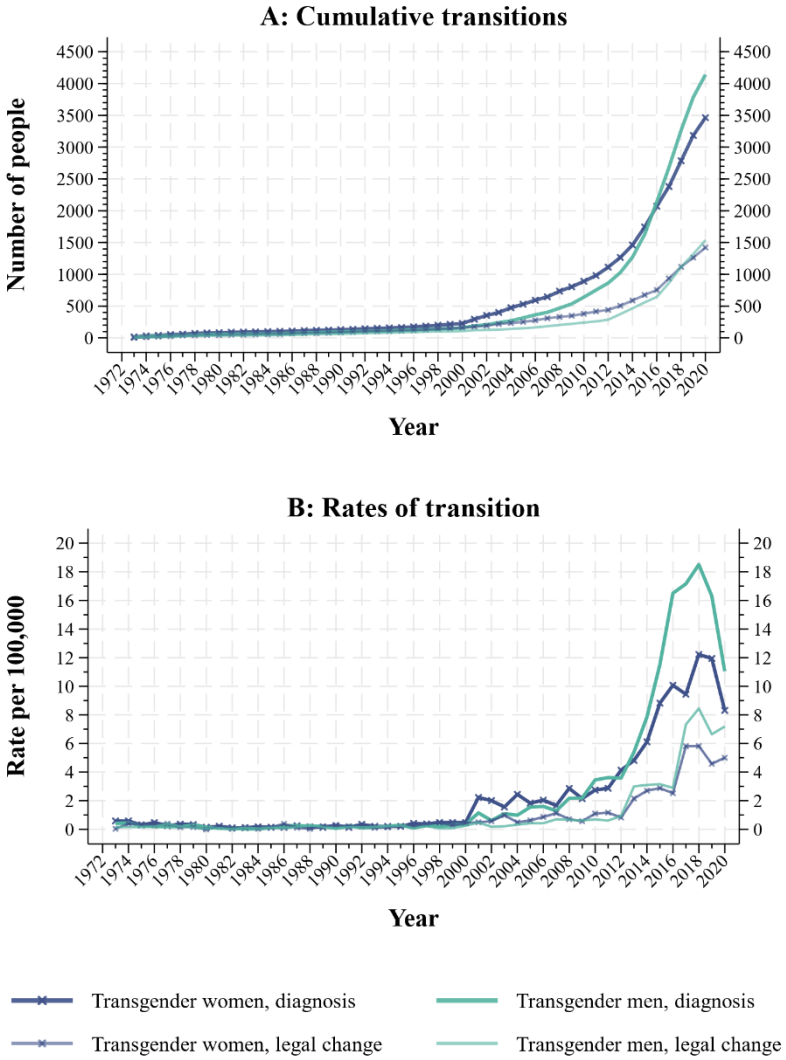

Figure 1. Cumulative number of transitions (panel A) and rates of transition (panel B). Diagnosis refers to the earliest diagnosis of gender incongruence observed in the National Patient Registry. Since 1987, the patient records have had nationwide coverage, and since 2001, they include diagnoses received in outpatient settings. Before 2001, we only observe diagnoses from hospital discharge records. Legal change refers to a change of the gender marker on record with the Swedish Tax Agency. In panel B, we calculate the annual transition rate for transgender men as the number of people who have their first event in a given year divided by the number of people assigned female at birth who have never had an event between 1973 and the given year, and vice versa for transgender women.

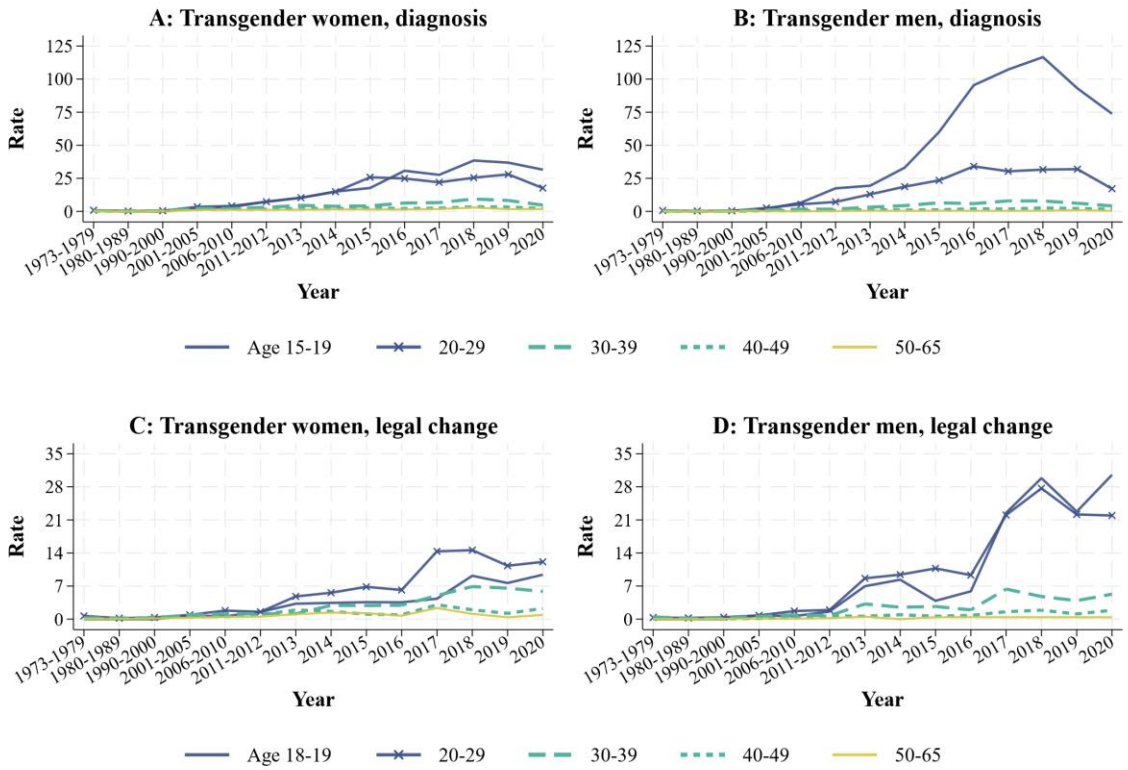

Figure 2. Rates of gender transition by age group and period (per 100,000 people). For each age group, we calculate the transition rate for transgender women (transgender men) as the number of people who have their first event in a given period divided by the number of people assigned male (assigned female) at birth who have never had an event between 1973 and the given period. For calculations over multiple years, people are counted in the denominator once per year that they appear in the data, as long as they have not transitioned. Panels A and B show the rates for earliest diagnosis of gender incongruence. Panels C and D show the rates for change of legal gender marker.

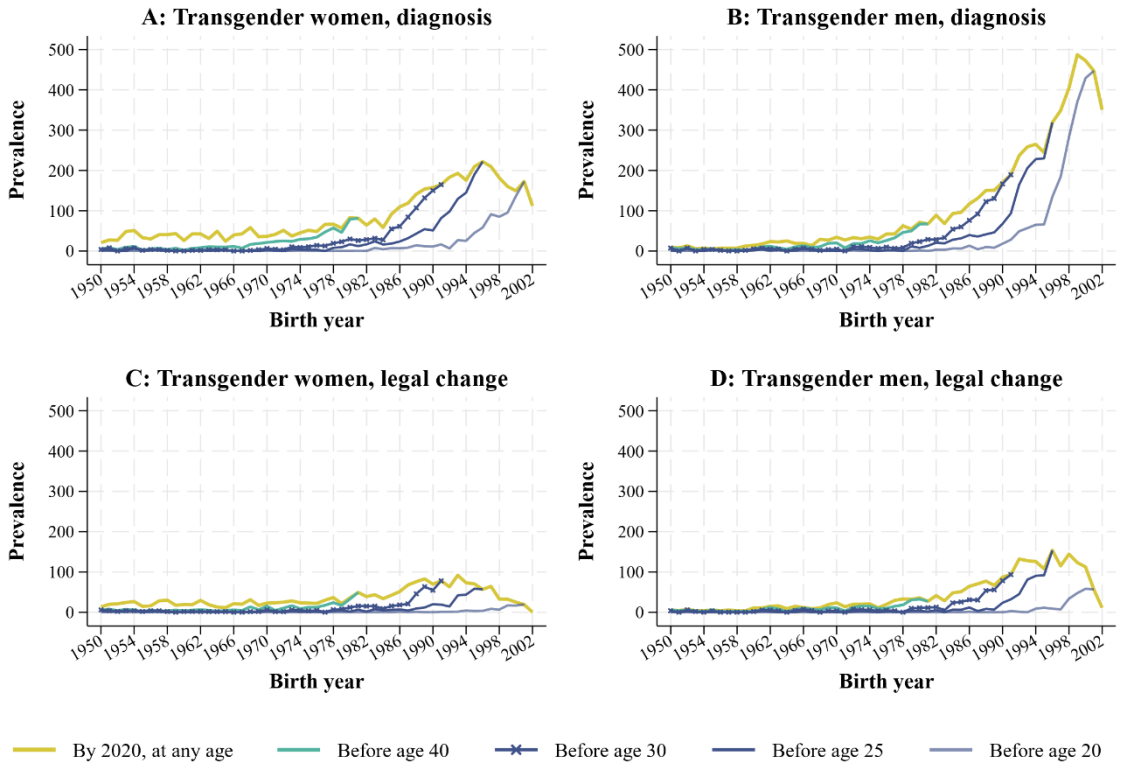

Figure 3. Prevalence of gender transitions by birth cohort (per 100,000 people). Birth cohorts consist of people who are born in the same year, regardless of their country of birth. We restrict the population to people who reside in Sweden at the end of 2020. For each birth cohort, the numerator for transgender women (transgender men) equals the number of people assigned male (assigned female) at birth who had an event before a specific age, and the denominator for transgender women (transgender men) equals the total population of people assigned male (assigned female) at birth. Panels A and B show the rates for earliest diagnosis of gender incongruence. Panels C and D show the rates for change of legal gender marker.

Table 1. Socio-demographics in the year of earliest gender incongruence diagnosis by gender, age group, and period.

	Trans-gender women, 18–29	Cis-gender women, 18–29	Trans-gender men, 18–29	Cis-gender men, 18–29	Trans-gender women, 30–65	Cis-gender women, 30–65	Trans-gender men, 30–65	Cis-gender men, 30–65
A. Early period, 1990–2000								
Year	1996.3	1994.9	1995.8	1994.9	1995.8	1995.1	1996.1	1995.1
Age	24.2	23.7	24.3	23.7	42.9	46.4	38.9	46.1
Swedish-born (%)	67.7	88.7	60.6	89.8	73.2	86.1	65.6	86.6
Lives in a metropolitan area (%)	58.1	35.5	69.7	33.4	49.3	33.4	53.1	32.9
Married or registered partner (%)	3.2	15.7	3.0	8.2	0.0	61.2	21.9	57.9
Lives with young children (%)	0.0	27.2	3.0	13.7	0.0	18.3	12.5	18.7
Years of education	10.4	11.5	10.8	11.3	11.2	11.3	10.7	11.3
Labor earnings (1000s of 2020 SEK)	27.9	94.0	63.1	132.2	88.7	153.5	72.7	231.5
Low labor earnings (%)	67.7	34.5	60.6	30.2	64.1	25.7	63.3	24.1
Observations	31	7.5 mil	33	7.8 mil	71	21.7 mil	32	22.2 mil
B. Pre-reform period, 2001–2012								
Year	2007.8	2006.7	2008.4	2006.7	2006.6	2006.5	2007.0	2006.5
Age	22.7	23.5	22.3	23.5	43.7	47.3	38.9	47.1
Swedish-born (%)	83.0	83.8	84.7	84.8	80.3	82.8	69.5	83.9
Lives in a metropolitan area (%)	31.9	37.9	38.8	35.9	45.1	35.8	52.7	35.4
Married or registered partner (%)	2.6	11.7	2.9	5.9	14.2	53.5	19.2	50.0
Lives with young children (%)	2.6	19.1	2.6	9.2	3.0	18.0	5.4	17.8
Years of education	10.9	12.1	10.8	11.8	11.9	12.2	12.6	11.9
Labor earnings (1000s of 2020 SEK)	44.0	110.4	47.4	149.6	146.8	210.9	98.2	297.7
Low labor earnings (%)	73.9	37.9	70.9	35.2	47.4	25.5	56.9	23.4
Observations	389	8.1 mil	417	8.4 mil	437	25.8 mil	167	26.4 mil
C. Post-reform period, 2013–2020								
Year	2016.9	2016.5	2016.9	2016.5	2016.9	2016.5	2016.8	2016.6
Age	22.9	23.8	22.0	23.8	41.3	47.2	37.4	47.0
Swedish-born (%)	82.8	80.3	87.5	79.3	68.2	76.1	66.1	77.0
Lives in a metropolitan area (%)	40.4	38.9	40.2	36.8	45.9	38.5	52.5	38.2
Married or registered partner (%)	2.0	11.3	3.3	5.6	20.1	50.9	20.3	47.8
Lives with young children (%)	2.3	18.9	3.3	9.0	5.6	20.1	9.0	19.7
Years of education	11.2	12.3	10.8	11.9	12.7	12.8	13.1	12.3
Labor earnings (1000s of 2020 SEK)	53.0	142.6	49.2	181.7	196.3	277.4	153.9	359.1
Low labor earnings (%)	75.8	38.2	75.3	35.8	46.4	23.3	44.9	21.0
Observations	1444	6.0 mil	1864	6.4 mil	588	17.8 mil	413	18.4 mil

Notes: For transgender men and women, we measure covariates in the year of transition (earliest observed gender incongruence diagnosis). Cisgender men and women are included every person-year within the period window they reside in Sweden.

Supplementary Figures and Tables

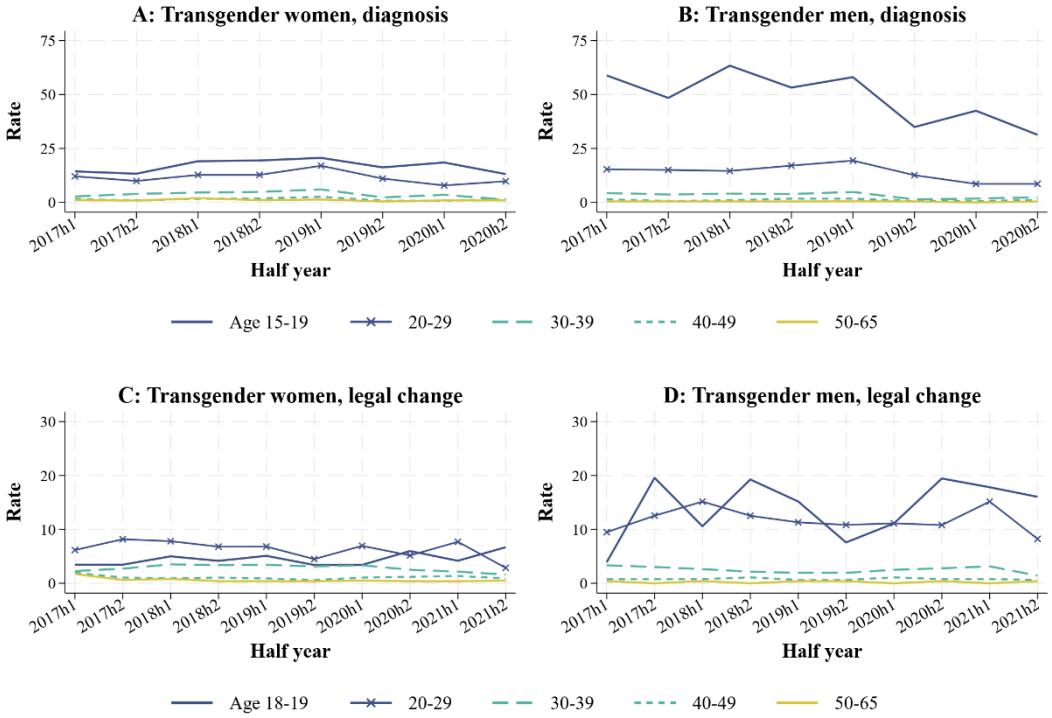

Fig. S.1. Rates of gender transition by age group and half year (per 100,000 people). For each age group, we calculate the transition rate for transgender women (transgender men) as the number of people who have their first event in a given period divided by the number of people assigned male (assigned female) at birth who have never had an event between 1973 and the given period. Panels A and B show the rates for earliest diagnosis of gender incongruence. We do not show rates in 2021 because we only have data on diagnoses through 2020. Panels C and D show the rates for change of legal gender marker.

Table S.1. Definitions of socio-demographic variables.

Variable	Definition
Year	For transgender people, the year of the event (i.e., earliest gender incongruence diagnosis or change of legal gender marker). For cisgender people, the year of measurement (with one observation for each year that they reside in Sweden during the period window).
Age	For transgender people, age in the year of the event. For cisgender people, age in the year of measurement. All ages are calculated as of December 31.
Swedish-born	Equal to one if the person was born in Sweden.
Lives in a metropolitan area	Equal to one if the person lives in a municipality that includes one of Sweden's three major cities or a commuting municipality to one of these cities. Based on the classification of municipalities by the Swedish Association of Local Authorities and Regions (SKR) in 2017 (groups A1 and A2).
Married or registered partner	Equal to one if the person is legally married (includes both different-sex and same-sex marriage) or in a registered partnership. See the section on the Swedish context on varying legal status on being able to marry when changing legal gender.
Lives with young children	Equal to one if the person lives in a household with any children under age seven, irrespective of the children's biological relation to the person. This is based on Statistics Sweden's definition of a household, where in addition of sharing a household with the child either requires having biological/adoptive/custodial links to the child or being in a marriage/registered partnership with the parent of a non-biological/adopted/custodial child residing in the household.
Years of education*	Equal to the typical duration of the highest observed level of education completed in Swedish educational registers. Based on 3-digit SUN2000 codes reported in Statistics Sweden's LISA database.
Labor earnings*	Annual labor earnings, reported in 1000s of Swedish krona (SEK) from Swedish annual taxation records. Benchmarked to SEK in 2020 using CPI data from Statistics Sweden. 1000 SEK ≈ 100-150 USD over the period.
Low labor earnings*	Equal to one if the person has either (i) no labor earnings (zero earnings) or (ii) earns below the 10^{th} percentile of the annual earnings distribution (for the population with non-zero earnings).

Notes: All variables are derived from Swedish administrative registers. For transgender people, we measure most variables in the year of the earliest event (i.e., diagnosis of gender incongruence or legal gender change). The variables marked with an asterisk (*) are instead measured in the year before the event. We lag these variables by one year due to a high share of missing values in the year of legal gender change, resulting from the fact that a new personal identification number is assigned at that time, which temporarily causes issues in register linkages.

Table S.2. Prevalence measures in 2020 using different age spans for the numerator and denominator.

		Diagnosed with gender incongruence				*Changed legal gender marker*			
		Prevalence per 100,000 people			Ratio	Prevalence per 100,000 people			Ratio
Age span	**Size of denominator**	**Overall**	**Transgender women**	**Transgender men**	**Transgender women: Transgender men**	**Overall**	**Transgender women**	**Transgender men**	**Transgender women: Transgender men**
All ages	10,379,295 people total (5,222,847 registered men and 5,156,448 registered women)	71.97	32.13	39.84	0.81	27.01	12.76	14.25	0.90
0–65	8,401,432 people total (4,303,915 registered men and 4,097,517 registered women)	85.78	37.29	48.49	0.77	31.54	14.33	17.21	0.83
15–65	6,563,634 people total (3,358,234 registered men and 3,205,400 registered women)	106.79	46.53	60.26	0.77	40.37	18.34	22.03	0.83
18+	8,189,892 people total (4,096,028 registered men and 4,093,864 registered women)	82.96	38.29	44.66	0.86	34.23	16.17	18.06	0.90
18–75	7,296,256 people total (3,707,965 registered men and 3,588,291 registered women)	92.35	42.42	49.93	0.85	37.98	17.80	20.17	0.88
18–65	6,212,029 people total (3,177,096 registered men and 3,034,933 registered women)	105.13	47.23	57.90	0.82	42.66	19.38	23.28	0.83
18–45	3,685,223 people total (1,900,962 registered men and 1,784,261 registered women)	156.41	65.88	90.52	0.73	60.27	25.26	35.00	0.72
18–30	1,679,646 people total (874,360 registered men and 805,286 registered women)	239.99	91.69	148.31	0.62	79.78	28.22	51.56	0.55
18–25	933,423 people total (491,256 registered men and 442,167 registered women)	273.72	93.42	180.30	0.52	68.99	20.03	48.96	0.41

Notes: All measures are calculated using the population of Sweden at the end of 2020. The numerator of the prevalence measures counts the number of people in the given age span who ever had an event (i.e., gender incongruence diagnosis or legal gender change) between 1973 and 2020. The denominator of the prevalence measures counts the total number of people in the given age span, regardless of their registered gender or event history. Registered men (women) refers to people legally registered as male (female) in 2020, regardless of their sex assigned at birth. The category 18+ contains everyone age 18 and above, i.e., without an upper age limit.

Table S.3. Socio-demographics in the year of earliest gender incongruence diagnosis by gender, age group, and period—re-weighting the cisgender population to have the age distribution of transgender women.

	Trans-gender women, 18–29	**Cis-gender women, 18–29**	**Trans-gender men, 18–29**	**Cis-gender men, 18–29**	**Trans-gender women, 30–65**	**Cis-gender women, 30–65**	**Trans-gender men, 30–65**	**Cis-gender men, 30–65**
A. Early period, 1990–2000								
Year	1996.3	1994.9	1995.8	1994.9	1995.8	1995.1	1996.1	1995.1
Age	24.2	24.2	24.3	24.2	42.9	42.9	38.9	42.9
Swedish born (%)	67.7	88.5	60.6	89.8	73.2	85.8	65.6	86.2
Lives in metropolitan area (%)	58.1	35.9	69.7	33.5	49.3	34.0	53.1	33.5
Married or registered partner (%)	3.2	16.6	3.0	8.6	0.0	60.9	21.9	56.0
Lives with young children (%)	0.0	28.0	3.0	13.5	0.0	21.5	12.5	22.9
Years of education	10.4	11.7	10.8	11.5	11.2	11.6	10.7	11.5
Labor earnings (1000s of 2020 SEK)	27.9	101.3	63.1	142.3	88.7	168.0	72.7	249.6
Low labor earnings (%)	67.7	30.3	60.6	25.5	64.1	20.0	63.3	19.6
Observations	31	7.5 mil	33	7.8 mil	71	21.7 mil	32	22.2 mil
B. Pre-reform period, 2001–2012								
Year	2007.8	2006.7	2008.4	2006.7	2006.6	2006.5	2007.0	2006.5
Age	22.7	22.7	22.3	22.7	43.7	43.7	38.9	43.7
Swedish born (%)	83.0	84.6	84.7	85.5	80.3	82.0	69.5	83.2
Lives in metropolitan area (%)	31.9	36.9	38.8	35.1	45.1	37.1	52.7	36.6
Married or registered partner (%)	2.6	9.9	2.9	4.8	14.2	51.1	19.2	46.2
Lives with young children (%)	2.6	16.4	2.6	8.0	3.0	24.7	5.4	22.6
Years of education	10.9	12.0	10.8	11.7	11.9	12.4	12.6	12.0
Labor earnings (1000s of 2020 SEK)	44.0	102.2	47.4	137.0	146.8	212.8	98.2	303.4
Low labor earnings (%)	73.9	39.5	70.9	37.5	47.4	23.7	56.9	21.2
Observations	389	8.1 mil	417	8.4 mil	437	25.8 mil	167	26.4 mil
C. Post-reform period, 2013–2020								
Year	2016.9	2016.4	2016.9	2016.5	2016.9	2016.6	2016.8	2016.6
Age	22.9	22.9	22.0	22.9	41.3	41.3	37.4	41.3
Swedish born (%)	82.8	81.3	87.5	79.8	68.2	73.7	66.1	74.4
Lives in metropolitan area (%)	40.4	38.0	40.2	36.2	45.9	40.7	52.5	40.2
Married or registered partner (%)	2.0	8.9	3.3	4.2	20.1	47.6	20.3	42.2
Lives with young children (%)	2.3	15.6	3.3	7.5	5.6	33.5	9.0	28.2
Years of education	11.2	12.1	10.8	11.7	12.7	13.1	13.1	12.5
Labor earnings (1000s of 2020 SEK)	53.0	128.6	49.2	161.8	196.3	262.2	153.9	348.2
Low labor earnings (%)	75.8	41.2	75.3	39.8	46.4	23.6	44.9	19.5
Observations	1444	6.0 mil	1864	6.4 mil	588	17.8 mil	413	18.4 mil

Notes: For transgender people, we measure covariates at the time of transition (i.e., in the year of earliest gender incongruence diagnosis). Cisgender people are included in the calculations each year they live in Sweden within the period window.

Table S.4. Socio-demographics in the year of earliest gender incongruence diagnosis by gender, age group, and time period—re-weighting the cisgender population to have the age distribution of transgender men.

	Trans-gender women, 18–29	**Cis-gender women, 18–29**	**Trans-gender men, 18–29**	**Cis-gender men, 18–29**	**Trans-gender women, 30–65**	**Cis-gender women, 30–65**	**Trans-gender men, 30–65**	**Cis-gender men, 30–65**
A. Early period, 1990–2000								
Year	1996.3	1994.9	1995.8	1994.9	1995.8	1995.1	1996.1	1995.1
Age	24.2	24.3	24.3	24.3	42.9	38.9	38.9	38.9
Swedish born (%)	67.7	88.4	60.6	89.5	73.2	85.4	65.6	85.8
Lives in metropolitan area (%)	58.1	36.2	69.7	33.9	49.3	35.3	53.1	34.6
Married or registered partner (%)	3.2	17.7	3.0	9.2	0.0	55.1	21.9	47.7
Lives with young children (%)	0.0	30.4	3.0	15.1	0.0	37.5	12.5	31.5
Years of education	10.4	11.5	10.8	11.4	11.2	11.6	10.7	11.5
Labor earnings (1000s of 2020 SEK)	27.9	99.2	63.1	142.1	88.7	148.4	72.7	230.4
Low labor earnings (%)	67.7	33.3	60.6	28.1	64.1	23.7	63.3	20.4
Observations	31	7.5 mil	33	7.8 mil	71	21.7 mil	32	22.2 mil
B. Pre-reform period, 2001–2012								
Year	2007.8	2006.7	2008.4	2006.8	2006.6	2006.5	2007.0	2006.5
Age	22.7	22.3	22.3	22.3	43.7	38.9	38.9	38.9
Swedish born (%)	83.0	85.1	84.7	86.0	80.3	81.0	69.5	82.4
Lives in metropolitan area (%)	31.9	36.4	38.8	34.6	45.1	39.0	52.7	38.5
Married or registered partner (%)	2.6	8.7	2.9	4.1	14.2	47.3	19.2	40.4
Lives with young children (%)	2.6	14.7	2.6	7.2	3.0	37.2	5.4	31.0
Years of education	10.9	11.9	10.8	11.6	11.9	12.6	12.6	12.2
Labor earnings (1000s of 2020 SEK)	44.0	95.3	47.4	126.4	146.8	201.8	98.2	297.2
Low labor earnings (%)	73.9	41.4	70.9	40.1	47.4	23.9	56.9	19.6
Observations	389	8.1 mil	417	8.4 mil	437	25.8 mil	167	26.4 mil
C. Post-reform period, 2013–2020								
Year	2016.9	2016.4	2016.9	2016.5	2016.9	2016.6	2016.8	2016.6
Age	22.9	22.0	22.0	22.0	41.3	37.4	37.4	37.4
Swedish born (%)	82.8	81.9	87.5	80.1	68.2	72.0	66.1	72.6
Lives in metropolitan area (%)	40.4	37.4	40.2	35.8	45.9	42.2	52.5	41.5
Married or registered partner (%)	2.0	7.1	3.3	3.2	20.1	45.8	20.3	38.8
Lives with young children (%)	2.3	13.4	3.3	6.9	5.6	42.5	9.0	34.4
Years of education	11.2	11.7	10.8	11.4	12.7	13.2	13.1	12.7
Labor earnings (1000s of 2020 SEK)	53.0	112.4	49.2	138.6	196.3	252.6	153.9	342.0
Low labor earnings (%)	75.8	47.2	75.3	46.8	46.4	23.7	44.9	18.3
Observations	1444	6.0 mil	1864	6.4 mil	588	17.8 mil	413	18.4 mil

Notes: For transgender people, we measure covariates at the time of transition (i.e., in the year of earliest gender incongruence diagnosis). Cisgender people are included in the calculations each year they live in Sweden within the period window.

Table S.5. Socio-demographics in the year of legal gender change by gender, age group, and period.

	Trans-gender women, 18–29	**Cis-gender women, 18–29**	**Trans-gender men, 18–29**	**Cis-gender men, 18–29**	**Trans-gender women, 30–65**	**Cis-gender women, 30–65**	**Trans-gender men, 30–65**	**Cis-gender men, 30–65**
A. Early period, 1990–2000								
Year	1996.0	1994.9	1995.0	1994.9	1995.6	1995.1	1996.0	1995.1
Age	24.9	23.7	25.4	23.7	42.6	46.4	38.0	46.1
Swedish born (%)	62.5	88.7	66.7	89.8	71.9	86.1	63.2	86.6
Lives in metropolitan area (%)	66.7	35.5	75.0	33.4	50.9	33.4	68.4	32.9
Married or registered partner (%)	4.2	15.7	8.3	8.2	0.0	61.2	5.3	57.9
Lives with young children (%)	0.0	27.2	4.2	13.7	0.0	18.3	0.0	18.7
Years of education	10.6	11.5	11.1	11.3	11.7	11.3	10.3	11.3
Labor earnings (1000s of 2020 SEK)	22.2	93.9	58.3	132.2	74.8	153.5	55.7	231.5
Low labor earnings (%)	79.2	34.5	56.5	30.2	67.3	25.7	78.9	24.1
Observations	24	7.5 mil	24	7.8 mil	57	21.7 mil	19	22.2 mil
B. Pre-reform period, 2001–2012								
Year	2007.6	2006.7	2007.9	2006.7	2006.9	2006.5	2007.6	2006.5
Age	24.4	23.5	24.2	23.5	43.2	47.3	37.7	47.1
Swedish born (%)	81.0	83.8	84.2	84.8	81.4	82.8	70.1	83.9
Lives in metropolitan area (%)	53.0	37.9	40.0	35.9	51.2	35.8	58.4	35.4
Married or registered partner (%)	0.0	11.7	3.2	5.9	2.3	53.5	5.2	50.0
Lives with young children (%)	2.0	19.1	0.0	9.2	0.0	18.0	2.6	17.8
Years of education	11.2	12.1	11.2	11.8	12.1	12.2	12.3	11.9
Labor earnings (1000s of 2020 SEK)	53.3	110.4	58.9	149.6	141.1	210.9	140.0	297.7
Low labor earnings (%)	71.4	37.9	64.9	35.2	48.8	25.5	39.5	23.4
Observations	100	8.1 mil	95	8.4 mil	172	25.8 mil	77	26.4 mil
C. Post-reform period, 2013–2020								
Year	2017.3	2016.5	2017.4	2016.5	2017.1	2016.5	2017.2	2016.6
Age	24.2	23.8	23.1	23.8	40.5	47.2	36.5	47.0
Swedish born (%)	83.3	80.3	88.4	79.3	69.1	76.1	81.4	77.0
Lives in metropolitan area (%)	46.3	38.9	44.9	36.8	53.5	38.5	43.6	38.2
Married or registered partner (%)	2.7	11.2	3.2	5.6	11.7	50.9	15.2	47.8
Lives with young children (%)	0.5	18.9	2.8	9.0	2.9	20.1	8.0	19.7
Years of education	11.7	12.3	11.4	11.9	12.7	12.8	12.8	12.3
Labor earnings (1000s of 2020 SEK)	62.5	142.5	68.4	181.6	161.6	277.4	154.2	359.0
Low labor earnings (%)	70.5	38.3	65.2	35.9	54.7	23.3	42.7	21.0
Observations	562	6.0 mil	976	6.4 mil	411	17.8 mil	264	18.4 mil

Notes: For transgender people, we measure covariates at the time of transition (i.e., in the year of legal gender change). Cisgender people are included in the calculations each year they live in Sweden within the period window.

Appendix 1 –Descriptions of context and measurements

This supplemental text provides information on the legal framework and health care structure relevant to our study and describes in detail how we define our population. Section A explains the requirements for changing legal gender in Sweden, how this legislation has changed over time, and other relevant legal reforms related to transgender people. Section B describes how health care is provided and structured for people wishing to make a gender transition. Section C explains how we identify transgender and cisgender people using administrative data on inpatient and outpatient visits in the Swedish medical system, as well as records of legal gender changes.

A. The Development of Legal and Social Recognition of Transgender People in Sweden

In 1972, Sweden became the first country in the world to allow legal gender changes (SOU, 2017). The law led to a harmonization of the processes and facilitated access to gender-affirming care. From 1972 to 2013, sterilization (in practice castration) and destruction of any saved gametes were mandated before changing legal gender (SOU, 2017). This requirement ended as a result of a court ruling in January 2013, followed by a change of the law in July 2013. Since the abolishment of the sterilization requirement, people undergoing gender transition are instead offered storage of gametes before having bottom surgery (i.e., surgery on the reproductive organs). In the years before the abolishment, Sweden was criticized for violating the human rights of transgender people by Amnesty International and LGBTQ organizations. In 2018, the Swedish government paid compensation to transgender people who had been forced to get sterilized because of the previous law.

Another significant legal change occurred in 2009, when gender identity became a legal ground for discrimination claims. In practice, though, very few such claims have been brought to court. Additionally, in 2009, a court ruling made it possible for people to change their first name to a name more common among the "opposite" sex without first changing their legal gender. This made it easier for transgender people to control their transition process and obtain recognition of their identity in terms of a new name faster than before. It also made it possible for, e.g., non-binary people to choose two first names typically associated with different sexes.

An additional legal requirement for changing legal gender as per the law of 1972 was that the person should not be married. Since then, Sweden has changed its laws on same-sex union formation and childbearing, which indirectly affected transgender people. Following the introduction of a civil status form called registered partnership in 1995, it became possible for people who had changed legal gender to "re-marry" their former spouse or enter a union with a new spouse through a registered partnership. The legalization of same-sex marriage was implemented in 2009, which ultimately led to the abolishment of the requirement to be unmarried when changing legal gender, because the non-existence of same-sex marriage had been the foundation of this requirement. Although the requirement to be unmarried was not officially eliminated from the law until 2013, it was no longer enforced after a court ruling in

September 2010. Likewise, important reforms recognizing same-sex parenthood in 2003 and 2005 (Evertsson, Jaspers, & Moberg, 2020; Kolk & Andersson, 2020) made it easier for some people who had changed legal gender to be legally recognized as parents.

B. Gender-Affirming Care in Sweden

In Sweden, gender-affirming care is provided and subsidized by the public health care system; hence, it can be used at a significantly lower cost, compared to countries where private insurance or large out-of-pocket spending is needed. Annual expenditures on health care, such as surgery and visits to doctors and hospitals, are capped at around 100 USD, while annual expenditures on prescription drugs are capped at around 250 USD. Access to gender-affirming care is affected by guidelines, policies, and occasionally discrimination within the health care system. In general, these practices have become increasingly inclusive over time (Dhejne, 2017; SOU, 2017).

To receive gender-affirming care, one must first have a referral sent to a gender incongruence clinic. The clinics are located in eight cities spread across different regions of Sweden, and several of them specialize in the treatment of patients under age 18: Alingsås (adults, children, and adolescents); Karlskrona (adults); Linköping (adults); Linköping (children and adolescents); Malmö (adults); Malmö (children and adolescents); Stockholm (adults); Stockholm (children and adolescents); Umeå (adults); Umeå (children and adolescents); Uppsala (adults, children, and adolescents); and Östersund (adults) (National Board of Health and Welfare, 2020a).

The waiting time from initial referral until the first visit has varied over time and between clinics, typically ranging from a few months to over a year. In recent years, waiting times at several of the larger clinics have reached two to three years. The first step in the treatment process is a psychological evaluation, in which a team of psychiatrists and psychologists decide on an appropriate diagnosis. The evaluation is thorough and can last anywhere from a few months to over a year. At the end of the evaluation, patients who receive a diagnosis of gender incongruence have the option to receive gender-affirming medical treatments. For example, they may receive a referral for hormone replacement therapy, speech therapy, hair removal, chest surgery, or other types of plastic surgery. Each type of treatment is associated with additional waiting time, often up to a year or more.

After a period of "real-life experience" with their "new" gender, people can apply for legal gender recognition (change of legal gender) and to have bottom surgery (surgery on the reproductive organs) (National Board of Health and Welfare, 2015). The application is filed with the Legal Advisory Board at the National Board of Health and Welfare. There are several legal requirements for approval: the person must be 18 years or older, reside in Sweden, and have a gender incongruence diagnosis. Additionally, the Board typically requires the applicant to have had at least two years of treatment at a gender clinic and one year of "real-life experience" of living as their desired gender by, for example, using a new name and dressing in a way typical of that gender (National Board of Health and Welfare, 2020). People under age 23 are approved for bottom surgery only under special circumstances.

Minors

Gender-affirming health care has been offered to minors since about the year 2000 in Stockholm, after which it gradually became available at other places in Sweden. People under age 18 have never been able to have bottom surgery or change their legal gender. In some cases,

minors over age 16 have received hormone replacement therapy and mastectomy. Until 2022, teenagers with gender incongruence could take hormone blockers to delay puberty until they were old enough to begin cross-sex hormone replacement therapy. As of 2022, national guidelines are stricter and do not recommend the use of hormone blockers before age 18, except in special circumstances—for example, as part of medical trials (National Board of Health and Welfare, 2022)

Care for Non-Binary People

Non-binary people can receive most types of gender-affirming medical care except for bottom surgery, although availability and practices vary across clinics. In the past, it was more difficult for non-binary people to access such care, because the diagnostic criteria for gender incongruence only included a binary perspective of gender transition. The diagnostic criteria has become more inclusive of non-binary identities and gender expressions since the mid-2010s (National Board of Health and Welfare, 2015).

Transitioning Abroad

People who start their gender transition while living in another country may be permitted to receive hormones or other treatments without undergoing extensive psychological evaluation in Sweden. Citizens of other countries who immigrate to Sweden after changing their legal gender in their home country can be registered with their "new" gender from the time of arrival. If they have not changed their legal gender in their home country, they can apply to change their legal gender in Swedish records as long as they meet the Swedish requirements.

C. Definitions of Transgender and Cisgender People

Gender identity is a person's sense of self as male, female, both, or neither. Given its personal nature, gender identity must be self-reported (e.g., through a survey) and is therefore not directly observable in our administrative data. Instead, we infer a person's gender identity based on what we can observe: their sex assigned at birth and whether they have received a diagnosis of gender incongruence in the Swedish medical system. If a person has not been diagnosed with gender incongruence, we assume that they are cisgender and their gender identity aligns with their sex assigned at birth. If a person has been diagnosed with gender incongruence, we assume that they are transgender and their gender identity is the opposite of their sex assigned at birth. This leads to four mutually exclusive categories:

i. *Cisgender women*: Assigned female at birth, not diagnosed with gender incongruence, and assumed, therefore, to self-identify as female.
ii. *Cisgender men*: Assigned male at birth, not diagnosed with gender incongruence, and assumed, therefore, to self-identify as male.
iii. *Transgender women*: Assigned male at birth, diagnosed with gender incongruence, and assumed, therefore, to self-identify as female.
iv. *Transgender men*: Assigned female at birth, diagnosed with gender incongruence, and assumed, therefore, to self-identify as male.

While these four categories are the best we can do with the data on hand, they unfortunately gloss over non-binary and fluid identities. We acknowledge that the people whom we classify as women and men, or cisgender and transgender, may not self-identify that way.

In a strict statistical sense, throughout our analyses, we use the term transgender to refer to people after they have transitioned (that is, after they have received their first diagnosis, or changed their legal gender, depending on the event we analyze). This is due to our methodological approach focusing on the occurrence of an "event": in our case, when the person receives a diagnosis or changes legal gender. We use the term cisgender people for people who have not received such a diagnosis or changed legal gender. In our calculations, a person who has undergone a gender transition is thus treated as cisgender before that and transgender thereafter. This does not imply any judgment on transgender identities over the life course but is due to the fact that we use the timing of gender incongruence diagnoses to identify our population. For analyses on legal gender, we use a similar event-based approach but use the timing before/after the legal change to define the numerator (legal change) and denominator (people who have not had a legal gender change) in our calculations. In the following section, we explain how we identify the "event" of receiving a diagnosis and/or changing legal gender using Swedish register data.

Identifying Transgender People in Swedish Register Data

Since 1973, the National Patient Register has included diagnoses of *gender incongruence* (formerly known as *gender dysphoria* or *transsexualism*). Our administrative data contain inpatient records from 1973–2020 (with nationwide coverage since 1987) and outpatient records from 2001–2020. We classify people as transgender if they ever appear in the register with a diagnosis of gender incongruence. When identifying these diagnoses, we use the most

inclusive set of ICD codes possible and consider both main and secondary diagnoses received in either an inpatient or outpatient setting. Although this enables us to include as many transgender people as possible in our analysis, the full transgender population is still much broader than we can observe in the register data, given that some people who self-identify as transgender do not desire to—or have the possibility to—pursue medical care.

The National Medical Birth Register contains *sex assigned at birth*—hereafter, assigned sex—for all people born in Sweden since 1973. However, we do not have access to that database for the current project, and even if we did, we would still be missing information for people born in Sweden before 1973 and those born abroad. We, therefore, rely on a record of legal gender changes registered with the Swedish Tax Agency to determine people's assigned sex. Cisgender people (as defined above) never change their legal gender marker and thus their assigned sex is the same as their current gender marker in other available registers. By contrast, many transgender people change their legal gender marker at some point during their transition, so we define their assigned sex as the first legal gender marker on record.

ICD Codes for Gender Incongruence in Swedish Medical Registers

The table below describes the diagnostic codes found in the Swedish inpatient and outpatient registers used for patients with gender incongruence from the 1960s to the present day. For the period 1968–1986, the diagnosis was labeled transsexualismus (ICD-8 code 302,31). Between 1987 and 1996, these patients were instead given a diagnosis falling under the Sexual Disorders chapter (ICD-9 code 302). From 1997 to 2021, the diagnoses of gender dysphoria / transsexualism (ICD-10 code F64.0) or gender identity disorder (ICD-10 codes F64.8, F64.9) were used primarily used for people undergoing gender transition. These are the codes we use for the identification of transgender men and women.

Because codes 302,99 (ICD-8) and 302X (ICD-9) are broad classifications that include several sexual disorders, we use them as a first recorded diagnosis for a transgender person only for cases in which the person changes their legal gender marker or is later diagnosed with a more specific code for gender incongruence. We impose the same restrictions on codes 302,30 (ICD-8), F641 (ICD-10), and F642 (ICD-10) because the 302,30 and F641 diagnoses are sometimes given as a secondary diagnosis to patients with mental disorders and the F642 diagnosis is typically temporary and given to young children.

We find the ICD codes in the inpatient (hospital care) and outpatient (specialized primary care) registers, which contain information on all visits to hospitals or primary health care clinics for all people in Sweden. We have data from the inpatient register for years 1973–2020, with coverage of the whole population since 1987, and data from the outpatient register for years 2001–2020. Besides the increase in the likelihood of seeking care for gender incongruence over time, the lack of data on outpatient visits prior to 2001 is another reason for the low number of cases observed in the early years of our study period. The coverage of the outpatient register was low from 2001–2004 (Indremo et al., 2021). Combining diagnostic data from the inpatient and outpatient registers since 2001 increases our data quality.

Table S.6. Swedish ICD codes related to gender incongruence.

	Description	Manual	Years
302,30	Transvestitismus	ICD-8-SE	1968–1981
302,31	Transsexualismus	ICD-8-SE	1968–1986
302,99	Sexual anomalies, not otherwise specified	ICD-8-SE	1968–1986
302X	Sexual disorders	ICD-9-SE	1987–1996
F640	Transsexualism; gender dysphoria	ICD-10-SE	1997–2021
F641	Dual-role transvestism	ICD-10-SE	1997–2009
F642	Gender identity disorder of childhood	ICD-10-SE	1997–2009
F648	Other gender identity disorder	ICD-10-SE	1997–2021
F649	Gender identity disorder, not otherwise specified	ICD-10-SE	1997–2021

Notes: ICD-8-SE codes sometimes appear in the patient register without the final digit. We treat codes 302,3 and 302,9 as equivalent to codes 302,30 and 302,99.

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