# School Outcomes of Children Raised by Same-Sex Couples: Evidence from Administrative Panel Data

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*Although widely used in policy debates, the literature on children's outcomes in same-sex families has mostly relied on small selective samples or on samples based on cross-sectional survey data. This led to a lack of statistical power, misclassification of same-sex couples, and the inability to separate children born in same-sex families from children of divorce. We address these issues by using unique administrative panel data from the Netherlands: the first country to legalize same-sex marriage in the world. The results indicate that children raised by same-sex couples perform better than children raised by opposite-sex couples in both primary and secondary education. Our findings are robust to the use of Coarsened Exact Matching to improve covariate balance and to reduce model dependency. Further analyses using a novel bounding estimator suggest that the selection on unobserved characteristics would have to be at more than two and a half times higher than the selection on observed characteristics to render the estimates insignificant. Overall, children raised by same-sex couples appear to perform at least as well as children raised by opposite-sex couples in school.*

**Keywords:** Same-Sex Families; Administrative Panel Data; School Outcomes; Coarsened Exact Matching; Treatment Effect Bounds.

**Word count:** 11,985

## I. Introduction

A central component of the public policy debates about marriage and family matters is the wellbeing of children in nontraditional family structures. One such debate focuses on the marriage and adoption rights of same-sex couples. It is often stated that the legal issue of same-sex marriage and adoption should revolve around the outcomes of children raised by same-sex couples (Alvaré, 2005). Hence, the social science research about the effects of same-sex couples on children has featured prominently in most public debates to both support as to challenge same-sex marriage. For instance, former U.S. President George Bush Jr. defended Florida's ban on gay adoption rights stating that "studies have shown that the ideal is where a child is raised in a married family with a man and a woman" (Carey, 2005). By contrast, in the U.S. Supreme Court case Obergefell v. Hodges (2015), the American Sociological Association states that "the clear and consistent social science consensus is that children raised by same-sex parents fare just as well as children raised by different-sex parents".

In this article, we compare school outcomes of children raised by same-sex couples with school outcomes of children raised by opposite-sex couples. Education is believed to influence many social outcomes such as crime, health, life expectancy and happiness (Kingston et al., 2003; Oreopoulos & Salvanes, 2011). For this purpose, we employ unique administrative panel data from the Netherlands, the first country to legalize same-sex marriage in the world. The data includes the entire population of children born between 1995 and 2005. This enables us to study the academic achievement of 1,200 children raised by same-sex couples and more than a million children raised by opposite-sex couples, followed from birth until the end of primary education. In addition, we also follow about 18 percent of these children until the end of secondary education, enabling us to study diploma attainment in secondary education. To the best of our knowledge, this is the first study to address how children who were actually raised by same-sex couples from birth (instead of simply happen to live with same-sex couples at one point in time) fare in school while retaining a large representative sample. The only other article using administrative panel data is a concurrent Discussion Paper by Aldén, Björklund, and Hammarstedt (2017) who study health outcomes of about 750 children from lesbian couples in Sweden. Overall, they find a positive association between living in a lesbian family and health outcomes. In additional analyses, they also estimate a positive association between living in a lesbian family and mathematics and language test scores. However, data availability allowed them to estimate school outcomes for only 56 children from

lesbian couples. Therefore, the study of health outcomes by Aldén, Björklund, and Hammarstedt (2017) complements our study of school outcomes among children from same-sex couples.

Previous literature on children's school outcomes in same-sex families has been limited either by very small selective samples that could identify children raised by same-sex couples, or by large representative Census data that is cross-sectional and therefore only able to identify children who simply happened to live with a same-sex family at a certain point in time. Most studies in this literature have relied on small convenience samples of individuals recruited from sperm banks or homosexual events, by word of mouth or through newspaper advertisements[1] (Gartrell & Bos, 2010; Golombok, Tasker, & Murray, 1997; Golombok et al., 2003; MacCallum & Golombok, 2004; Sarantakos, 1996). With the exception of Sarantakos (1996)[2], these studies find no statistical difference between children from same-sex and children from opposite-sex couples on a range of school outcomes. Nonetheless, in the absence of a representative sample, the internal validity of these studies is questionable.

A second strand of literature employed representative samples, but could not address the issue of small sample size. More specifically, Wainright, Russell, and Patterson (2004) and Sullins (2015) draw their sample from the National Longitudinal Study of Adolescent Health (Add Health); Fedewa and Clark (2009), and Potter (2012) from the Early Childhood Longitudinal Study – Kindergarten (ECLS-K); and Regnerus (2012) and Cheng & Powell (2015) from the New Family Structures Study (NFSS). With the exception of Regnerus (2012)[3], these studies find that children from same-sex couples fare at least as well (if not better, e.g. Sullins, 2015) in school as children from opposite-sex couples. However, as same-sex couples with children comprise a small percentage of the overall number of couples (around half a percent in most western countries), the maximum number of children from same-sex couples among these studies was 158 children in Potter (2012)[4]. Evidently, such small samples threaten statistical power, leading to a small probability of rejecting a false null hypothesis.

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[1] Often in combination with snowball methods in which friends and acquaintances of the recruited individuals were also included in the study.

[2] Sarantakos (1996) estimated that children from same-sex couples fared worse than children from opposite-sex couples on both language and mathematics tests.

[3] Regnerus (2012) found that children from same-sex couples have a lower educational attainment than children from opposite-sex couples (among other outcomes). Cheng & Powell (2015), however, could not replicate this finding.

[4] It should be noted that the original Regnerus (2012) study identified 248 children from same-sex couples. As noted by Cheng and Powell (2015), however, once the misclassification error is taken into account, the number reduces to 51.

A more recent literature has addressed the issues of both selective and small samples by using Census data. More specifically, Rosenfeld (2010) used the 2000 U.S. Census 5% Public Use Microdata Sample and found that children from same-sex couples were equally likely to normally progress through school as children from opposite-sex couples. In a replication study, by contrast, Allen, Pakaluk, and Price (2013) argued that the results in Rosenfeld (2010) were driven by sample restriction choices and that the true association was negative. Similarly, employing the 2006 Canada Census 20% restricted master file, Allen (2013) estimated that children from same-sex couples were about 65 percent as likely to graduate compared to children from opposite-sex couples. More recently, however, using the 2012, 2013, and 2014 American Community Surveys (ACS), Watkins (2018) reanalysed progress through school as an outcome and found no significant differences between children from same-sex and children from opposite-sex couples.

Although these studies use large representative samples, Census data provides only a cross-sectional snapshot of family structure. As a result, these studies do not study school performance of children who grew up in a same-sex family, but rather the school performance of children who lived in a same-sex family at a certain point in time. This is an important limitation as many children come into a same-sex family through divorce of a homosexual parent with a heterosexual partner and therefore did not grow up in a same-sex family. Moreover, divorce may exert an independent negative effect on school outcomes (see review by McLanahan, Tach, and Schneider, 2013). Consequently, as Census data does not provide information on when a child entered a same-sex family, studies based on these data may mistakenly attribute a negative coefficient to living in a same-sex family. Another limitation of Census data is misclassification of same-sex couples due to misreporting, especially given that many Censuses were collected at the time same-sex marriage was illegal. For instance, due to misidentification, Census Bureau retracted its 2010 estimates of the number of same-sex couples in the U.S (O'Connell & Feliz, 2011). Similarly, Census Bureau estimates that about one-half of those reporting as same-sex married couples in the 2010 ACS were actually opposite-sex married couples who misreported on the sex question (Kreider and Lofquist, 2015). As this type of measurement error is not classical, it is unclear in which direction the endogenous coefficients are biased. Lastly, in the absence of a measure of student achievement, studies that used the U.S. Census or ACS data are limited to an imperfect proxy of progress through school in primary education calculated using current grade and age.

Using administrative panel data that include the entire population of children born between 1995 and 2005 in the Netherlands, we are able to address all the issues above. The data enable us to study student achievement – and for earlier cohorts also diploma attainment – of children raised by same-sex couples from birth while retaining a large representative sample and minimizing misreporting. Moreover, the Netherlands is a particularly interesting country to study, as it is the first country in the world to legalize same-sex marriage on 1 April 2001. In addition, the Dutch population is among the most favourable countries to same-sex couples[5]. This makes it unlikely that the results are influenced by factors uniquely problematic for same-sex couples and their children such as a lack of social support for same-sex parents, stress arising from persistent stigma and sex discrimination, and limited legal security for same-sex parents. This article

The results indicate that children from same-sex couples outperform children from opposite-sex couples on standardized test scores at the end of primary education by 0.18 standard deviations. We found no heterogeneity by gender nor by ethnicity. By family structure, however, our findings indicate that children particularly benefit from same-sex couples compared to opposite-sex couples if the couple is cohabiting rather than married. Further, we also find that children from same-sex couples continue to outperform children from opposite-sex couples in secondary education. Our results suggest that children from same-sex couples are 6.7 percent more likely to graduate than children from opposite-sex couples. Finally, we use a novel bounding estimator developed by Oster (2017) to bound the causal effect of living in a same-sex family. Treatment effect bounds indicate that the selection on unobserved characteristics would have to be more than two and a half times higher than the selection on observed characteristics to render the positive association insignificant. Therefore, we conclude that children from same-sex couples are likely to perform at least as well in school as children from opposite-sex couples.

The remainder of the paper is structured as follows. Section II outlines potential theoretical mechanisms through which children from same-sex couples may perform differently in school compared to children from opposite-sex couples. Section III describes the data and sample restrictions. Section IV formulates the empirical model. Section V presents the results and bounds

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[5] This is apparent from the Eurobarometer survey (European Commission, 2015). In 2015, 96 percent of the Dutch respondents agreed that homosexual persons should have the same rights as heterosexual persons. Moreover, 85 percent of the respondents would have been comfortable having a homosexual person holding the highest political office in the country, and 92 percent of the respondents would have been comfortable working with a homosexual person. Furthermore, 86 percent of the respondents from the Eurobarometer survey were comfortable with their son or daughter having a relationship with someone of the same sex.

the causal effect of being raised by a same-sex couple using treatment effect bounds. The article ends with a discussion of the results and several limitations of the analysis.

## II. Theoretical Mechanisms

Several theoretical mechanisms from the parental investment literature can explain how gender of the parents may affect school outcomes of their children (see Hamilton, Cheng, & Powell, 2007). Given that there is no consensus on the mechanisms behind these potential effects, we can distinguish between theories that predict that children raised by same-sex couples may perform worse in school than children raised by opposite-sex couples, and theories that predict that they are likely to perform just as well if not better.

Theoretical mechanisms predicting that children from same-sex parents may perform worse in school are the family structure approach and the kin selection theory. The family structure approach suggests that same-sex couples face increased stressors that decrease the ability of parents to allocate time and effort to invest in their children (Cherlin, 1978; Thomson, Hanson, & McLanahan, 1994). These stressors include lack of blood ties to their children, negative feedback from family and friends who question the authenticity of their roles as parents, persistent stigma from the society, and modest or absent legal security. Consequently, a decreased ability of same-sex parents to invest in their children is likely to result in worse school performance. The kin selection theory is an evolutionary theory suggesting that because parents incur economic, physical and mental costs in raising a child, they display discriminative parenting (Hamilton, 1964). In particular, they invest the most in their biological children who share their genetic material. Given that at least one of the same-sex parents is not a biological parent of the child[6], the kin selection theory predicts that children from same-sex parents are likely to perform worse in school than children from opposite-sex parents.

Other theoretical approaches predict that children from same-sex parents are likely to perform just as well (if not better) than children from opposite-sex parents. These mechanisms include the compensation approach and the selection approach. The compensation approach agrees with the family structure approach that same-sex parents face unique stressors. However, unlike the family structure approach, the compensation approach argues that same-sex parents channel these

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[6] Absent a prior sex change or surrogacy for gay men in which both partners donate genetic material.

stressors as motivation to prove themselves as good parents. Consequently, the compensation approach predicts that children from same-sex parents are likely to perform just as well (if not better) than children from opposite-sex parents. The selection approach suggests that differences in outcomes among children from same-sex parents and children from opposite-sex parents may be a function of selection on socioeconomic characteristics such as parental income, education and age. Given the time-consuming and costly procedures for same-sex couples to obtain children[7], same-sex couples with children typically have high levels of income and education and are older than both the same-sex couples without children as the general population overall (Black, Sanders, & Taylor, 2007). As these background variables typically enter as parental inputs in an education production function (Hanushek, 1986), the selection approach predicts that children from same-sex parents are likely to perform better than children from opposite-sex parents.

## III. Data

### A. Sample Construction

The data come from administrative records collected by Statistics Netherlands that cover the entire Dutch population in 2017. These administrative records are based on automated municipal population registers (Steenhof & Harmsen, 2003). Every municipality in the Netherlands has its own population register containing information on all inhabitants of that municipality. Each inhabitant has been given a unique personal identification number, which allows us to link their data to those on the children, parents, and partners. Moreover, starting from 1995 and annually until 2017, the data also contain household and address identifiers as well as marital history and demographic characteristics (i.e. date of birth, gender, birth country) for each individual. Consequently, linking all individuals (children, parents, and partners) to their household, address, and marital history, we are able to identify all the members of a household and their relationship[8]. In addition, by simply observing the gender of each household member, we can identify children in same-sex households. Furthermore, we also observe labour market information from tax

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[7] Except becoming a parent through one partner's prior heterosexual relationship, same-sex couples become parents through time-consuming and costly procedures such as adoption, donor insemination or surrogate parenting (Stacey & Biblarz, 2001). In the Netherlands, adoption and donor insemination typically cost between 10,000 and 40,000 euros depending on the specificities of the procedure.

[8] We could find a match for 91 percent of the population.

authorities of each individual annually from 1999 to 2016. Finally, the data also provide information on student achievement in primary education starting from school year 2008-2009 and annually until school year 2016-2017. For about 18 percent of these children, we also have information on diploma attainment in secondary education.

These data offer four primary advantages over the Census data used in previous studies. First, we can determine each year whether children actually lived with their parents in the same household. As stated previously, Census data provides only a snapshot of the family in a given year. Second, we can determine whether and when children entered a same-sex household. This is an important advantage over the studies based on Census data as we observe whether children were born in a same-sex household or whether they entered a same-sex household through parental divorce. Moreover, we also observe whether and when a child was adopted (and whether this happened through foster care). Third, as we observe most of the information annually over a more than 20 years period, we can construct control variables (e.g. socioeconomic status based on household income) at birth for the majority of individuals in our sample. Therefore, we can limit endogeneity issues arising from control variables measured at the time or even after treatment as in the studies using Census data (Elwert & Winship, 2014). The last advantage of these data compared to Census data is that we observe a reliable measure of actual achievement in primary education, instead of an unreliable measure of progress through school as used in most studies.

To study school outcomes of children raised by same-sex couples, we restrict the sample in three ways. First, as a measure of student achievement, our data includes the score on the standardized test conducted in the final year of primary education (see further). As primary education in the Netherlands normally ends at age 12, we remove children who are not in the last grade of primary education in 2016-2017 (last school year in the data), as these children are not yet old enough to do the test. As a second sample restriction, we solely study couples. Therefore, we do not include children from single parents, children who resided with single persons or children who were in an institution[9]. This is because our administrative data does not include a direct measure of sexual orientation. As a result, we do not observe whether a single parent or a single person is a homosexual. Similarly, children in an institution do not fall within the common definitions of same-sex or opposite-sex households. Following Watkins (2018) who used the ACS, we have removed

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[9] Single persons can both legally adopt children as well as use donor insemination or surrogate parenting in the Netherlands.

these children from the analysis (3.46 percent of the sample). Nonetheless, we have also tried an alternative approach used by Rosenfeld (2010) and Allen (2013) in which we consider single parents to be heterosexual. The coefficients (available upon request) remained virtually unchanged. Lastly, we remove a small percentage (0.02 percent) of children with missing covariates (see further), none of which are children from same-sex couples. The final sample includes 1,201,012 children born between 1995 and 2005.

## B. Variable Construction

*Children from Same-Sex Couples*. Our administrative data do not include a measure of sexual orientation. We therefore solely consider sexual behaviour[10]. We identify children from same-sex couples by observing the household composition of each child and the gender of each household member. If the child lived with both parents who were both men or both women, we conclude that the child lived with a same-sex couple. Further, a child is also from a same-sex couple if he or she lived with only one parent who was in a married or cohabiting relationship with a partner of the same-sex that is not the parent of the child. Finally, if a child was adopted or lived in a foster home, we observe the gender of these persons. If the adoptive or foster parents are persons of the same-sex, we consider the child as from a same-sex couple. As previously noted, children who lived with a single parent, a single person or in an institution are not considered in this article, as we do not possess a direct measure of sexual orientation. In the analyses, we will use an indicator given value of 1 if the child is from a same-sex couple at least one year (1,661 children) and value of 0 if the child is from an opposite-sex couple (1,199,351 children).

*Outcome Variables*. Our outcome variables closely follow the main transition points in the Dutch education system. Education in the Netherlands is compulsory from the age of five until the age of 18 or until a student has obtained a diploma. Primary education typically lasts seven years until the age of 12[11]. At this point, students enter a tracking system in secondary education that includes

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[10] It is therefore possible that one of the parents is married to a person of the opposite-sex but identifies as a homosexual or is attracted or aroused to a person of the same sex.

[11] It should be noted that it is possible for children to repeat grade and therefore conduct the test at a later age. This would introduce a mechanical relationship between the number of years observed in the data and the probability of residing in a same-sex family. The longer a child is observed in the data (e.g., a child who took 6 years to conduct the test and a child who took 8 years to conduct the test), the higher the probability that a child could reside in a same-sex family. Therefore, we will observe each child until they are 12 years old. Nonetheless, observing children until the actual age at which they conducted the test does not influence our results.

three main tracks: preparatory secondary vocational education (VMBO), general secondary education (HAVO) and preuniversity education (VWO). Typically, VWO is considered the most prestigious track. Students decide on the track based on a standardized test in the final year of primary education and based on teacher advice. We will use the score on this standardized test as our primary outcome of interest as it is an objective measure of student achievement. In supplemental analyses in **Table A1** in the Appendix, we also used teacher advice at the end of primary education as an outcome. We do not present these results as part of the main analysis as teacher advice is by definition a subjective opinion of the teacher. Nonetheless, this outcome yields analogous conclusions as the standardized test. Technically, schools may choose among several standardized tests. Although these tests may differ by school, all the students within a school complete the same standardized test. In practice, these tests are very comparable. Nonetheless, most schools use the so-called Central Institute of Test Development test (CITO-test). We observe that 84.56 percent of the children in our sample have done the CITO-test. This test is considered as a high-stakes test by students and parents and is also used for school evaluation (Scheerens, Ehren, Sleegers, & de Leeuw, 2012). It includes two components: language and mathematics. To make the test scores comparable across different tests and across years, we standardize test scores by the test and by year to have a mean zero and unit variance. Thus, to maximize sample size, we also use tests other than the CITO-test. Nonetheless, if we solely consider the CITO-test, our results remain unchanged. Further, for about 18 percent of the population, we also observe diploma attainment in secondary education. This variable is measured as an indicator given value of 1 if the student obtained an upper secondary education diploma according to the International Standard Classification of Education framework (i.e. qualification at ISCED 2011 level 3) and 0 if the student was a high school dropout.

*Control variables*. We include various observed covariates that may account for differences between children from same-sex and children from opposite-sex couples. As children from same-sex couples comprise less than one percent of the overall sample, we have constructed variables in a way to maximize cell sizes[12]. At individual level, we control for the gender of the child (1 is boy, 0 is girl) and the year of birth. As a measure of socioeconomic background, we include six variables. First, we construct a variable for child's ethnicity based on parental birth country. It is

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[12] Nonetheless, using continuous measures yields analogous results.

given value of 1 if at least one parent was born outside the Netherlands and value of 0 if both parents were born in the Netherlands. Similar to U.S. studies that find that children from same-sex couples are more likely to be white (Rosenfeld, 2010; Watkins, 2018), we control for children from same-sex couples likely having parents born in the Netherlands rather than having parents who emigrated from potentially more conservative countries such as Turkey or Morocco. Second, we include indicators for neighbourhood at birth to account for children from same-sex couples potentially being located in wealthier neighbourhoods (Black, Gates, Sanders, & Taylor, 2002).

Further, we include a measure for household annual net income in 10,000 euros[13] at birth, and an indicator for parental education given value of 1 if at least one parent did not complete upper secondary education and 0 otherwise. Neighbourhood and household net income are measured at birth for most of the children in the sample (83 percent) to avoid endogenous controls (Elwert & Winship, 2014)[14]. If the information at birth was not available, we used information from subsequent years[15]. Rosenfeld (2011) has found that measures of parental income and education account for most of the differences between children from same-sex and opposite-sex couples. Lastly, we include categorical variables for the average age of the parents at birth[16] (*younger than 35*, *36 to 40*, *older than 40*) and for the number of siblings (*only child*, *one sibling*, *two or more siblings*), given that same-sex couples are typically older and have less children than opposite-sex couples (Black, Sanders, & Taylor, 2007).

As a last control variable, we include a discrete measure of family structure at birth comprising three categories: *married parents*, *cohabiting parents*, and *other*. The last category includes children born into a family with one parent and a stepparent as well as adopted children and foster children. It includes less than a half percent of the children. The distinction between married and cohabiting parents is used in most studies of same-sex parenting (for instance, see Allen, 2013; Rosenfeld, 2010; Watkins, 2018). It should be noted that we do not make a distinction between marriage and a registered partnership. This is because, in practice, registered partnership is almost

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[13] We calculate this measure based on net income of the parents. If a child resided with one parent and his or her partner, we consider the income of both the parent as the partner. If the child resided with adoptive parents or in a foster home, we consider the income of these persons.

[14] It should be noted, however, that many of the mothers did not work during pregnancy or were on reduced pay. Therefore, this variable will underestimate the true household income. Nonetheless, our results are robust to the measurement of household income (and neighbourhood) at the start and at the end of primary education.

[15] Removing these children does not alter the results significantly.

[16] If a child resided with one parent and his or her partner, we consider the average of the age of both the parent as the partner. If the child resided with adoptive parents or in a foster home, we consider the average age of these persons.

a perfect substitute for marriage (Trandafir, 2014). Registered partnership differs from marriage solely on contract dissolution. Registered partnership can be dissolved at the civil registry by mutual agreement, while marriage can only be dissolved in court. Consequently, we chose to maximize cell sizes by treating registered partnership as marriage[17]. It is also worth mentioning that registered partnership was introduced on 1 January 1998 for both same-sex as opposite-sex couples, while same-sex marriage was legalized on 1 April 2001. This means that some children from same-sex couples in our sample were born before either registered partnership or marriage was legal. As a result, these children are classified as living with cohabiting parents, while their parents' relationship could more accurately be described as married. Nonetheless, as this is a small percentage of children (about 6 percent), excluding them from the analysis does not alter the results.

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[17] Nonetheless, our results are robust to treating marriage and registered partnership as separate categories.

## C. Descriptive Statistics

TABLE 1 – DESCRIPTIVE STATISTICS

| | Children from same-sex couples | Children from opposite-sex couples | Difference (T-test) |
|---|---|---|---|
| Control variables: | | | |
| Gender (1 is boy, 0 is girl) | 0.493 | 0.503 | -0.010 (0.012) |
| Ethnicity (1 is foreign, 0 is Dutch) | 0.215 | 0.261 | -0.046 (0.011)*** |
| Household annual net income at birth | | | |
|    At most 10,000 EUR | 0.168 | 0.262 | -0.094 (0.011)*** |
|    10,001 EUR – 20,000 EUR | 0.494 | 0.513 | -0.019 (0.012) |
|    20,001 EUR – 30,000 EUR | 0.288 | 0.184 | 0.104 (0.010)*** |
|    More than 30,000 EUR | 0.050 | 0.041 | 0.009 (0.005)** |
| Parental education at birth (1 is no high school degree) | 0.033 | 0.106 | -0.073 (0.008)*** |
| Average age of the parents at birth | | | |
|    Younger than 35 | 0.498 | 0.754 | -0.256 (0.011)*** |
|    36 to 40 | 0.340 | 0.173 | 0.166 (0.009)*** |
|    Older than 40 | 0.163 | 0.073 | 0.090 (0.006)*** |
| Number of siblings | | | |
|    Only child | 0.530 | 0.429 | 0.101 (0.012)*** |
|    One sibling | 0.370 | 0.384 | -0.014 (0.012) |
|    Two or more siblings | 0.101 | 0.187 | -0.086 (0.010)*** |
| Family structure at birth | | | |
|    Married parents | 0.654 | 0.803 | -0.149 (0.010)*** |
|    Cohabiting parents | 0.314 | 0.196 | 0.119 (0.010)*** |
|    Other | 0.032 | 0.002 | 0.030 (0.001)*** |
| | | | |
| Outcomes: | | | |
| Test score at the end of primary education (standardized) | 0.310 | 0.041 | 0.269 (0.024)*** |
| High school diploma (1 is graduated, 0 is dropout)[a] | 0.895 | 0.873 | 0.021 (0.021) |
| | | | |
| Number of children | 1,661 | 1,199,351 | |

*Notes.* Standard errors are in parentheses.

[a] As children are born from 1995 to 2005 and the last observed school year is 2016-2017, a high school diploma is observed for 212,432 children from which 256 children are from a same-sex couple.

*** Significance at the 1 percent level.

** Significance at the 5 percent level.

Descriptive statistics are presented in **Table 1**. We observe standardized test scores at the end of primary education of 1,201,012 children, from which 1,661 children (0.14 percent) are from a same-sex couple. Only 29 of these children are from a gay couple. This is likely because gay couples with children are a recent phenomenon and children in our sample have to be at least 12 years old to conduct the standardized test at the end of primary education. Therefore, we are unable to separate the analysis by gender of the couple.

**Table 1** suggests that children from same-sex couples are equally likely to be boys as children from opposite-sex couples. Further, we observe that compared to children from opposite-sex households, children from same-sex couples enjoy a significantly higher socioeconomic status.

Their parents are more likely to be older, to be born in the Netherlands, to earn more and to be well educated. Moreover, children from same-sex couples are more likely to have fewer siblings. However, children from same-sex couples are less likely to be born into a married family. This is not surprising as for some of the earlier cohorts, same-sex marriage was unavailable. If we solely consider children born after same-sex marriage was introduced in 2001 (not shown in **Table 1**), the difference in family structure between children from same-sex and opposite-sex couples reduces, but remains significant. In particular, children from same-sex couples are 0.029 percentage points significantly less likely to be born in a married family, and 0.040 percentage points more likely to be born in other family types.

Finally, the descriptive statistics suggest that children from same-sex couples perform significantly better on the standardized test at the end of primary education. They score 0.269 standard deviations higher than children from opposite-sex couples. For the earlier cohorts, we also observe diploma attainment at the end of secondary education. Although same-sex couples have a higher mean diploma attainment, this difference is not significant. Nonetheless, these results are strictly descriptive. For a better view of the children's outcomes in same-sex families, we need to address the main issues of selection on socioeconomic status and family instability.

## IV. Empirical Methodology

We estimate school outcomes among children from same-sex couples by an Ordinary Least Squares (OLS)[18] model that is formulated as follows:

(1) $\quad y_i = \alpha_0 + \beta_1 H_i + \boldsymbol{\theta} \boldsymbol{X_i} + \varepsilon_i$

where $y_i$ is the outcome variable of individual $i$ (i.e., standardized test score at the end of primary education and diploma attainment in secondary education). The variable of interest is $H_i$, given value of 1 if the child was from a same-sex couple at least one year and 0 if the child was from an opposite-sex couple. Depending on the specification, we also include in equation (1) control variables defined above as part of $\boldsymbol{X_i}$. Each specification is estimated using clustered standard errors at the household level to account for dependence of observations within households, e.g. siblings.

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[18] Results from a logit model for diploma attainment are similar to the OLS results.

Several points about equation (1) are worth mentioning. First, we defined treatment to identify all children who resided in a same-sex family at least one year. However, this group of children is heterogeneous: it includes children who were born in a same-sex family, children from parents' prior heterosexual relationships, and adopted children (often from foster care). Although we do not directly observe how same-sex couples obtained children (for instance, we do not know whether a couple used donor insemination), we do know when a child entered a same-sex family and whether the child was adopted[19] (or was in foster care). Moreover, we also observe whether and when parents divorced. Therefore, we can identify children who entered a same-sex family at birth with parents not being divorced prior to or in the year of child's birth. We call these children biological children. Next, we identify children who entered a same-sex family after birth or at birth with parents being divorced either prior to or in the year of child's birth. We call these children, children from a prior heterosexual relationship or children from divorce. Finally, we identify children who were adopted or in foster care. We find that 72.25 percent of children from same-sex children are biological children. Another 26.49 percent come from a previous heterosexual relationship and only 1.26 percent of children from same-sex couples are adopted (or in foster home).



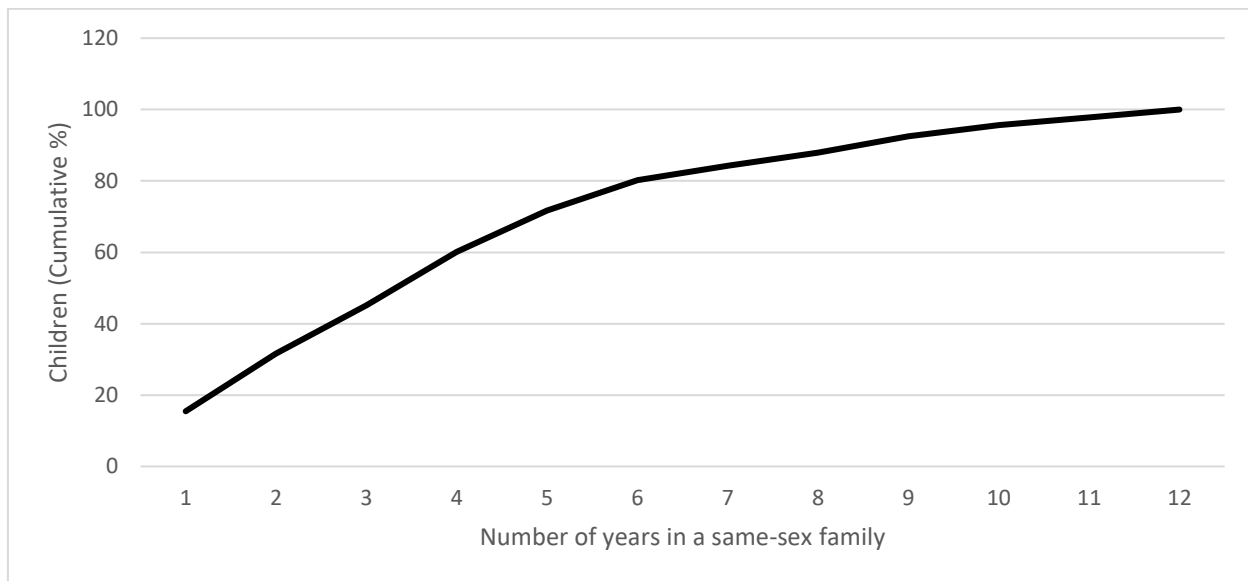FIGURE 1 – CUMULATIVE NUMBER OF YEARS CHILDREN FROM PREVIOUS HETEROSEXUAL RELATIONSHIPS SPENT IN A SAME-SEX FAMILY ($N = 461$)

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[19] By adoption, we mean same-sex couples adopting a child who was conceived by another couple. In the Netherlands, parental rights often have to be claimed by at least one of the partners in a same-sex relationship. In this article, we do not consider this as adoption.

Although the analysis of children who were born in a same-sex family is relatively straightforward, the analysis of other children is econometrically challenging. Children from parents' prior heterosexual relationships enter a same-sex family around the period of divorce. Consequently, the effect of living in a same-sex family is conflated with the potential independent negative effect of family instability[20]. Moreover, these children often did not reside in a same-sex family for a long time. **Figure 1** presents the cumulative number of years spent in a same-sex family by children from previous heterosexual relationships. More than 80 percent of the children from previous heterosexual relationships spent maximally 6 years in a same-sex family[21]. Similarly to children from previous heterosexual relationships, adopted children (and foster children) may face exceptional challenges during their lives and may be at a disproportionate risk of adverse outcomes throughout the life course (Doyle, 2007; Font, Berger, Cancian, & Noyes, 2018). Consequently, we are unable to separate the effect of living in a same-sex family with the independent effect of adoption. There is considerable disagreement among sociologists about how to treat these children. Whereas Rosenfeld (2011, 2013) argues that these children should be dropped from the analysis, Allen, Pakaluk, and Price (2013) argue that these children should be included. We, on the other hand, opt for a more inclusive approach and estimate a model with all children included as well as a model without children from previous heterosexual marriages and adopted children[22]. This final model is estimated on 1200 children who were raised by same-sex families from birth[23].

Further, although the sample of children from same-sex couples is relatively large, these children represent less than one percent of the total sample. As a result, the treatment group is much smaller (and therefore less heterogeneous) than the control group. To account for this, we perform Coarsened Exact Matching (CEM) as in Blackwell et al. (2009) and Iacus, King, & Porro (2008). This technique selects for every child from a same-sex couple, a corresponding child from an

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[20] For the literature on the causal effects of family instability on school outcomes, see the review by McLanahan, Tach, and Schneider (2013).

[21] It should be noted that some children spent all 12 years in a same-sex family. However, children of these parents divorced in the year of birth. Therefore, we were conservative and counted these children as children from a previous heterosexual relationship. Counting these children as biological children does not alter the results significantly.

[22] Separate results solely for children from previous heterosexual marriages and adopted children (with children raised by same-sex couples from birth excluded) show a negative association between residing in a same-sex family and test scores (available upon request). Evidently, these results are merely suggestive as they are prone to selection bias.

[23] It should be noted that it is still possible that these children have experienced family instability while residing in a same-sex family. However, these children did not enter a same-sex family as a result of family instability.

opposite-sex couple having either exact same values or same coarsened values on observed characteristics in $X_i$. The goal of CEM is to both reduce the imbalance in covariates as to reduce model dependence stemming from a disproportionately large control group. Iacus, King, & Porro (2008) find CEM to perform better than the commonly used Propensity Score Matching (PSM)[24].

Finally, a word of caution is necessary about the causal interpretation of our findings. Unlike previous studies, our administrative panel data enable us to limit misidentification as well as to identify children born into a same-sex family who actually lived with their parents. This, however, does not imply that we can interpret our results as causal. Although we control for the main observable characteristics (*selection on observables*), we are unable to control for unobservable characteristics (*selection on unobservables*). As mentioned in the previous section, same-sex parents appear to have a higher socioeconomic status than opposite-sex parents. In **Table A2** in the Appendix, we describe socioeconomic characteristics of same-sex parents in more detail and compare them with same-sex couples without children, opposite-sex couples without children, and opposite-sex couples with children. Based on ethnicity and net income per year as proxies for socioeconomic status, we conclude that same-sex couples with children have the highest socioeconomic status among the four groups, followed by opposite-sex couples with and without children. Same-sex couples without children seem to have the lowest socioeconomic status[25]. Therefore, selection on observables stems from two sources: same-sex couples with children have a higher socioeconomic status than the overall population; and same-sex couples with children have an even higher socioeconomic status than same-sex couples without children. In addition to selection on observed characteristics, children from same-sex couples may also be selected on unobserved characteristics such as ability. This is because, as we have seen, most same-sex couples in the Netherlands are likely to be conceived by donor insemination, while the Dutch law prohibits using an anonymous donor. Therefore, couples in the Netherlands may select a donor with most favourable characteristics such as ability, leading to selection on unobservables. To the extent that this applied for same-sex couples, we would expect our results to represent an upper bound of the causal effect of being raised by a same-sex family.

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[24] Nonetheless, PSM yields analogous results.

[25] This conclusion also holds if we consider lesbian and gay couples separately. Gay couples with children have the highest socioeconomic status, followed by lesbian couples with children, opposite-sex couples with children, opposite-sex couples without children, and gay couples without children. Lesbian couples without children have the lowest socioeconomic status.

To better understand these selection effects, we perform an additional analysis using a novel bounding estimator developed by Oster (2017). By observing coefficient and $R^2$ movements before and after the inclusion of observed characteristics, we can calculate how large the effect of unobserved characteristics would have to be compared to the effect of observed characteristics to render the estimates insignificant. If we find that the effect of unobservables would have to be several times larger than the effect of observables, this would suggest that our findings are likely to have a causal interpretation. Nonetheless, this estimation assumes that selection on observables is informative about the selection on unobservables. The results should be interpreted bearing this in mind.

In a supplemental analysis, we also include cousin fixed effects. This is possible as our data allows for linking individuals across two generations. Consequently, we compare children who share a grandmother/grandfather pair on the father's or the mother's side where one child has lived in a same-sex family while his or her cousin has not. This approach has been used in the literature based on the rationale that cousins share some genetic material (Geronimus, Korenman, & Hillemeier, 1994; Hällsten & Pfeffer, 2017). A limitation of this approach is, however, that we need grandparents with multiple children and enough variation in the treatment. Therefore, the sample is reduced and estimates less precise. Moreover, although cousins share some genetic material, these children are likely still different on many characteristics. As a result, the selection on unobservables is potentially reduced, but not eliminated. The results are presented in **Table A3** in the Appendix and are very similar to the main results.

## V. Results

This section starts by estimating how children from same-sex couples fare on the standardized test at the end of primary education compared to children from opposite-sex couples. In addition, we estimate heterogeneous effects based on gender, ethnicity, and family structure. Further, for the earlier cohorts, we estimate whether children from same-sex couples differ in diploma attainment from children from opposite-sex couples. Finally, we use treatment effect bounds to assess the causal interpretation of our findings.

## A. Children From Same-Sex Couples and Achievement in Primary Education

TABLE 2 – CHILDREN FROM SAME-SEX COUPLES AND STANDARDIZED TEST SCORES AT THE END OF PRIMARY EDUCATION

| | Full sample | | Children raised by same-sex couples from birth[a] | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Child from same-sex couple (1 is yes) | 0.252*** | 0.112*** | 0.180*** | 0.193*** |
| | (0.024) | (0.023) | (0.026) | (0.027) |
| Gender (1 is male) | 0.011*** | 0.006*** | 0.006*** | |
| | (0.002) | (0.002) | (0.002) | |
| Ethnicity (1 is foreign) | -0.192*** | -0.054*** | -0.054*** | |
| | (0.002) | (0.002) | (0.002) | |
| Parental education at birth (1=no diploma SE) | | -0.512*** | -0.513*** | |
| | | (0.003) | (0.003) | |
| Household income at birth (ref: <= 10k EUR) | | | | |
|   10,001 EUR – 20,000 EUR | | 0.108*** | 0.108*** | |
| | | (0.002) | (0.002) | |
|   20,001 EUR – 30,000 EUR | | 0.357*** | 0.358*** | |
| | | (0.003) | (0.003) | |
|   More than 30,000 EUR | | 0.504*** | 0.505*** | |
| | | (0.005) | (0.005) | |
| Mean parental age at birth (ref: <35) | | | | |
|   36-40 | | 0.101*** | 0.102*** | |
| | | (0.002) | (0.002) | |
|   >40 | | 0.101*** | 0.101*** | |
| | | (0.003) | (0.003) | |
| Number of siblings (ref: only child) | | | | |
|   One sibling | | -0.089*** | -0.089*** | |
| | | (0.002) | (0.002) | |
|   Two or more siblings | | -0.134*** | -0.134*** | |
| | | (0.003) | (0.003) | |
| Family structure at birth (ref: married parents) | | | | |
|   Cohabiting parents | | -0.069*** | -0.069*** | |
| | | (0.002) | (0.002) | |
|   Other | | -0.276*** | | |
| | | (0.023) | | |
| Fixed effects: | | | | |
|   Birth year | Yes | Yes | Yes | |
|   Neighbourhood at birth | No | Yes | Yes | |
| Coarsened Exact Matching (CEM)[b] | No | No | No | Yes |
| Number of children | 1,201,012 | 1,201,012 | 1,198,433 | 757,333 |
| Number of children from same-sex couples | 1,661 | 1,661 | 1,200 | 1,200 |
| Adj. R$^2$ | 0.012 | 0.109 | 0.109 | 0.081 |

*Notes.* Standard errors clustered at the household level are in parentheses.
[a] This means that children from previous heterosexual relationships and adopted children (including foster children) have been excluded.
[b] Due to a large control group, we searched for an exact match on all the covariates.
*** Significance at the 1 percent level.

**Table 2** compares children from same-sex couples with children from opposite-sex couples on the standardized test score measured at the end of primary education. The first two columns include all children who resided with a same-sex couple at least one year. This group of children includes children raised by same-sex couples from birth as well as children from previous heterosexual relationships and adopted children. It appears from column (1) that children from same-sex couples perform significantly better at the end of primary education than their peers from opposite-sex couples. In particular, we find that children from same-sex couples have 0.252 standard deviations higher test score than children from opposite-sex couples. We further observe that boys perform better than girls and that children of foreign ethnicity have a considerably lower achievement than children of Dutch ethnicity. In column (2), we also control for socioeconomic variables. All the coefficients have the expected signs. The results indicate that a higher parental education and income as well as older parents increase children's academic performance. On the other hand, children from larger families and children whose parents are not married are likely to perform worse on the standardized test. We further observe that once we control for socioeconomics variables, the estimated coefficient on same-sex families drops significantly. This is consistent with the socioeconomic approach predicting that same-sex parents invest considerable resources into obtaining children in the first place, and enjoy therefore a higher socioeconomic status than opposite-sex parents on average. Nonetheless, even after controlling for socioeconomic variables, children from same-sex couples still seem to have a 0.112 standard deviations higher test scores at the end of primary education than their peers from opposite-sex couples.

In the last two columns, we only consider children who were actually raised by same-sex couples from birth. We exclude children from previous heterosexual relationships and adopted children (also foster children) as divorce and adoption may have a negative independent effect on test scores and therefore create selection bias (Rosenfeld, 2010, 2013). Our preferred specification in column (3) confirms this finding. If we only consider children raised by same-sex couples from birth, the coefficient increases significantly to 0.18 standard deviations, a rather large effect. To place this estimate in perspective, in his synthesis of over 800 meta-analyses, Hattie (2009) finds that the average effect of having a good teacher on student achievement is 0.32 standard deviations. The association we find of residing in a same-sex couple and student achievement is almost half the average teacher effect.

As a final specification, we perform Coarsened Exact Matching (CEM) applied on control variables used in the previous specification. The goal of CEM is to account for a much larger (and therefore more heterogeneous) group of children from opposite-sex couples compared to the group of children from same-sex couples. CEM can reduce both the imbalance in covariates and the model dependence. Despite the alternative specification in which we compare children with similar observed characteristics, column (4) indicates that CEM left the estimated coefficients from Table 2 virtually unchanged. The estimated coefficient is slightly higher (although not significantly higher) at 0.193 standard deviations. This similar estimate obtained by CEM yields more confidence in our main results.

### B. Heterogeneity by Gender, Ethnicity, and Family Structure

TABLE 3 – CHILDREN RAISED BY SAME-SEX COUPLES FROM BIRTH AND STANDARDIZED TEST SCORES AT THE END OF PRIMARY EDUCATION BY GENDER, ETHNICITY, AND FAMILY STRUCTURE

|  | Boys | Girls | Foreign | Dutch | Married | Cohabiting |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Child from same-sex couple (1 is yes) | 0.181*** | 0.184*** | 0.238*** | 0.159*** | 0.129*** | 0.235*** |
|  | (0.036) | (0.035) | (0.058) | (0.029) | (0.032) | (0.043) |
| Additional controls[a] | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of children | 602,560 | 595,873 | 312,484 | 885,949 | 963,315 | 235,118 |
| Number of children from same-sex couples | 603 | 597 | 256 | 944 | 774 | 426 |
| Adj. $R^2$ | 0.106 | 0.115 | 0.140 | 0.092 | 0.107 | 0.128 |

*Notes.* Standard errors clustered at the household level are in parentheses.
[a] Additional controls include (gender), (ethnicity), birth year, parental education at birth, household income at birth, neighbourhood at birth, average age of the parents at birth, number of siblings, and (family structure at birth).
*** Significance at the 1 percent level.

In **Table 3**, we perform the analysis by gender, ethnicity, and family structure. To conserve space, we only present the coefficient of the treatment variable. Nonetheless, each model was estimated while controlling for covariates as in **Table 1**. Allen (2013) finds that girls rather than boys are particularly negatively affected by residing in a same-sex family. Columns (1) and (2) do not support these findings. The coefficient for both boys and girls is virtually equal and very similar to the association for both groups together of around 0.18 standard deviations. We also split the sample by ethnicity. Children from same-sex couples born outside the Netherlands may experience more stigma than children from same-sex couples born in the Netherlands. However, only 28 children in our sample had parents who were both born outside the Netherlands. Among these, only 10 children had parents who were both born outside the European Union. Thus, it appears that

same-sex couples with children are rare in the population of minorities in the Netherlands. Therefore, to maximize sample size, we split the sample into children whose at least one parent was born outside the Netherlands and children whose parents were both born in the Netherlands. We find no evidence of this as children from both foreign as Dutch ethnicity perform better on standardized tests than children from opposite-sex couples. The coefficient for foreign ethnicity children in column (3) is higher than the coefficient for Dutch children in column (4), but so is the standard error due to a smaller sample size. A test of equality of coefficients does not reject the hypothesis of equal coefficients ($p = 0.245$). Finally, we also split the sample by family structure. Watkins (2018) estimates that children from same-sex couples progress through school faster if the couple is married rather than cohabiting. Sullins (2015), on the other hand, argues that children from same-sex couples perform worse on GPA if the couple is married rather than cohabiting. Our results are more in line with Sullins (2015). We find that children from same-sex couples outperform children from opposite-sex couples by 0.129 standard deviations if the couple is married, and by 0.235 standard deviations if the couple is cohabiting. In supplemental analyses in **Table A4** in the Appendix, we treat family structure as a categorical variable including four categories: *opposite-sex married*, *opposite-sex cohabiting*, *same-sex married*, and *same-sex cohabiting*. We find that children from same-sex cohabiting couples perform the best, followed by children from same-sex married couples and opposite-sex married couples. Children from opposite-sex cohabiting couples appear to perform the worst. Using children from same-sex married couples as a reference category, we see no significant difference between these children and children from children from cohabiting same-sex families. Thus, it appears that the large coefficient on children from same-sex cohabiting couples was driven by children from opposite-sex cohabiting couples performing significantly worse than other groups, rather a difference in achievement between children from married and cohabiting same-sex couples.

### C. Bounding the Causal Effect

TABLE 4 – BOUNDING THE CAUSAL EFFECT OF BEING RAISED BY A SAME-SEX COUPLE FROM BIRTH ON STANDARDIZED TEST SCORES AT THE END OF PRIMARY EDUCATION

| Selection on unobservables / Selection on observables ratio[a] | 1 | 1.5 | 2 | 2.62 |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Child from same-sex couple (1 is yes) | 0.112 | 0.078 | 0.043 | 0.000 |
| Children raised by same-sex couples from birth[b] | Yes | Yes | Yes | Yes |

| | | | | |
|---|---|---|---|---|
| Number of children | 1,198,433 | 1,198,433 | 1,198,433 | 1,198,433 |
| Number of children from same-sex couples | 1,200 | 1,200 | 1,200 | 1,200 |

*Notes.* The table shows that selection on unobservables should be 2.62 times higher than selection on observables to reduce the effect of being raised by a same-sex couple on standardized test scores at the end of primary education to zero. $R^2$max is set as 1.3 times $R^2$ from the regression including all controls as recommended by Oster (2017).
[a] For instance, a ratio of 2 indicates that the selection on unobserved characteristics is two times higher than selection on observed characteristics.
[b] "Yes" indicates that children from previous heterosexual relationships and adopted children have been excluded.
*** Significance at the 1 percent level.

The previous two sections show that children from same-sex couples are likely to outperform children from opposite-sex couples on standardized tests at the end of primary education. This result, however, is an association and not a causal effect. Although we control for many observable characteristics (*selection on observables*), we are unable to control for unobservable characteristics (*selection on unobservables*). We have seen from **Table 2** that the selection mechanism plays a role when comparing test scores of children from same-sex couple to children from opposite-sex couples. Once we controlled for socioeconomic variables, the positive coefficient dropped significantly. Moreover, same-sex couples may also select donors with most favourable unobserved characteristics when using donor insemination, leading to selection on unobservables. Therefore, we would expect our results to represent an upper bound of the causal effect of being raised by a same-sex family.

To better understand these selection effects, we perform a novel bounding approach developed by Oster (2017)[26]. This approach exploits coefficient and $R^2$ movements before and after the inclusion of observed characteristics to bound the treatment effect[27]. Table 4 column (2) indicates that even when the selection on unobserved characteristics is twice as high as selection on observed characteristics, children from same-sex couples outperform children from opposite-sex couples by 0.045 standard deviations. We calculate in column (4) that the selection on unobserved characteristics would have to be at least 2.62 times higher than the selection on observed characteristics already included in the model to render our positive estimate insignificant. It is therefore unlikely that selection mechanism alone can explain our findings. Nevertheless, this estimation assumes that selection on observables is informative about the selection on unobservables. To truly speak about causality, we would need an exogenous variation in the treatment which is currently not available in the literature.

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[26] See also Altonji, Elder, & Taber (2008) and Lindquist & Santavirta (2014).
[27] $R^2$max is set at 1.3 times $R^2$ from the regression including all controls as recommended by Oster (2017).

## D. Children From Same-Sex Couples and Diploma Attainment

TABLE 5 – CHILDREN FROM SAME-SEX COUPLES AND DIPLOMA ATTAINMENT

| | Full sample | | Children raised by same-sex couples from birth[c] | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Child from same-sex couple (1 is yes) | 0.020 | 0.025 | 0.067*** | 0.042* |
| | (0.018) | (0.019) | (0.019) | (0.024) |
| | | | | |
| Additional controls[a] | No | Yes | Yes | Yes |
| Coarsened Exact Matching (CEM)[b] | No | No | No | Yes |
| | | | | |
| Number of children | 212,432 | 212,432 | 211,975 | 124,057 |
| Number of children from same-sex couples | 256 | 256 | 164 | 164 |
| Adj. $R^2$ | 0.047 | 0.078 | 0.077 | 0.222 |

*Notes.* Standard errors clustered at the household level are in parentheses. Diploma attainment is coded as an indicator given value of 1 is the child graduated from upper secondary education and 0 if the child dropped out before graduating.
[a] Additional controls include gender, ethnicity, birth year, parental education at birth, household income at birth, neighbourhood at birth, average age of the parents at birth, number of siblings, and family structure at birth.
[b] Due to a large control group, we searched for an exact match on all the covariates.
[c] This means that children from previous heterosexual relationships and adopted children (including foster children) have been excluded.
* Significance at the 10 percent level.
*** Significance at the 1 percent level.

**Table 5** compares children from same-sex couples with children from opposite-sex couples on diploma attainment. As children in our sample are born between 1995 and 2005, we can only analyse children from earlier cohorts as they are old enough to graduate from secondary education. The first two columns include all children who resided with a same-sex couple at least once. It appears from columns (1) and (2) that children from same-sex couples perform just as well as their peers from opposite-sex couples on diploma attainment. However, once we consider children who were actually raised by same-sex couples from birth in column (3), children from same-sex couples are 6.7 percent more likely to graduate than children from opposite-sex couples (from a mean diploma attainment of children from opposite-sex couples of 87 percent). CEM confirms these results, although the coefficient is only significant at the 10 percent level. In sum, it appears that children raised by same-sex couples from birth continue to outperform their peers from opposite-sex couples in secondary education. Nonetheless, we only observe 164 children from same-sex couples in our preferred specification in column (3). These results should therefore be interpreted with caution.

## VI. Discussion

Using a unique administrative panel dataset from the Netherlands, this article compared children from same-sex couples with children from opposite-sex couples on high-stakes standardized test scores at the end of primary education. The results indicate that children from same-sex couples outperform children from opposite-sex couples by 0.18 standard deviations. We found no heterogeneity by gender nor by ethnicity. By family structure, however, our findings indicate that children particularly benefit from same-sex couples compared to opposite-sex couples if the couple is cohabiting rather than married. Further, we also find that children from same-sex couples continue to outperform children from opposite-sex couples in secondary education. Our results suggest that children from same-sex couples are 6.7 percent more likely to graduate than children from opposite-sex couples. Overall, these results are in contrast with the previous literature using cross-sectional Census data[28]. The literature either finds a negative association between residing in a same-sex household and school outcomes (Allen, 2013; Allen, Pakaluk, & Price, 2013) or no association at all (Rosenfeld, 2010; Watkins, 2018). We mostly attribute this difference to misclassification of same-sex households and to the cross-sectional nature of the Census data due to which it is not possible to differentiate between children actually raised by same-sex couples from birth and children who simply happened to live with a same-sex couple at one point in time.

It is also possible to address some of the theoretical mechanisms that may be driving our results. As we estimated that children from same-sex couples fare better in school than children from opposite-sex couples, the family structure and evolutionary approach did not hold. Our results mostly support the selection approach stating that given the time-consuming and costly procedures for same-sex couples to obtain children, same-sex parents typically have a high socioeconomic status resulting in higher parental investment. Indeed, once we controlled for socioeconomic variables, the positive association between residing in a same-sex family and test scores dropped significantly. Nonetheless, the positive association was not entirely removed. We further used a novel method to bound the causal effect of living in a same-sex family. Treatment effect bounds indicated that the selection on unobserved characteristics would have to be more than two and a half times higher than the selection on observed characteristics to render the positive association insignificant. Therefore, it is likely that mechanisms other than the selection mechanism also play

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[28] They are in line, however, with concurrent work by Aldén, Björklund, and Hammarstedt (2017) who use administrative data, albeit they include only 56 children from lesbian families.

a role. One possible approach is the compensation approach stating that same-sex parents might compensate for their unique stressors by investing more time and energy in their children. Although the adult population in the Netherlands is relatively favourable to same-sex couples compared to other countries, significant challenges remain. For instance, a survey among students between the ages of 12 and 25 finds that only 11 percent of the respondents feel that homosexual students can freely tell everyone at their school about their sexual orientation (Kuyper, 2015). To the extent that same-sex parents feel that their children may experience stigma and discrimination, they may channel this as motivation to increase their parental investment. Unfortunately, data on parental investment was not available for this study.

   Although we attempted to solve the main caveats in the research on children's outcomes in same-sex families, this study is not without limitations. First, we solely considered couples and made no claims about children living with single parents. Second, our sample of children from gay same-sex couples is too small to estimate heterogeneous effects by gender of the same-sex couple. Third, we could estimate diploma attainment only for earlier cohorts leading to a relatively small sample size of children from same-sex couples. In addition, although our data includes labour market outcomes, the children in the sample are too young to meaningfully compare children from same-sex and children from opposite-sex couples. Finally, we do not consider bisexual and transgender couples. Further research should address these issues.

# REFERENCES

Aldén, L., Björklund, A., & Hammarstedt, M. (2017). *Early Health and School Outcomes for Children with Lesbian Parents: Evidence from Sweden*. IZA Discussion Paper No. 10616.

Allen, D. W. (2013). High school graduation rates among children of same-sex households. *Review of Economics of the Household, 11(4)*, 635-658.

Allen, D. W, Pakaluk, C., & Price, J. (2013). Nontraditional Families and Childhood Progress Through School: A Comment on Rosenfeld. *Demography, 50(3)*, 955-961.

Altonji, J. G., Elder, T. E., and Taber, C. (2005). Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools. *Journal of Political Economy, 113(1)*, 151-184.

Alvaré, H. M. (2005). The Turn Toward the Self in the Law of Marriage and Family: Same-Sex Marriage and Its Predecessors. *Stanford Law and Policy Review, 16(1)*, 135-196.

Black, D. A., Gates, G., Sanders, S. G., & Taylor, L. J. (2002). Why Do Gay Men Live in San Francisco?. *Journal of Urban Economics, 51(1)*, 54-76.

Black, D. A., Sanders, S. G., & Taylor, L. J. (2007). The Economics of Lesbian and Gay Families. *Journal of Economic Perspectives, 21*(2), 53-70.

Blackwell, M., Iacus, S., King, G., & Porro, G. (2009). CEM: Coarsened exact matching in Stata. *The Stata Journal, 9*(4), 524-546.

Carey, B. (2005, January 29). Experts Dispute Bush on Gay-Adoption Issue. *The New York Times*. Retrieved from https://www.nytimes.com/2005/01/29/politics/experts-dispute-bush-on-gayadoption-issue.html

Cheng, S., & Powell, B. (2015). Measurement, methods, and divergent patterns: Reassessing the effects of same-sex parents. *Social Science Research, 52*, 615-626.

Cherlin, A. (1978). Remarriage as an Incomplete Institution. *American Journal of Sociology, 84(3)*, 634-650.

Doyle, J. J. Jr. (2007). Child Protection and Child Outcomes: Measuring the Effects of Foster Care. *American Economic Review, 97(5)*, 1583-1610.

Elwert, F., & Winship, C. (2014). Endogenous Selection Bias: The Problem of Conditioning on a Collider Variable. *Annual Review of Sociology, 40*, 31-53.

European Commission. (2015). *Special Eurobarometer 437: Discrimination in the EU in 2015*. Brussels: European Commission.

Fedewa, A. L., & Clark, T. P. (2009). Parent Practices and Home-School Partnerships: A Differential Effect for Children with Same-Sex Coupled Parents?. *Journal of GLBT Family Studies, 5(4)*, 312-339.

Font, S. A., Berger, L. M., Cancian, M., & Noyes, J. L. (2018). Permanency and the Educational and Economic Attainment of Former Foster Children in Early Adulthood. *American Sociological Review, 83(4)*, 716-743.

Gartrell, N., & Bos, H. (2010). US National Longitudinal Lesbian Family Study: Psychological Adjustment of 17-Year-Old Adolescents. *Pediatrics, 126(1)*, 28-36.

Geronimus, A. T., Korenman, S., & Hillemeier, M. M. (1994). Does Young Maternal Age Adversely Affect Child Development? Evidence from Cousin Comparisons in the United States. *Population and Development Review, 20(3)*, 585-609.

Golombok, S., Perry, B., Burston, A., Murray, C., Mooney-Somers, J., Stevens, M., & Golding, J. (2003). Children With Lesbian Parents: A Community Study. *Developmental Psychology, 39(1)*, 20-33.

Golombok, S., Tasker, F., & Murray, C. (1997). Children Raised in Fatherless Families From Infancy: Family Relationships and the Socioemotional Development of Children of Lesbian and Single Heterosexual Mothers. *Journal of Child Psychology and Psychiatry, 38(7)*, 783-791.

Hällsten, M., & Pfeffer, F. T. (2017). Grand Advantage: Family Wealth and Grandchildren's Educational Achievement in Sweden. *American Sociological Review, 82(2)*, 328-360.

Hamilton, W. D. (1964). The Genetical Evolution of Social Behavior, *Journal of Theoretical Biology, 7(1)*, 1-51.

Hamilton, L., Cheng, S., & Powell, B. (2007). Adoptive Parents, Adaptive Parents: Evaluating the Importance of Biological Ties for Parental Investment. *American Sociological Review, 72(1)*, 95-116.

Hanushek, E. A. (1986). The Economics of Schooling: Production and Efficiency in Public Schools. *Journal of Economic Literature, 24(3)*, 1141-1177.

Hattie, J. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement*. New York: Routledge.

Iacus, S., King, G., & Porro, G. (2008). Causal Inference without Balance Checking: Coarsened Exact Matching. *Political Analysis, 20*(1), 1-24.

Kingston, P. W., Hubbard, R., Lapp, B., Schroeder, P., & Wilson, J. (2003). Why Education Matters. *Sociology of Education, 76(1)*, 53-70.

Kreider, R. M., & Lofquist, D. A. (2015). *Matching survey data with administrative records to evaluate reports of same-sex married couple households*. Census Working Paper No. SEHSD-WP2014-36. Washington, D.C: U.S. Census Bureau.

Kuyper, L. (2015). *Jongeren en seksuele oriëntatie [Youth and sexual orientation]*. The Hague: The Netherlands Institute for Social Research.

Lindquist, M. J., & Santavirta, T. (2014). Does placing children in foster care increase their adult criminality?. *Labour Economics, 31*, 72-83.

MacCallum, F., & Golombok, S. (2004). Children raised in fatherless families from infancy: a follow-up of children of lesbian and single heterosexual mothers at early adolescence. *Journal of Child Psychology and Psychiatry, 45(8)*, 1407-1419.

McLanahan, S., Tach, L., & Schneider, D. (2013). The Causal Effects of Father Absence. *Annual Review of Sociology, 39*, 399-427.

O'Connell, M., & Feliz, S. (2011). *Same-Sex Couple Household Statistics from the 2010 Census*. Census Working Paper No. SEHSD-WP2011-26. Washington, D.C.: U.S. Census Bureau.

Obergefell v. Hodges, 14-556 (Supreme Court of the United States June 26, 2015).

Oreopoulos, P., & Salvanes, K. G. (2011). Priceless: The Nonpecuniary Benefits of Schooling. *Journal of Economic Perspectives, 25(1)*, 159-184.

Oster, E. (2017). Unobservable Selection and Coefficient Stability: Theory and Evidence. *Journal of Business & Economic Statistics. Available Online*.

Potter, D. (2012). Same-Sex Parent Families and Children's Academic Achievement. *Journal of Marriage and Family, 74(3)*, 556-571.

Regnerus, M. (2012). How different are the adult children of parents who have same-sex relationships? Findings from the New Family Structures Study. *Social Science Research, 41(4)*, 752-770.

Rosenfeld, M. J. (2010). Nontraditional families and childhood progress through school. *Demography, 47(3)*, 755-775.

Rosenfeld, M. J. (2013). Reply to Allen et al. *Demography, 50(3)*, 963-969.

Sarantakos, S. (1996). Children in three contexts: Family, education and social development. *Children Australia, 21(3)*, 23-31.

Scheerens, J., Ehren, M., Sleegers, P., & de Leeuw, R. (2012). *OECD Review on Evaluation and Assessment Frameworks for Improving School Outcomes*. University of Twente and OECD.

Stacey, J., & Biblarz, T. J. (2001). Does the Sexual Orientation of Parents Matter?. *American Sociological Review, 66(2)*, 159-183.

Steenhof, L., & Harmsen, C. (2003). *Same-sex couples in the Netherlands*. Voorburg: Statistics Netherlands.

Sullins, P. D. (2015). The Unexpected Harm of Same-Sex Marriage: A Critical Appraisal, Replication and Re-analysis of Wainright and Patterson's Studies of Adolescents with Same-sex Parents. *British Journal of Education, Society & Behavioural Science, 11(2)*, 1-22.

Thomson, E., Hanson, T. L., & McLanahan, S. S. (1994). Family Structure and Child Well-Being: Economic Resources vs. Parental Behaviors. *Social Forces, 73(1)*, 221-242.

Trandafir, M. (2014). The Effect of Same-Sex Marriage Laws on Different-Sex Marriage: Evidence From the Netherlands. *Demography, 51(1)*, 317-340.

Wainright, J. L., Russell, S. T., & Patterson, C. J. (2004). Psychosocial Adjustment, School Outcomes, and Romantic Relationships of Adolescents With Same-Sex Parents. *Child Development, 75(6)*, 1886-1898.

Watkins, C. S. (2018). School Progress Among Children of Same-Sex Couples. *Demography, 55(3)*, 799-821.

# APPENDIX

TABLE A1 – CHILDREN FROM SAME-SEX COUPLES AND TEACHER ADVICE AT THE END OF PRIMARY EDUCATION

| | Full sample | | Children raised by same-sex couples from birth[c] | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Child from same-sex couple (1 is yes) | 0.075*** | 0.056*** | 0.084*** | 0.086*** |
| | (0.013) | (0.013) | (0.015) | (0.016) |
| | | | | |
| Additional controls[a] | No | Yes | Yes | Yes |
| Coarsened Exact Matching (CEM)[b] | No | No | No | Yes |
| | | | | |
| Number of children | 1,171,899 | 1,171,899 | 1,169,396 | 740,292 |
| Number of children from same-sex couples | 1,625 | 1,625 | 1,181 | 1,181 |
| Adj. $R^2$ | 0.055 | 0.088 | 0.088 | 0.089 |

*Notes.* Standard errors clustered at the household level are in parentheses. The outcome teacher advice is an indicator given value of 1 if the teacher advised the preuniversity track VWO (most prestigious track), and 0 otherwise.
[a] Additional controls include gender, ethnicity, birth year, parental education at birth, household income at birth, neighbourhood at birth, average age of the parents at birth, number of siblings, and family structure at birth.
[b] Due to a large control group, we searched for an exact match on all the covariates.
[c] This means that children from previous heterosexual relationships and adopted children (including foster children) have been excluded.
*** Significance at the 1 percent level.

TABLE A2 – SOCIOECONOMIC CHARACTERISTICS OF COUPLES WITH AND WITHOUT CHILDREN BY GENDER IN 2016

| | Opposite-sex couple with children | Opposite-sex couple without children | Same-sex couple with children | Same-sex couple without children |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Ethnicity (1 is foreign, 0 is Dutch) | 0.256 | 0.378 | 0.224 | 0.562 |
| Net income per year in euros | 24,526 | 25,255 | 49,880 | 19,096 |
| Number of couples | 4,488,532 | 1,557,507 | 4,928 | 276,425 |

TABLE A3 – CHILDREN RAISED BY SAME-SEX COUPLES FROM BIRTH AND STANDARDIZED TEST SCORE AT THE END OF PRIMARY EDUCATION USING COUSIN FIXED EFFECTS

|  | Cousin on father's side | Cousin on mother's side |
|---|---|---|
|  | (1) | (2) |
| Child from same-sex couple (1 is yes) | 0.240*** | 0.160** |
|  | (0.067) | (0.076) |
| Number of children actually driving the results | 1,129 | 849 |
| Number of children from same-sex couples | 347 | 288 |
| Adj. R$^2$ | 0.320 | 0.325 |

*Notes.* Standard errors clustered at the cousin level are in parentheses.

*** Significance at the 1 percent level.

TABLE A4 – CHILDREN RAISED BY SAME-SEX COUPLES FROM BIRTH AND STANDARDIZED TEST SCORES AT THE END OF PRIMARY EDUCATION WITH CATEGORICAL FAMILY STRUCTURE

|  | (1) | (2) |
|---|---|---|
| Child from opposite-sex married couple | (reference category) | -0.125*** |
|  |  | (0.032) |
| Child from opposite-sex cohabiting couple | -0.070*** | -0.195*** |
|  | (0.002) | (0.032) |
| Child from same-sex married couple | 0.125*** | (reference category) |
|  | (0.032) |  |
| Child from same-sex cohabiting couple | 0.211*** | 0.086 |
|  | (0.043) | (0.053) |
| Additional controls[a] | Yes | Yes |
| Children | 1,198,433 | 1,198,433 |
| Children from same-sex couples | 1,200 | 1,200 |
| Adj. R$^2$ | 0.109 | 0.109 |

*Notes.* Standard errors clustered at the household level are in parentheses.

[a] Additional controls include gender, ethnicity, birth year, parental education at birth, household income at birth, neighbourhood at birth, average age of the parents at birth, and number of siblings.

* Significance at the 10 percent level.

*** Significance at the 1 percent level.