

## High school graduation rates among children of same-sex households

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**Abstract** Almost all studies of same-sex parenting have concluded there is “no difference” in a range of outcome measures for children who live in a household with same-sex parents compared to children living with married opposite-sex parents. Recently, some work based on the US census has suggested otherwise, but those studies have considerable drawbacks. Here, a 20 % sample of the 2006 Canada census is used to identify self-reported children living with same-sex parents, and to examine the association of household type with children’s high school graduation rates. This large random sample allows for control of parental marital status, distinguishes between gay and lesbian families, and is large enough to evaluate differences in gender between parents and children. Children living with gay and lesbian families in 2006 were about 65 % as likely to graduate compared to children living in opposite sex marriage families. Daughters of same-sex parents do considerably worse than sons.

**Keywords** Same sex households · Same sex parents · High school graduation

**JEL Classification** I21 · J12 · J16

Children raised by gay or lesbian parents are as likely as children raised by heterosexual parents to be healthy, successful and well-adjusted. The research supporting this conclusion is accepted beyond serious debate in the field of developmental psychology.

[Justice Vaughn Walker, section 70, Perry v. Schwarzenegger]

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## 1 Introduction

The matter of same-sex marriage is perhaps the most significant policy issue in family law since the introduction of no-fault divorce in the late 1960s and 1970s. Much of the debate is focused on the question of equality, although issues of relationship stability, consequences for opposite sex marriages, and marriage culture are often brought up. One aspect that is seldom argued is the effect a same-sex union might have on the children within that union. The absence of any discussion on children no doubt reflects the unanimous consensus in the child development literature on this question—it makes no difference.

Within the last 15 years there have been over fifty empirical studies considering the effects on children of growing up within a same-sex household.<sup>1</sup> Despite the various differences in each study, all but a couple have the same conclusion: children of same-sex parents perform at least as well as children from heterosexual families. This conclusion, that there is no difference in child outcomes based on family structure, has played a major role in legal cases, legislation, popular culture, and professional opinions on gay family rights—including rights to adoption and marriage.<sup>2</sup> As Justice Walker claimed, to suggest otherwise is to risk not being taken seriously.

Unfortunately, the literature on child development in same-sex households is lacking on several grounds.<sup>3</sup> First, the research is characterized by levels of advocacy, policy endorsement, and awareness of political consequences, that is disproportionate with the strength and substance of the preliminary empirical findings. Second, the literature generally utilizes measures of child and family performance that are not easily verifiable by third party replication, which vary from one study to another in ways that make comparisons difficult, and which differ substantially from measures standardly used in other family studies.<sup>4</sup> But most important, almost all of the literature on same-sex parenting (which almost always

<sup>1</sup> Table 1 lists the studies. See Allen (2012) or Marks (2012) for surveys of this literature. Throughout the paper the term “same-sex household” is used to mean gay or lesbian headed households.

<sup>2</sup> For example, it forms the basis for the American Psychological Association’s position supporting gay marriage.

<sup>3</sup> Economists have written a considerable amount on gay and lesbian issues *outside* of child development, and generally find differences in behavior. For example, Negrusa and Oreffice (2011) on savings rates, Oreffice (2010) on labor supply, Black et al. (2007) on labor markets, Jepsen and Jepsen (2009) on home ownership, and Carpenter and Gates (2008) on family formation. Indeed, *The Review of Economics of the Household* devoted its 2008 December issue to gay and lesbian households. Those papers examined wage differentials [Zavodny (2008), Booth and Frank (2008)], household formation [Badgett et al. (2008)], and bank deposits [Klawitter (2008)]. This is the first paper in economics to examine differences in child performance.

<sup>4</sup> This is often a characteristic of a nascent field. These measures include self reports on attitudes, awareness, and adjustments [e.g., McNeill and Rienzi (1998)]; self reports on parenting quality and socio-emotional child development [e.g., Golombok et al. (1997)]; self reports on psychological well-being, identity, and relationships [e.g., Tasker et al. (1995)]; self reports on family closeness, parental legitimacy, child bonding [e.g., Gartrell et al. (1999)]; and self reports on stigma and self-esteem [e.g., Gershon et al. (1999)].

**Table 1** Summaries of gay parenting studies

Study	Random sample	Gay sample size	Content <sup>a</sup>	Comparison group size	Time series data	Gay or lesbian study
Bailey et al. (1995)	No	55	Hard	None	No	G
Flaks et al. (1995)	No	30	Soft	30	No	L
Patterson (1995)	No	26	Soft	None	No	L
Tasker et al. (1995)	No	25	Soft	21	No	L
Golombok et al. (1996)	No	25	Hard	21	No	L
Sarantakos (1996)	No	58	Soft	116	Yes	G & L
Brewaeyts et al. (1997)	No	30	Soft	68	No	L
Golombok et al. (1997)	No	30	Soft	83	Yes	L
Chan et al. (1998a)	No	30	Soft	16	No	L
Chan et al. (1998b)	No	55	Soft	25	No	L
McNeill and Rienzi (1998)	No	24	Soft	35	No	L
Patterson et al. (1998)	No	37	Soft	None	No	L
Gershon et al. (1999)	No	76	Soft	None	No	L
Gartrell et al. (1999)	No	84	Soft	None	Yes	L
Dundas et al. (2000)	No	27	Soft	None	No	L
Gartrell et al. (2000)	No	84	Soft	None	Yes	L
Barrett et al. (2001)	No	101	Soft	None	No	G
Chrisp (2001)	No	8	Soft	None	No	L
Patterson (2001)	No	37	Soft	None	No	L
Fulcher et al. (2002)	No	55	Soft	25	No	L
Vanfraussen et al. (2002)	No	24	Soft	24	No	L
Golombok et al. (2003)	No	39	Soft	134	No	L
Bos et al. (2004)	No	100	Soft	None	No	L
Patterson et al. (2004)	No	33	Hard	33	No	L
Stacey (2004)	No	50	Soft	None	No	G
MacCallum and Golombok (2004)	No	25	Soft	76	No	L
Wainright et al. (2004)	Yes	44	Hard	44	No	L
Gartrell et al. (2005)	No	84	Soft	None	Yes	L
Leung et al. (2005)	No	47	Soft	111	No	G & L
Scheib et al. (2005)	No	12	Soft	17	No	L
Stacey (2005)	No	50	Soft	None	No	G
Wainright et al. (2006)	Yes	44	Hard	44	No	L
Wright et al. (2006)	No	156	Soft	None	No	G
Bos et al. (2007)	No	99	Soft	100	No	L
Goldberg (2007)	No	46	Soft	None	No	G & L
Balsam et al. (2008)	No	281	Soft	55	No	G & L
Bos et al. (2008)	No	63	Soft	None	No	L
Bos et al. (2008)	No	152	Soft	None	No	L
Fairlough (2008)	No	67	Soft	None	No	G & L

**Table 1** continued

Study	Random sample	Gay sample size	Content <sup>a</sup>	Comparison group size	Time series data	Gay or lesbian study
Fulcher et al. (2008)	No	33	Soft	33	No	L
Goldberg et al. (2008)	No	30	Soft	None	No	L
Oswald et al. (2008)	No	190	Hard	None	No	G & L
Rothblum et al. (2008)	Pop.	475	Hard	None	No	G, L & T
Rivers et al. (2008)	Yes	18	Soft	18	No	L
Sutfin et al. (2008)	No	29	Soft	28	No	L
Wainright and Patterson (2008)	Yes	44	Soft	44	No	L
Bos (2010)	No	36	Soft	36	No	G
Gartrell and Bos (2010)	No	84	Hard	93	Yes	L
Lehmiller (2010)	No	68	Soft	86	No	G
Power et al. (2010)	No	455	Hard	None	No	G & L
Rosenfeld (2010)	Yes	3,502	Hard	>700,000	No	G & L
Regnerus (2012)	Yes	248	Hard	2,988	No	G & L
Allen et al. (2013)	Yes	8,632	Hard	1,189,833	No	G & L

*G* gay, *L* lesbian, and *T* transgendered

<sup>a</sup> Hard implies the questions asked were potentially verifiable, quantifiable, and had observable answers. Soft implies the opposite. Some studies included both and were classified as hard

means lesbian parenting) is based on some combination of weak empirical designs, small biased convenience samples, “snowballing,” and low powered tests.<sup>5</sup>

This paper addresses these shortcomings by using the 2006 Canada census to study high school graduation probabilities of children who lived with both gay and lesbian parents in 2006, and to compare them with four other family types: married, common law, single mothers, and single fathers. Currently, the 2006 Canada census has several strengths compared to any other data set. First, it uses information from a country where same-sex couples have enjoyed all taxation and government benefits since 1997, and legal same-sex marriage since 2005.<sup>6</sup> As Biblarz and Savci note, such legalization reduces the stress and stigma of homosexuality, and encourages honest participation in census questions.<sup>7</sup> Second, not only does the census provide a large random sample, but married and common law same-sex

<sup>5</sup> “Snowballing” is the practice of asking individuals within a study to recruit their friends and associates to join the study.

<sup>6</sup> The first Canadian same-sex marriages took place on January 14, 2001 at the Toronto Metropolitan Community Church. These became the basis of a successful legal challenge which ended at the court of appeal on June 10, 2003. On July 20, 2005, the Federal government passed the Civil Marriage Act that made Canada the fourth country in the world to legalize same-sex marriage. Thus, different people date the arrival of same-sex marriage in Canada as 2001, 2003, or 2005.

<sup>7</sup> Biblarz and Savci, p. 490, 2010.

couples and their children are self identified.<sup>8</sup> This is an important advantage over the US census. Third, because the child and parent records are linked together, the marital status and educational levels of the parents can be controlled for when analyzing child performance. Finally, because of the relatively large sample size, there is enough power to not only separate gay from lesbian households, but also enough to examine the gender mix of same-sex households.<sup>9</sup>

The point estimates for high school graduation show that there is a significant reduction in the odds of children living in same-sex homes completing high school. In the case of gay parents, children are estimated to be 69 % as likely to graduate compared to children from opposite sex married homes.<sup>10</sup> For lesbian households the children are 60 % as likely to graduate from high school. A breakdown of performance by the sex of the child shows a more dramatic result. Daughters of gay parents are only 15 % as likely to graduate, while daughters of lesbian parents are 45 % as likely to graduate. Both sets of results are estimated with precision. On the other hand, sons of lesbian parents are 76 % as likely to graduate, while sons of gay parents are 61 % *more* likely to graduate. However, neither of these results are statistically significant. In general, the results for gays and lesbians respond differently to different controls, and differ from the results for the other family types. This, and the different graduation rates for sons and daughters, suggest that the two types of same-sex couples are much different and should not be categorized together in empirical work.

These results survive several robustness checks. Graduation rates may be different because school attendance rates are different, yet no statistical difference in the probability of attending school across the different family types is found. In fact, the point estimates indicate children of opposite-sex married parents are less likely to attend school. Various changes in sample restrictions and controls also leave the results unchanged.

## 2 Context within the child development literature

Since most economists are unfamiliar with the literature on child performance in same-sex households, a brief review of its empirical problems is warranted. Generally speaking the literature is characterized by several different types of data bias and small samples that lack any power. Table 1 reports some information on the relevant fifty three studies conducted the past 15 years. With the exception of

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<sup>8</sup> Unfortunately, it also lumps married and common law same-sex couples together, and I am unable to separate them.

<sup>9</sup> The census is not a panel, and provides only a snap shot of the population. As a result, this paper does not study the effect of *growing up* in a same-sex household, but rather examines the association of school performance for those children who lived with same-sex parents in 2006.

<sup>10</sup> Rosenfeld (2010) stressed the importance of controlling for a child's home life stability. He restricted the sample to households that remained in one place for the past 5 years. Here mobility is controlled for with a fixed effect on whether or not the child has remained in the home for 1 year. Results reported in the text all refer to this mobility control. The "Appendix" shows the results of the alternative control: did the child move residences in the past 5 years.

two of the last three, the others have serious empirical problems that render them exploratory in nature.

## 2.1 Random samples

Although a proper probability sample is a necessary condition for making any claim about an unknown population, within the same-sex parenting literature researchers have studied only those community members who are convenient to study. This point has been raised by others regarding the literature on gay parenting, including many within the literature.<sup>11</sup> Of the fifty-three studies reviewed here, only seven used probability samples.<sup>12</sup> All of the other studies arrived at their samples through means that introduced various levels of bias. Some studies recruited individuals from sperm bank data sources or other types of reproduction technology providers.<sup>13</sup> Other studies used Internet surveys where the respondents were recruited by various methods: parent forums, gay and lesbian web-sites, and online advocacy organizations.<sup>14</sup> Many studies recruited through LGBT events, bookstore and newspaper advertisements, word of mouth, networking, and youth groups.<sup>15</sup> A common method of recruitment was to use a combination of the above methods to form a sample base, and then recruit friends of the base.<sup>16</sup> Still other studies failed to even mention how their samples were arrived at.<sup>17</sup> Each different procedure has a different and unknown source of bias.

Of the studies before 2010, there are only four that use a random sample, and each has a trivial sample size. For example, consider the three studies by Wainright and Patterson.<sup>18</sup> These are not three independent studies, but rather three separate publications utilizing the same data source: the National Longitudinal Survey of Adolescent Health. Even though the survey contains 12,105 households, Wainright and Patterson were only able to identify 6 gay households and 44 lesbian ones. The

<sup>11</sup> Andersson et al. (2006) note:

The lack of representative samples is the most fundamental problem in quantitative studies on gays and lesbians, which commonly rely on self-recruited samples from an unknown population. [p. 81]

See also Sweet (2009) or Stacey and Biblarz (2001).

<sup>12</sup> These were Allen et al. (2013), Regnerus (2012), Rosenfeld (2010), Wainright et al. (2004), Wainright and Patterson (2006, 2008), and Golombok et al. (2003). One study used a population: Rothblum et al. (2008).

<sup>13</sup> For example: Bos et al. (2007), Bos and Van Balen (2008), Chan et al. (1998a), Brewaeys et al. (1997) and Chan et al. (1998b).

<sup>14</sup> For example: Lehmiller (2010), Bos (2010), or Power et al. (2010).

<sup>15</sup> For example: Wright and Perry (2006), Oswald et al. (2008), Lehmiller (2010), Goldberg (2007), Bailey et al. (1995), Flaks et al. (1995), Fairtlough (2008), Dundas and Kaufman (2000), Power et al. or Fulcher et al. (2008).

<sup>16</sup> For example: Balsam et al. (2008), Golombok et al. (2003).

<sup>17</sup> For example: Stacey (2004, 2005) or Chrisp (2001).

<sup>18</sup> Wainright and Patterson (2006, 2008) and Wainright et al. (2006).

other study by Rivers et al. (2008) used a similar British survey, and ended up with a sample of 18 lesbian households.<sup>19</sup>

The only study with a large random sample in the entire literature is Rosenfeld (2010), that used the 2000 US Census 5 % Public-use Micro-sample to examine the association between same-sex parenting and normal progress through school.<sup>20</sup> His study confirmed the findings of most earlier research, and he concluded that in terms of school grade progression children raised by same-sex couples “cannot be distinguished with statistical certainty from children of heterosexual married couples.” Rosenfeld’s study was the first to use a large random sample to support the finding that children of same-sex households were no different in a performance measure from children of married opposite sex couples.

However, a follow up study by Allen et al. (2013), found that Rosenfeld’s conclusion was questionable. His estimates were so imprecise that the outcomes of children in same-sex households could not be distinguished with any statistical certainty from almost any other family type—not just opposite-sex married families. The imprecision came from Rosenfeld’s decision to exclude from the sample any family who had moved within the past 5 years. Same-sex households turned out to be strongly correlated with mobility, and the result was a large reduction in the same-sex household sample, which led to an inability to statistically distinguish the children from these households with any others—including ones known to be poor environments for children. By controlling for mobility and restoring the sample to its full size, Allen et al. (2013) found that children from same-sex homes were about 35 % more likely to fail a grade compared to children from intact opposite sex married homes. About on par with children from single parent homes.<sup>21</sup>

## 2.2 Small sample sizes

Aside from the problem of non-random samples, most of the existing parenting studies contain tiny sample sizes.<sup>22</sup> Of the fifty-three studies examined here, only

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<sup>19</sup> Golombok et al. (2003) uses a random sample from the Avon Longitudinal Study of Parents and Children—a local British study—and comes up with 18 lesbians. They then use snowball methods to bring their numbers up to 39 lesbians.

<sup>20</sup> The 2000 US Census does not directly identify same-sex couples. Rosenfeld, like others, did the best he could by indirectly identifying them. He did this by selecting those couples who indicated they were a couple and who identified their sex as being the same. This procedure requires the correct answer of three questions, and a small chance of error on the part of heterosexuals can lead to a large measurement error for the same-sex couple sample, given the large size of the former and the small size of the latter. Black et al. (2006) suggest a procedure for correcting this statistical problem; however, there is no indication in the Rosenfeld paper that he followed it.

<sup>21</sup> The Regnerus study (2012) also used a random sample; however, it was still too small to identify a sufficient sample of same-sex parents. To increase his sample size he decided to use a broader definition of same-sex parent.

<sup>22</sup> Of the fifty-three studies examined here, only a few dealt with gay male parents. Almost all of the studies are done on lesbians. This is another source of bias that warrants caution in drawing any conclusions about non-lesbian families.

two had sample sizes larger than 500.<sup>23</sup> Much more common were sample sizes between 30-60.<sup>24</sup> The problem with such small sample sizes is that the data cannot generate any power for statistical testing, and low power means there is a small chance of rejecting a false null hypothesis.

Hence, the very small sample sizes found in many of these studies creates a bias towards accepting a null hypothesis of “no effect” in child outcomes between same- and opposite-sex households. This is well recognized, but it is exacerbated in the context of gay parenting because avenues through which these households are formed are many and complicated. As noted by Stacey and Biblarz (2001), Biblarz and Stacey (2010), these families often have experienced a prior divorce, previous heterosexual marriages, intentional pregnancies, co-parenting, donor insemination, adoption, and surrogacy. These channels may have different effects on boys or girls, and may differ in gay or lesbian homes. Empirical work needs to control for the various selection effects that arise from the number of parents, sexual identity, marital status, gender, and biological relationships with children. That is, child performance is affected by all these channels and they need to be statistically identified, but this requires large sample sizes.

A review of the same-sex parenting literature inevitably leads to the conclusion that it is a collection of exploratory studies. Even the two most recent studies by Rosenfeld (2010) and Allen et al. (2013) suffer from several drawbacks. First, they have to rely on indirect identification of same-sex couples within an environment where same-sex marriage was illegal in all fifty states. Second, neither paper distinguishes between gay and lesbian households, and there is no reason to think their parental performance should be the same. Third, both papers fail to control for the marital history of the parents. The increased chance of failing a grade—especially when the correlation magnitude is so close to that of single parents—could likely be the result of a previous divorce or separation since many children in same-sex households were initially born into opposite sex families that later broke apart. The “same-sex” aspect of these parents may have nothing to do with slower grade progress.

And so, within the context of this uniform literature based on small biased samples, this study intends to examine high school graduation rates of children who lived within either gay or lesbian households in 2006, using a large random data set that links parent and child records.

<sup>23</sup> These were Rosenfeld (2010) and Allen et al. (2013). According to Nock (p. 37, 2001), to properly test any hypothesis regarding gay parenting, a sample size of 800 is required.

<sup>24</sup> Often the problem of small sample size comes from low response rates. Many of the fifty-two studies are silent on the question of response rates to their surveys, but when information is provided it often shows that response rates are very low. For example, in Bos (2010) the gay males were recruited from an Internet mail list for gay parents. Although the list had 1,000 names, only 36 replied and participated in the study. This amounts to a 3.6 % response rate. Other studies (e.g., Chan et al. and Fulcher et al.) have reductions in their samples similar in relative size to Rosenfeld. Response rates lower than 60 % are usually taken to mean the presence of a strong selection bias—even when the initial list is random.



### 3 Data

Data come from the 2006 Canada census 20 % restricted master file.<sup>25</sup> From this file all children *living with* a parent within the home were selected.<sup>26</sup> It is important to note that the census identifies children living with their *parents*, and not just adults. Hence, children of same sex parents are those who respond affirmative to the question: “Are you a child of a male (female) same-sex married or common law couple?” This implies that the results below address the association of having two same-sex parents with a given sexual orientation, rather than just the association of having two parents of the same-sex. That is, the two parents are not same-sex roommates, friends, or other relatives.<sup>27</sup>

Restricting the sample to children living with parents allowed a matching of the child files with the parent files. Children over the age of 22 were dropped because of a likely selection bias in children who live at home well into adulthood.<sup>28</sup> Although the Census identifies children living with *two* same-sex parents, it does not identify children living with a gay or lesbian *single* parent. These families are inadvertently included with the single mothers and fathers.<sup>29</sup>

Table 2 defines the variables used in the analysis, and Tables 3 and 4 report some unconditional means for children between the ages 17–22 across the six family types. Table 3 reports graduation rates for the different family types, not just for the full sample, but also on three sub samples. In terms of the full sample three things stand out: children of married opposite-sex families have a high graduation rate compared to the others; children of lesbian families have a very low graduation rate compared to the others; and the other four types are similar to each other and lie in between the married/lesbian extremes. The three sub samples (both parents are high school graduates; the family never changed dwellings in the previous 5 years; and the family did change dwellings in the previous 5 years) show that even though the

<sup>25</sup> This file is not a public use data set. To use the data, a proposal is screened by the Social Sciences Research Council of Canada, an RCMP criminal check is conducted, and the researcher becomes a deemed employee of Statistics Canada subject to the penalties of the Statistics Act. Empirical work was conducted at the SFU Research Data Center, and all results were screened by Statistics Canada before release. Statistics Canada does not allow any unweighted observations or descriptives to be released, nor any maximums or minimums of weighted estimates, nor sample sizes for the weighted regressions.

<sup>26</sup> Because the procedure starts by selecting the children, and then matches the parents of the child to the file, the problem of having a non-biological parent *not* report a child in the household who is biologically related to their spouse is avoided.

<sup>27</sup> Statistics Canada does not allow the sample sizes to be released; however, there are approximately ten million children in Canada, and so the sample has close to two million children in it.

<sup>28</sup> There’s no reason to believe this selection bias would be correlated with family type, however. All regressions were run with various restrictions on the child’s age within the sample, including keeping everyone, and none of the gay or lesbian family results in the paper change, in terms of magnitudes or levels of significance, in an important way.

<sup>29</sup> Many children in Canada who live with a gay or lesbian parent are actually living with a single parent. About 64 % of children in gay homes have a single father, and about 46 % of children in lesbian homes have a single mother (see Allen and Lu, “Marriage and children: differences across sexual orientations,” (unpublished, 2013). The number of gay and lesbian single parent homes is so small compared to all other single parent homes, however, that it likely causes little bias. In any event, the children analyzed here are a distinct subset of all children raised by a gay or lesbian parent.

**Table 2** Definitions of variables

Variable name	Definition
Human capital variables	
Highschool grad	1 if child has graduated from highschool
Province	10 if located in Newfoundland, 12 if PEI...62 if Nunavut
Visible minority	1 if a member of a visible minority
Disabled	1 if physically or mentally disabled
Moved within 1 year	1 if family changed dwelling within past year
Moved within 5 years	1 if family changed dwelling within the past 5 years
Urban	1 if child lives in urban area
Age	Age of child in years
Family size	Number of family members
Female	1 if child is a girl
Family income	Before tax income in dollars
Same race	1 if child is the same race as resident parent(s)
Father HSG	1 if father graduated from highschool
Mother HSG	1 if mother graduated from highschool
Father grad degree	1 if father has a graduate degree
Mother grad degree	1 if mother has a graduate degree
Father attended	1 if father ever attended school
Mother attended	1 if mother ever attended school
Parent's current marital status	
Father married	1 if father is legally married
Father divorced	1 if father is divorced
Father separated	1 if father is separated
Father never married	1 if father has never legally married and single
Father widowed	1 if father is widowed
Mother married	1 if mother is legally married
Mother divorced	1 if mother is divorced
Mother separated	1 if mother is separated
Mother never married	1 if mother has never legally married and single
Mother widowed	1 if mother is widowed
Family type	
Common law	1 if couple is living common law
Gay parents	1 if couple is two gay men
Lesbian parents	1 if couple is two lesbian women
Single mother	1 if only parent in the home is the mother
Single father	1 if only parent in the home is the father

level of graduation rates may change, the relationship between the groups remains the same.

Some of the results from Table 4 are fascinating. In terms of sample sizes, it is striking how few same-sex couples with children (between ages 17–22) there are. The country estimates for gay families is just 423, and for lesbian families 969;

which together make up just over half of 1 % of all couples with children in this age group. There are a higher number of visible minority children for gay households (28 % compared to 13 % for common law couples), and a higher number of disabled children (13 % compared to 6 % for opposite sex married parents). This may imply a high number of adopted children in gay households, but interestingly there are no cases of inter-racial same-sex families within the 20 % sample.<sup>30</sup> Both lesbian and gay parents are well educated with well over 19 % of them graduating from high school. Finally, lesbians are much more likely to have moved dwellings, with 60 % having moved within the past 5 years.

The next section estimates the association of family type on high school graduation rates, controlling for individual and family characteristics. One contribution of this paper is to control for parental marital status.<sup>31</sup> However, the census, of course, is not a panel or even a retrospective data set. All it records is the current marital status of the parents. Unfortunately, this introduces measurement error into the marital status control for married individuals because the census only identifies if a spouse is currently married, common law, never married, divorced, separated, or widowed. Hence a married spouse may have *previously* been divorced, but is recorded as married; that is, the married category contains couples who have been divorced. This is not a problem for those currently cohabitating, since they are accurately coded as divorced, separated, never married (single), or widowed. Since the marriage rate is lower for gays and lesbians, this measurement error is likely to bias the opposite-sex family type effect on child school performance downwards.<sup>32</sup>

## 4 Estimation

### 4.1 School graduation

Table 5 reports on three logit regressions, where the dependent variable equals 1 if the child has graduated from high school.<sup>33</sup> All of the regressions in this table control for whether or not the family moved with the past year. Table 8 in the appendix reports on another three logit regressions with the same dependent variable and the same right hand side variables, except for the variable used to control for family mobility—it uses the mobility measure “did child move within

<sup>30</sup> The census identifies many visible minorities, but only has a broad based question on race. Hence, the same race variable likely contains significant measurement error.

<sup>31</sup> This control is lacking in other large sample studies on same-sex parents. It is important because a previous marriage disruption is likely to have a negative impact on high school performance. This is particularly important with same-sex couples given the evidence that their relationships are less stable [see Andersson et al. (2006)].

<sup>32</sup> Using current parental marital status is a decent *control* for family history (as used here), but the coefficients estimated are biased measures of the *correlation* of parental marital history on child school performance. For this reason, and to keep the tables to one page, these coefficients are not reported.

<sup>33</sup> Rosenfeld (2010), and Allen et al. (2013) use normal progress through school as their measure of child performance. The Canada census does not identify the grade of the student in 2006, and therefore, this measure is not possible. It does, however, identify if the child has graduated from high school or not.

**Table 3** Estimated population averages for child high school graduation (weighted observations, children ages 17–22)

	Opposite sex married parents	Opposite sex common law parents	Gay parents	Lesbian parents	Single father	Single mother
<i>Full sample</i>						
Highschool grad	0.72	0.59	0.60	0.52	0.62	0.61
<i>Both parent high school grad</i>						
Highschool grad	0.75	0.68	0.64	0.55	0.67	0.65
<i>Never moved</i>						
Highschool grad	0.73	0.62	0.59	0.58	0.65	0.64
<i>Did move</i>						
Highschool grad	0.69	0.55	0.60	0.48	0.58	0.57

past 5 years.”<sup>34</sup> There is no qualitative difference in the estimates when using the different mobility controls.

Table 5 only reports the logit coefficient, its standard error, the odds ratio, and marginal effects, for the household type variables in order to keep the tables a reasonable size. The log of the odds ratio is the logit, which is a linear combination of the parameters and exogenous variables. The odds ratio is found by taking the exponential of both sides of the logit equation. The odds ratio has the nice property of an easy interpretation.<sup>35</sup> The marginal effect equals  $(\partial y/\partial x)$ , where  $y$  is the graduation rate and  $x$  is one of the right hand side variables.

The different columns result from different types of controls. Column (1) includes controls for child characteristics, and these include: province, visible minority, disabled, mobility, urban, age, family size, family income, female, and same race. Column (2) adds the parental education controls: did the mother/father graduate from high school, and did the mother/father have a graduate degree. Column (3) adds the parental marital status variables found in Table 2.

Before examining the results of Tables 5, some comment on the unreported results is warranted. Among the child characteristics, being disabled or having moved in the recent past reduces the odds of graduation (on average, to about 50 and 75 % respectively). Living in an urban area, being female, and having all family members the same race raises the odds of graduation (on average, by 30, 60, and 35 % respectively). Parental education matters a great deal: if the parents have

<sup>34</sup> Two mobility measures are used because of the important role mobility played in Rosenfeld (2010). He decided to restrict his sample by removing households that moved within the past 5 years. This procedure was also performed here. No qualitative difference was made in terms of the point estimates. Rather than controlling for whether or not the child had moved residences over the past one or 5 years, the regressions were also run controlling for whether or not the child changed census metropolitan areas over the past 1 or 5 years. No qualitative difference in the point estimates on type of household resulted, although they were estimated with more precision. All regressions cluster by province to provide robust standard errors.

<sup>35</sup> The key to interpreting the odds ratio is to compare it to the odds of 1 (equally likely). Hence, an odds ratio of 1.2 means that a unit change in an independent variable, others held constant, increases the chance of a positive outcome by 20 %.

**Table 4** Estimated population averages of other variables for children (weighted observations, children ages 17–22)

	Married parents	Common law parents	Gay parents	Lesbian parents	Single father	Single mother
<i>Child characteristics</i>						
% of total pop.	71.16	6.60	0.02	0.04	5.08	17.07
School attendance	0.76	0.67	0.73	0.68	0.64	0.69
Province	36.58	32.2	29.32	36.9	35.5	35.9
Visible minority	0.23	0.13	0.28	0.17	0.19	0.28
Disabled	0.06	0.06	0.13	0.08	0.08	0.09
Moved within 1 year	0.07	0.13	0.08	0.19	0.15	0.15
Moved within 5 years	0.24	0.38	0.39	0.60	0.42	0.44
Urban	0.78	0.74	0.72	0.91	0.79	0.88
Age	19.26	18.91	18.96	18.79	19.20	19.15
Family size	4.30	4.05	3.34	3.77	2.72	2.98
Female	0.48	0.45	0.43	0.54	0.41	0.47
Family income	119,172	95,656	91,357	88,600	68,473	49,874
Same race	0.99	0.98	1	1	1	1
Father HSG	0.81	0.70	0.94	0.93	0.73	na
Mother HSG	0.84	0.77	0.96	0.93	na	0.79
Father grad degree	0.08	0.03	0.05	0.08	0.05	na
Mother grad degree	0.04	0.02	0.00	0.04	na	0.03
<i>Parent's current legal marital status</i>						
Father married	1.00	na	0.45	0.20	0.03	na
Father divorced	0.00	0.38	0.40	0.37	0.44	na
Father separated	0.00	0.08	0.01	0.11	0.27	na
Father never married	0.00	0.51	0.13	0.32	0.14	na
Father widowed	0.00	0.03	0.01	0.00	0.12	na
Mother married	1.00	na	0.45	0.20	na	0.03
Mother divorced	0.00	0.40	0.24	0.22	na	0.43
Mother separated	0.00	0.09	0.01	0.05	na	0.24
Mother never married	0.00	0.47	0.29	0.52	na	0.17
Mother widowed	0.00	0.04	0.01	0.01	na	0.13
Estimated N	1,400,074	129,991	423	969	99,978	336,036

For gay and lesbian households the “father” is the survey respondent who self-identified as the household head

graduated from high school, the child is almost twice as likely to do so. Finally, marital history has the expected effects. Any marital disruption reduces the odds of a child graduating from high school.<sup>36</sup> For any given household type variable the odds ratio and level of statistical significance is generally robust to the different

<sup>36</sup> The odds are reduced to around 70–80 %, but keep in mind this variable contains measurement error.

**Table 5** Odds ratios of high school graduation (weighted observations, children ages 17–22, dependent variable: 1 if child graduated from high school controlling for moved within past year)

	(1)	(2)	(3)
<i>Gay parents</i>			
Coefficient	<b>-0.446</b>	<b>-0.618</b>	<b>-0.374</b>
Std. error	<b>(0.255)</b>	<b>(0.234)*</b>	<b>(0.191)*</b>
Odds ratio	<b>0.64</b>	<b>0.54</b>	<b>0.69</b>
Marginal effect	<b>-0.08</b>	<b>-0.13</b>	<b>-0.06</b>
<i>Lesbian parents</i>			
Coefficient	<b>-0.816</b>	<b>-0.925</b>	<b>-0.511</b>
Std. error	<b>(0.221)*</b>	<b>(0.240)*</b>	<b>(0.336)</b>
Odds ratio	<b>0.44</b>	<b>0.41</b>	<b>0.60</b>
Marginal effect	<b>-0.17</b>	<b>-0.19</b>	<b>-0.09</b>
<i>Common law</i>			
Coefficient	-0.466	-0.338	0.124
Std. error	(0.079)*	(0.066)*	(.111)
Odds ratio	0.63	0.71	1.13
Marginal effect	-0.09	-0.06	0.03
<i>Single mother</i>			
Coefficient	-0.661	-0.672	-0.471
Std. error	(0.041)*	(0.038)*	(0.123)*
Odds ratio	0.51	0.51	0.62
Marginal effect	-0.13	-0.13	-0.09
<i>Single father</i>			
Coefficient	-0.633	-0.685	-0.454
Std. error	(0.039)*	(0.039)*	(0.161)*
Odds ratio	0.53	0.50	0.63
Marginal effect	-0.13	-0.14	-0.09
Child controls	Yes	Yes	Yes
Parent education controls	No	Yes	Yes
Marital status controls	No	No	Yes
Pseudo R <sup>2</sup>	.21	.23	.23

The variables of interest are highlighted in bold

\* Significant at the 5 % level

specifications. That is, changing the controls does not change the parameter estimates for the association of graduation rates and household type in large ways.

Table 5 shows the associations between family type and child graduation. In all cases, the odds of a child with gay or lesbian parents completing high school are lower, by a considerable margin, compared to children of married opposite sex parents. For gay and lesbian households, adding the parental education controls to the base controls lowers the odds of a child graduating for same-sex families. This is because gay and lesbian homes are characterized by high levels of parent education which contributes to child graduation, and so conditional on this the odds of a child

graduating are even lower. When all controls are used, including those for parental marital status, the conditional graduation rate odds ratios are reasonably similar between the two types of same-sex couples: 0.69 for gays and 0.60 for lesbians using the 1 year mobility measure.<sup>37</sup> The difference between the two point estimates for gay and lesbian parents in column (3) is not significant. To put this in another context, the marginal effect on the probability of graduating for children of same-sex homes is a reduction of approximately 6–9 % points.<sup>38</sup> The point estimates for gay households are always statistically significant at the 5 % level, but the estimate for lesbian households in column (3) is not.<sup>39</sup>

Table 6 repeats the column (2) and (3) regressions of Table 5, but this time separating girls and boys. This table shows that the particular gender mix of a same sex household has a dramatic difference in the association with child graduation. Consider the case of girls first. Regardless of the controls and whether or not girls are currently living in a gay or lesbian household, the odds of graduating from high school are considerably lower than any other household type. Indeed, girls living in gay households are only 15 % as likely to graduate compared to girls from opposite sex married homes. In all cases for girls the estimates are measured with precision.

The point estimates for boys are considerably different. Looking at equation (4) in Table 6, boys in lesbian homes are 76 % as likely to graduate, while boys in gay homes are 61 % *more* likely to graduate compared to boys in opposite sex married homes. However, none of these estimates are statistically significant. The results from Table 5 mask this gender difference, and the significant effect found in Table 5 column (3) for gay households is clearly being driven by the strong daughter effect.

The different results for the household gender mix are fascinating, especially since this difference is not found in single parent households. Table 6 shows that boys do better than girls in single parent homes, but the difference is not nearly as pronounced as in same sex households. Looking at the unconditional graduation rates (with standard errors in parentheses) for gay households, sons achieve 0.72 (0.074), while daughters achieve 0.43 (0.090). For lesbian households, son's graduation rates are 0.48 (0.060), and daughter's have 0.55 (0.055). Based simply on these unconditional measures, sons do better with fathers, and daughters do better with mothers.

<sup>37</sup> They are also reasonably close to the unconditional estimated average graduation rates found in Table 3. The odds ratios are .71 and .64 for the 5 year mobility measure.

<sup>38</sup> The reported odds ratios are relative to children from opposite sex married parents. Compared to children of opposite sex cohabitating parents, the children of same-sex parents do even worse. This can be seen indirectly from Table 5. If cohabitating parents are the left out category, the odds ratio (standard error) for high school graduation from a gay home is 0.61 (0.132), and 0.53 (0.138) from a lesbian home—when all controls are used.

<sup>39</sup> In order to further test the idea that lower graduation rates for children of gay and lesbian parents may be the result of a negative environment, more controls were used for location. Rather than just control for the province of residence, in an alternative specification the census metropolitan area was also controlled for. For gay parents the odds ratio changes from 0.69 to 0.68 if the 1 year mobility control is used with all other controls, and remains unchanged if the 5 year mobility control is used. For lesbian parents the odds ratio changes from 0.60 to 0.57, and from 0.64 to 0.58 depending on the mobility control. These estimates have slightly lower standard errors.

**Table 6** Odds ratios of high school graduation (weighted observations, children ages 17–22, dependent variable: 1 if child graduated from high school controlling for moved within past year)

	Girls		Boys	
	(1)	(2)	(3)	(4)
<i>Gay parents</i>				
Coefficient	<b>-1.939</b>	<b>-1.860</b>	<b>0.225</b>	<b>0.476</b>
Std error	<b>(0.109)*</b>	<b>(0.244)*</b>	<b>(0.510)</b>	<b>(0.491)</b>
Odds ratio	<b>0.14</b>	<b>0.15</b>	<b>1.25</b>	<b>1.61</b>
Marginal effect	<b>-0.42</b>	<b>-0.40</b>	<b>0.04</b>	<b>0.08</b>
<i>Lesbian parents</i>				
Coefficient	<b>-0.913</b>	<b>-0.796</b>	<b>-0.883</b>	<b>-0.269</b>
Std error	<b>(0.165)*</b>	<b>(0.365)*</b>	<b>(0.441)*</b>	<b>(0.519)</b>
Odds ratio	<b>0.40</b>	<b>0.45</b>	<b>0.41</b>	<b>0.76</b>
Marginal effect	<b>-0.17</b>	<b>-0.14</b>	<b>-0.20</b>	<b>-0.06</b>
<i>Common law</i>				
Coefficient	-0.180	-0.072	-0.450	0.214
Std error	(0.053)*	(0.313)	(0.079)*	(0.109)
Odds ratio	0.83	0.93	0.64	1.23
Marginal effect	-0.027	-0.010	-0.099	0.042
<i>Single mother</i>				
Coefficient	-0.663	-0.672	-0.723	-0.371
Std error	(0.031)*	(0.350)	(0.049)*	(0.064)*
Odds ratio	0.55	0.51	0.48	0.68
Marginal effect	-0.099	-0.112	-0.160	-0.079
<i>Single father</i>				
Coefficient	-0.615	-0.761	-0.721	-0.274
Std error	(0.048)*	(0.379)*	(0.042)*	(0.092)*
Odds ratio	0.54	0.46	0.48	0.76
Marginal effect	-0.106	-0.113	-0.164	-0.058
Child controls	Yes	Yes	Yes	Yes
Parent education controls	Yes	Yes	Yes	Yes
Marital status controls	No	Yes	No	Yes
Pseudo R <sup>2</sup>	.26	.26	.21	.21

The variables of interest are highlighted in bold

\* Significant at the 5 % level

At this state, such a result is an interesting empirical finding, and one worthy of further investigation. On the one hand, it seems this result is inconsistent with any type of discrimination theory for the lower graduation rates among children of same-sex households. Or, a discrimination theory would have to be modified to include the household gender mix. Within the child development literature and pop culture, there is the belief that mothers and fathers provide different parenting inputs



that are not perfectly substitutable.<sup>40</sup> These results would be consistent with this notion, but further research is necessary to show any causality.

#### 4.2 School attendance

Any difference found in graduation rates may be the result of a selection bias—children of same-sex families may be less likely to attend school. In this section, school attendance is investigated. Table 7 reports on four logit regressions, where the dependent variable equals 1 if the child attended school between September 2005 to May 2006; that is, if the child was in school during the previous year. School attendance is mandatory in Canada until age 15, thus children between 17–22 who do not attend have either quit, been expelled, or graduated already. The structure of the first three regressions of Table 7 is the same as Table 5.<sup>41</sup> The last regression in column (4) controls for the gender mix of the household.

In terms of the odds ratios results for unreported controls, being disabled or moving residences both lead to a reduced chance of attending school, while being a visible minority, older, and urban increase the odds of attending.<sup>42</sup> Having a parent who graduated school significantly increases the odds of a child attending.

In terms of the odds ratios reported in the table, once all controls are in place, column (3) shows that each family type is more likely to have their children in school compared to married parents (the omitted category). Indeed, lesbian households are 23 % more likely, while gays are about 16 % more likely. None of the column (3) coefficients are statistically significant; that is, there is little statistical confidence in the difference between married opposite sex and other family types when it comes to child school attendance. Indeed, none of the odds ratios for any family type are statistically different from each other. The bottom line from Table 7 is that in terms of school attendance, a conclusion of “no difference,” between children of gay, lesbian, and married families is reasonable, and therefore, any difference in graduation rates is unlikely caused by a selection bias based on attendance.

<sup>40</sup> Within the literature, see Chrisp (2001), which addresses sons in lesbian homes. Within the popular culture, see *Modern Family*, Season 4, Episode 19, where the gay couple Cam and Mitchell decide their daughter Lily needs the input of aunt Gloria to discuss “girl issues.”

<sup>41</sup> For school attendance only the results for the 1 year mobility control are reported. The results for controlling for 5 year mobility were virtually identical. An unreported regression on primary school attendance found no difference between the different household types.

<sup>42</sup> It might seem odd that the effect of Age is positive. However, the dependent variable is 1 if the child ever attended school, or is now attending. Given that some students start school later than age 5, and that many children are home schooled in primary divisions, a positive effect of Age is expected. If the regression is run restricting the sample to students older than 12, the age effect is greatly removed. When the sample is restricted to various age ranges (e.g., starting at ages 6–12, or ending at ages 17–22, the odds ratios for the family type variables barely change at all and remain statistically indistinguishable.

**Table 7** Odds ratios of school attendance (weighted observations, children ages 17–22, dependent variable: 1 if child graduated from high school controlling for moved within past 5 years)

	(1)	(2)	(3)	(4)
<i>Gay parents</i>				
Coefficient	<b>-0.019</b>	<b>0.006</b>	<b>0.149</b>	
Std error	<b>(0.259)</b>	<b>(0.260)</b>	<b>(0.311)</b>	
Odds ratio	<b>0.980</b>	<b>1.05</b>	<b>1.16</b>	
Marginal effect	<b>0.004</b>	<b>0.009</b>	<b>0.034</b>	
<i>Daughter of gay parents</i>				
Coefficient				<b>0.166</b>
Std error				<b>(0.437)</b>
Odds ratio				<b>1.18</b>
Marginal effect				<b>0.038</b>
<i>Son of gay parents</i>				
Coefficient				<b>0.737</b>
Std error				<b>(0.287)*</b>
Odds ratio				<b>1.14</b>
Marginal effect				<b>0.031</b>
<i>Lesbian parents</i>				
Coefficient	<b>-0.020</b>	<b>-0.013</b>	<b>0.208</b>	
Std error	<b>(0.084)</b>	<b>(0.083)</b>	<b>(0.137)</b>	
Odds ratio	<b>0.979</b>	<b>0.986</b>	<b>1.23</b>	
Marginal effect	<b>-0.004</b>	<b>-0.003</b>	<b>0.047</b>	
<i>Daughter of lesbian parents</i>				
Coefficient				<b>0.277</b>
Std error				<b>(0.144)</b>
Odds ratio				<b>1.31</b>
Marginal effect				<b>0.063</b>
<i>Son of lesbian parents</i>				
Coefficient				<b>0.143</b>
Std error				<b>(0.250)</b>
Odds ratio				<b>1.15</b>
Marginal effect				<b>0.033</b>
<i>Common law</i>				
Coefficient	-0.179	-0.186	0.093	0.092
Std error	(0.042)*	(0.040)*	(0.076)	(0.076)
Odds ratio	0.835	0.829	1.09	1.09
Marginal effect	-0.043	-0.044	0.022	0.021
<i>Single mother</i>				
Coefficient	-0.106	-0.100	0.091	0.091
Std error	(0.025)*	(0.277)*	(0.076)	(0.076)
Odds ratio	0.898	0.904	1.090	1.090
Marginal effect	-0.025	-0.0249	0.021	0.021

**Table 7** continued

	(1)	(2)	(3)	(4)
<i>Single father</i>				
Coefficient	-0.213	-0.192	0.112	0.112
Std error	(0.036)*	(0.037)	(0.082)	(0.082)
Odds ratio	0.806	0.825	1.120	1.120
Marginal effect	-0.041	-0.046	0.026	0.026
Child controls	Yes	Yes	Yes	Yes
Parent education controls	No	Yes	Yes	Yes
Marital status controls	No	No	Yes	Yes
Pseudo R <sup>2</sup>	.11	.11	.12	.12

The variables of interest are highlighted in bold

\* Significant at the 5 % level

## 5 Conclusion

A casual reading of the literature on child performance would suggest that no-difference in child outcomes exists between children in same-sex or opposite-sex households. Indeed, the unanimous opinion of so many studies would appear conclusive—as noted by Justice Walker. However, a closer inspection reveals that there are really fifty-plus “preliminary” studies, and no general conclusion about child performance differences is warranted based on the literature. The samples used in these studies are often biased in some way, and the sample sizes are often very small. The one study that did use a large random sample and address a reliable performance measure (Rosenfeld 2010), turned out to draw the wrong conclusion, did not compare gay versus lesbian homes, did not examine the gender mix of the household, and did not control for parental marital status. As a result, there is little hard evidence to support the general popular consensus of “no difference.”

I have argued that the 2006 Canada census—though not perfect—is able to address most of these issues, and the results on high school graduation rates suggest that children living in both gay and lesbian households struggle compared to children from opposite sex married households. In general, it appears that these children are only about 65 % as likely to graduate from high school compared to the control group—a difference that holds whether conditioned on controls or not.<sup>43</sup> When the households are broken down by child gender it appears that daughters are struggling more than sons, and that daughters of gay parents have strikingly low graduation rates.

This paper confirms the findings of Allen et al. (2013), and taken together they cast doubt on the ubiquitous claim that no difference exists in child outcomes for children

<sup>43</sup> As mentioned, the census data has an imperfect measure of marital status. Those “currently married” could be divorced from an earlier marriage. Given the higher marriage rate for opposite sex couples, the estimated odds ratio on graduation rates for children of same-sex families may be biased *upwards*. The true effect may be larger and more troubling.

raised by same-sex parents compared to married opposite sex parents. That is, both the US census and Canada census show that children living with same-sex parents perform poorer in school when compared to children from married opposite sex families.

The question is: why? This study suggests further work is necessary to narrow down the source of this difference. This will require an exceptional data set that not only identifies sexual orientation of parents, but also has a retrospective or panel design to completely control for marital history. A better data set would also be able to test for the reasons behind any difference. An economist may be inclined to think that fathers and mothers are not perfect substitutes and that there must be some gains from a sexual division of labor in parenting. Others may suspect that children of same-sex parents are more likely to be harassed at school, and therefore, less likely to graduate. In any event, it is time to investigate the difference and reject the conventional wisdom of “no difference.”

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## Appendix

See Table 8.

**Table 8** Odds ratios of high school graduation (weighted observations, children ages 17–22, dependent variable: 1 if child graduated from high school controlling for moved within past 5 years)

	(1)	(2)	(3)
Gay parents	<b>0.66</b>	<b>0.55</b>	<b>0.71</b>
Marginal effect	<b>-0.08</b> <b>(0.208)</b>	<b>-0.13</b> <b>(0.132)*</b>	<b>-0.05</b> <b>(0.135)</b>
Lesbian parents	<b>0.47</b>	<b>0.42</b>	<b>0.64</b>
Marginal effect	<b>-0.16</b> <b>(0.085)*</b>	<b>-0.18</b> <b>(0.095)*</b>	<b>-0.08</b> <b>(0.205)</b>
Common law	0.65	0.73	1.17
Marginal effect	-0.09 <b>(0.208)*</b>	-0.06 <b>(0.048)*</b>	0.04 <b>(0.131)*</b>
Single mother	0.53	0.52	0.65
Marginal effect	-0.13 <b>(0.007)*</b>	-0.13 <b>(0.021)*</b>	-0.06 <b>(0.082)*</b>
Single father	0.55	0.51	0.66
Marginal effect	-0.14 <b>(0.012)*</b>	-0.13 <b>(0.021)*</b>	-0.06 <b>(0.106)*</b>
Child controls	Yes	Yes	Yes
Parent education controls	No	Yes	Yes
Marital status controls	No	No	Yes
Pseudo R <sup>2</sup>	.21	.23	.23

\* Significant at the 5 % level. z scores in parentheses

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