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Same-sex parent families and school progress of children: an association that disappeared over time

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Abstract

Previous research is divided as to whether children living in same-sex parent families achieve different outcomes compared to their peers. In this paper, we improve on earlier estimates of such differences and subsequently study whether and why the association between parental union sex-composition and children's school progress changed over time. Data from the American Community Survey waves 2008-2015 (N=1,952,490 including 7,792 children living with a same-sex couple) indicates that children living with same-sex couples were more likely to be behind in school in the past, but that this association disappeared over time. Changes in socioeconomic characteristics of same-sex couples played a minor role. In 2008, it was only in areas with unfavorable laws and attitudes toward same-sex couples that children living with same-sex couples were more likely to be behind in school. This was especially the case for adopted children. In more recent periods, no effect of parental union sex composition on school progress is observed within any area or among any group studied. Based on where and when these changes took place, it is suggested that changing attitudes toward same-sex couples might have played an important role in equalizing school progress across groups.

The aim of this article is to contribute to the debate on differences in child outcomes between children living with a parent in a co-residential same-sex relationship compared to children living with a parent in a co-residential different-sex relationship (Aldén et al. 2017; Allen 2013; Amato 2012; Manning et al. 2014; Marks 2012; Potter 2012; Potter and Potter 2017; Reczek et al. 2016; Regnerus 2012a,b). Some authors argue that children of parents in same-sex relationships perform worse on several outcomes (Allen 2013; Regnerus 2012a,b), whereas others argue that these differences disappear once accounting for the socioeconomic characteristics of families (Freeman Cenegy et al. 2018; Potter 2012; Potter and Potter 2017; Rosenfeld 2015).

A major part of the academic debate revolves around a study published in *Demography* on children's school progress using the 2000 United States Census (Rosenfeld 2010; 2013; Allen et al. 2013). The original study by Rosenfeld (2010) documented that children living with a biological parent in a stable same-sex relationship did not differ in their school progress from children living with a biological parent in a stable different-sex marriage. In a comment on the study, Allen and others (2013) argued that once sample restrictions are lifted based on family stability and on whether children have been adopted or not, children living with same-sex parents were on average more likely to be behind in school compared to their peers.

Rosenfeld make two contentions in a reply (2013). Firstly, that accounting for relationship stability is necessary to ensure the right causal order of events. Many same-sex unions with children are formed after the dissolution of a different-sex relationship. Previous research has repeatedly documented that the experience of a parental separation is related to children's outcomes (Amato 2010; Härkönen et al. 2017). The slower school progress of children living with same-sex couples could therefore be driven by effects of parental separations experienced

before the formation of parents' same-sex unions (Potter 2012; Potter and Potter 2017). Secondly, he argued that restricting the sample to biological children is justified by the disadvantages that adopted children of same-sex parents might have experienced before entering same-sex couples' families. For instance, same-sex couples are more likely to adopt disabled children (Brodzinsky 2003; Matthews and Cramer 2006).

Similar debates have emerged around studies on other child outcomes (Regnerus 2012b; Rosenfeld 2015). In most studies socio-economic characteristics explain differences between groups of children according to the sexual orientation or experiences of parents (Potter 2012; Potter and Potter 2017; Regnerus 2012b; Rosenfeld 2015). However, some studies argue that sexual orientation of parents does negatively relate to child outcomes (Allen 2013; Regnerus 2012b).

In this study, we contribute to this debate by employing recent data from the American Community Survey (ACS; 2008-2015) to investigate whether and why the association between parental union sex-composition and child progress at school has changed over time. Since 2000, the landscape for same-sex couple families has changed dramatically in the United States. Reproductive technologies and adoption are increasingly available to same-sex couples (Gates 2015), attitudes toward sexual minorities have become more permissive (Loftus 2001; Rosenfeld 2017) and marriage has become gradually available to same-sex couples across the country. Altogether, these changes might have augmented the stability of parents' relationships, lowered stigma-related family stress, and reduced bullying based on sex-composition of parents. Given that these factors are conducive of child development (Amato 2010; Bos 2013; Conger et al. 2010; Gartrell et al. 2005; Härkönen et al. 2017) the question arises to what extent the outcomes of children living with same-sex parents have changed over time too.

The first question answered in this paper is therefore: Are children living with a same-sex couple a disadvantaged group in terms of their school progress today? In this first part of our study, we update and improve on earlier estimates of differences in school progress by overcoming several obstacles to consensus that have persisted in the debate (Allen et al. 2013; Rosenfeld 2010; 2013; Watkins 2018). We use the largest sample of children living with same-sex couples in the United States employed so far, show how our conclusion of ‘no differences’ according to parental union sex-composition is not sensitive to accounting for socioeconomic characteristics today, and document how also among a large sample of adopted children no differences in school progress exist.

The second question of our study has not been addressed in previous research: Did the association between parental union sex-composition and school progress change over time, and if so, how could this be explained? The repeated cross-sectional nature of the data allows us to directly observe changes over time. This is important given the large standard errors of estimates produced in earlier research (Allen et al. 2013; Watkins 2018). We identify three major possible explanations for changes over time in the literature review: changes in socioeconomic characteristics of same-sex couple families, changes in the routes toward family formation, and changes in structural stigma and discrimination.

The analysis reveals that children living with same-sex parents were still significantly more likely to be behind in school in 2008 but that this association had disappeared by 2010. We find changes in socioeconomic characteristics to have played a minor but non-negligible role and do not find direct evidence that changes in family formation routes were important (but our data is limited in that regard). We do find some indications that structural stigma mattered. Children living with a same-sex couple in areas with unfavorable laws and attitudes toward same-sex

couples were more likely to be behind in school in 2008, especially those who were adopted by same-sex couples. The school progress of these groups of children became similar to that of others over time. Within more favorable contexts, few differences in school progress were observed already at the start of our observation window.

Child Outcomes and the Sex-Composition of Parents' Unions

Associations between the sex-composition of parents' unions and children's school progress could arise due to differences present prior to family formation (associations would then be spurious) and due to processes that take place after family formation (associations could then possibly reflect causal effects). In what follows, we briefly discuss what existing research leads us to expect about the importance of both categories of factors and how their role might have changed over time.

Selection into Same-Sex Couple Families

Families consisting of a same-sex couple and one or more co-resident children can differ from other families on many characteristics that pre-date the formation of the family. One clear difference is the process of family formation itself. Whereas different-sex parents usually start a family by giving birth to a common biological child, the most common routes for same-sex couples include the formation of a new relationship after the dissolution of a previous different-sex relationship, adoption, and (so far) to a lesser extent reproductive technologies (Gates 2015; Moore and Stambolis-Ruhstorfer 2013).

Given that a large share of same-sex couple families are formed after the dissolution of a different-sex relationship, many children living with same-sex parents will have experienced a family dissolution. Family structure transitions are associated with negative child outcomes (Amato 2010; Bernardi and Boertien 2016; Härkönen et al. 2017; Kim 2011) and could underlie differences in outcomes between groups of children. In line with this expectation, existing research has emphasized that descriptive differences in child outcomes disappear once accounting for the stability of family structures (Potter 2012; Potter and Potter 2017; Rosenfeld 2013; 2015).

Adoption is a second major route toward forming a family for same-sex couples, who are four times more likely to adopt as compared to different-sex couples (Gates 2013). Several studies have noted that same-sex couples experience some forms of discrimination within the adoption-system and are more likely to adopt children with special needs (Brodzinsky 2003; Farr and Patterson 2013; Matthews and Cramer 2006; Ryan 2000). An eventual negative association between parental union sex-composition and school progress among adopted children could in that case be driven by the higher prevalence of adoptees with special needs among same-sex couples.

Alternatives to adoption for same-sex couples include artificial insemination (for female same-sex couples) and surrogacy. Insemination creates the opportunity to co-reside with children from conception onward (Bos 2013). Children born through insemination are therefore less likely to have experienced a family structure transition as compared to other children of same-sex couples. The greater availability of reproductive options for female same-sex couples therefore makes it easier for them to form planned families compared to male same-sex couples (Stacey 2006).

There are reasons to expect the role of ‘pre-family formation’ factors to have changed over time. Firstly, as adoption and reproductive technologies have become more widely available to same-sex couples, relatively fewer children will have entered same-sex couple families after having previously lived within a different-sex couple family (Gates 2015). If family structure transitions that pre-date the formation of same-sex couple families are a main driver of differences in child outcomes (Allen et al. 2013; Regnerus 2012b; Rosenfeld 2015), differences between children living with same-sex and different-sex couples are likely to have declined with time. More generally, if families of same-sex couples increasingly follow a more planned trajectory (Biblarz and Stacey 2010), selection into these families based on socio-economic characteristics is likely to have changed too. For instance, if same-sex couples are more likely to wait until they are financially and emotionally ready to form a family (Goldberg et al. 2012), this could have benefited their children’s outcomes (Conger et al. 2010).

Effects of Living in a Same-sex Couple Family

There are characteristics specific to same-sex couple families that could causally affect child outcomes. Firstly, some authors have suggested that same-sex parents differ in their parenting styles from different-sex parents, and that children might need a parent of each sex because mothers and fathers teach different skills (Pruett 2000). Biblarz and Stacey (2010), however, found no strong empirical support for such a perspective. Secondly, same-sex families are subject to discrimination, stigma and encounter institutional obstacles (Meyer et al. 2008; Moore and Stambolis-Ruhstorfer 2013; Patterson 2017). Both the legal and social climate matter for the

well-being and outcomes of same-sex parents and their children (Oswald & Holman 2013; Hatzenbuelher 2011; Hatzenbuelher et al. 2009; 2014).

Institutional discrimination such as limited access to marriage can affect the likelihood that parents stay together as well as their economic resources. Married couples are less likely to break up as compared to cohabiting individuals (Heaton 2002; Raley and Wildsmith 2004). There is some evidence that the effects of marriage on stability are causal, possibly due to the benefits of going through a marital ritual together and social approval (Lyngstad & Jalovaara 2010). Qualitative research found increased couple commitment and perceived social approval among same-sex couples who married (Schecter et al. 2008). Married individuals also generate more income and accumulate more wealth in comparison to cohabiting individuals, possibly due to tax benefits, higher wages and increased incentives to save (Lersch 2017; Vespa-Painter 2011). Given that both economic resources and relationship stability positively predict child outcomes (Amato 2010; Conger et al. 2010) limited access to marriage might have negatively affected the outcomes of children living with same-sex parents.

A growing body of research has shown that the environment where same-sex couples live matters for stress within families and the well-being of both parents and children (Oswald & Holman 2013). For instance, the perception of unequal relationship-recognition by same-sex couples negatively affects their mental health (LeBlanc et al. 2018; Wight et al. 2013) and depression is more common among same-sex adoptive parents in states with an unfavorable legal climate for same-sex couples (Goldberg & Smith 2011). Such structural stigma also leads to more parenting stress among same-sex parents (Patterson 2017). The causal chain connecting family stress, parental mental health, and parenting to child outcomes has been documented in a large body of empirical research (Bradley & Corwyn 2002; Conger et al. 2010). Regarding same-

sex couple families specifically, there is evidence that the level of perceived stigma by same-sex parents is related to children's behavioral problems (Bos et al. 2004).

Children of sexual minority parents can also experience stigma directly by being teased about the sexual orientation of their parents (Gartrell et al. 2005). For instance, children who are teased about their parents being lesbian have lower self-confidence and increased behavioral problems (Bos 2013). Context matters in this regard given that children of lesbian mothers appear more resilient to stigma when they are attending a school that had LGBT issues included in the curriculum (Bos et al. 2008).

Resuming the possible ways in which parental union sex-composition can causally affect child outcomes, two competing scenarios regarding changes over time can be formulated. Pressures on same-sex couples and their children can be expected to decline as same-sex parents become more socially accepted and institutional discrimination weakens (Baunach 2012). Related reductions in family stress and bullying, as well as possible improvements in economic resources and union stability can improve the outcomes of children living with same-sex parents over time. On the other hand, if there is something inherent to being reared by a same-sex couple that negatively affects child outcomes, in other words, factors that are independent of social context, one would expect persistent negative associations across time.

Our Contributions

This article contributes to the literature by being the first to directly study changes over time in the association between parental union sex-composition and children's school progress. However, this article also contributes by overcoming several obstacles to consensus in the

general debate on child outcomes of children living with same-sex couples. In this regard, it is important to mention our contributions beyond a recently published article by Watkins (2018). Watkins used three of the eight years of data employed here (pooled 2012-2014 ACS data) and, congruent with our results, did not find any statistically significant differences in school progress between children of married different-sex couples and four categories of children living with same-sex couples (defined based on the marital status and gender of the parents).

We further improve on Watkins' estimates by addressing two important obstacles to consensus in the previous debate that remained unresolved in his study (Allen et al. 2013; Rosenfeld 2013). Firstly, we base our analysis on a considerably larger sample of children living with a same-sex couple as compared to both his and previous studies.¹ This is not a trivial point as part of the previous debate centered on sample size and the lack of precision of the estimates produced. For instance, one argument was that standard errors of previous estimates were so large that school progress of children living with same-sex parents did not differ in a statistically significant way from that of children from any other type of household. These other types of households included various traditionally disadvantaged groups of children who were considerably more likely to be behind in school as compared to children living with different-sex couples (Allen et al. 2013; but see Rosenfeld 2013). The large sample size of our study allows us to produce more precise estimates that enable us to show that children living with same-sex couples perform better (in a statistically significant way) as compared to several disadvantaged groups such as children living with never married single parents. We also provide large sample estimates of differences in school progress among adopted children, and show how children adopted by same-sex couples

¹ We study 7,792 children living with same-sex couples, whereas Watkins' sample included 4,430. However, Watkins consistently studies four subsamples and ends up comparing at most 1,613 children living with a same-sex couple at a time.

are no more likely to be behind school as compared to children adopted by different-sex couples. The inclusion of adopted children in the sample therefore does not affect general conclusions; another important point of debate (Allen et al. 2013; Rosenfeld 2013)

Secondly, a main obstacle to consensus in earlier research was that conclusions differed dramatically depending on several methodological choices made (Allen et al. 2013; Regnerus 2012b; Rosenfeld 2013; 2015). These methodological choices included whether to account for socioeconomic characteristics and other factors such as parents' relationship stability. Given that these characteristics could both be sources of endogeneity but could also mediate the relationship between parental union sex-composition and child outcomes, their inclusion was an important source of debate. We show how today the conclusion of 'no differences' between children living with different-sex and same-sex couples is reached regardless of whether one applies sample restrictions or controls for socioeconomic characteristics.

Data and Method²

We employ data from the American Community Survey (ACS) covering the years 2008-2015 (N = 1,952,490).³ Our focus is on children who co-reside with a same-sex or different-sex couple. Due to data limitations, we can only consider children whose biological, step or adoptive parent was considered head of household (i.e. the person who rented or owned the house, if none applied any adult living in the household was chosen). We exclude foster children and children living in group quarters. Children living with single parents are excluded from the main analysis, but serve as comparison groups in additional models.

² Code (STATA) used for data management and analysis is available in the online appendix.

³ Accessed through IPUMS, Ruggles et al (2017).

We select all children aged between 8 and 16 to minimize the influence of moving out of the parental home (as co-residence is necessary to measure the key variables of the analysis).⁴ The resulting final sample size of our study is 1,952,490, of which 0.39% (7,792 children) lived with a parent in a co-residential same-sex relationship. This share hovered between 0.35% and 0.40% until 2011, and subsequently increased to 0.58% in 2015.⁵

Parental Union Sex-composition

The sex-composition of the adult couple dyad is used to identify different- and same-sex couple families.⁶ The identification of same-sex couples in such a way is not without its problems, as even uncommon coding mistakes among different-sex couples can lead to a non-negligible number being marked as same-sex couples (Cheng and Powell 2015). We therefore manually screen a subsample of the data (100 random same-sex couple families, plus cases with extreme values on parental age, number of siblings, and household members). In this respect, most miscoding possibilities are found in multi-generational households.⁷ Because we cannot be certain which cases are miscoded and which ones are not, we retain children living in multi-generational households in the analysis but perform robustness checks excluding all multi-

⁴ In additional analysis we also exclude children aged 16, results are robust and available upon request. The maximum age of respondents included in Watkins (2018) was 21, likely explaining his higher estimates of being behind in school.

⁵ Gates (2013) reported that approximately 0.3% of all children under age 18 lived with a same-sex couple at the time of the 2010 US census, a number we also approach when lifting sample restrictions based on family structure (i.e. 0.31%).

⁶ The questions asked about sex and individuals' relationship to the household head are consistent across the 2008-2015 ACS waves.

⁷ The household roster questionnaire of the ACS is based on ticking a box for each member regarding their relationship to the household head. One of the options is 'unmarried partner'. We suspect that on several occasions household members marked as being an 'unmarried partner' of the head of household, were in fact an unmarried partner of another household member. For instance, in a 2009 household, the head of household was an 83-year old woman, living with her 53-year old daughter, and 20-year old grandson. A 21-year old female living in the household was marked as the unmarried partner of the 83-year old head of household, but was probably the partner of her grandson.

generational households (Models 3 and 4 of Table 2). For these robustness checks, we also exclude cases where a parent's sex or the relationship between parent and partner was allocated by the ACS or IPUMS, and might therefore have been more susceptible to miscoding (Gates and Brown 2015; Watkins 2018).

Our Outcome Variable: Timely School Progress

The child outcome studied here is timely school progress. Children can be held back a grade in school if they are considered to not have mastered grade-level material (Andrew 2014). Grade retention is related to various other child and adult outcomes such as psychological well-being (Jimerson and Ferguson 2007) and academic and labour market outcomes (Eide and Showalter 2001; Stearns et al. 2007). The determinants of being retained in school include many of the previously discussed mechanisms such as socioeconomic resources (Yang et al. 2018), peer relationships with other pupils (Caennerer & Keith 2015) and the experience of single parenthood (Andrew 2014).

Since 2008, the ACS provides data on the exact grade completed/attended by children, increasing the accuracy of the measure compared to the 2000 Census where grades were grouped into two categories (Rosenfeld 2013). School progress is measured based on current age and the highest grade completed by children. Children attending a given grade usually have one of two ages. We mark children as being behind in school if they are at least one year older than the usual two ages of attendance, and still have not completed the corresponding grade. A child aged eight who has completed grade one is therefore 'on track' whilst a child aged eight who has not

completed grade one is ‘behind in school’.⁸ Note that given the age range selected, children might have already experienced delays in the school system before our observation window (i.e. children who are 16 in 2008 had already started school in 1996 and could have fallen behind in school anytime between 1996 and 2008).

Being behind in school could reflect one of two processes. Firstly, children might be held back a grade due to poor school performance. Secondly, parents can purposefully delay the entry of their child into school (‘redshirting’) to increase ‘school readiness’. The school grades of children who are ‘redshirted’ are comparable to that of their peers who enter school normally, whereas children who are retained perform at lower academic levels (Graue and DiPerna 2000). An estimated 4% to 5.5% of children experience delayed school entry (Bassok and Reardon 2013), whereas around 10% to 30% of children are retained during their school career (Frederick and Hauser 2008). Frederick and Hauser (2008) found that 80% of children marked as being behind in school based on information on age and grade attended were retained at some point during their school career. We have nonetheless performed a robustness check to monitor the possible influence of redshirting on our conclusions by excluding children who were born in the third quarter of the year (i.e. from July to September) and therefore most likely to be redshirted. These results are displayed in Online Appendix A.⁹

Grade retention rates have been falling in the mid-2000s (Warren et al. 2014), and this might have reduced differences in grade retention between groups. Figures B2 and B3 in the Online

⁸ We therefore underestimate the amount of children being behind in school. In a normal course of events a subgroup of children will complete grade 1 at age 7 (depending on their birthdate). If children from this particular group are retained in grade 1 and interviewed after retention but before they turn 8, they will not be identified as being behind in school.

⁹ We also interacted quarter of birth with living with a same-sex couple and did not find differences in effects across quarter of birth, which is what one would expect if same-sex couples were more or less likely to ‘redshirt’ their children.

Appendix show how in our sample the share of children estimated to be behind in school hovered around 2.9% from 2008 to 2011 and subsequently dropped to 2.6% in 2015. The same pattern can be observed regarding socioeconomic differences in school progress. For instance, differences in the probability of being behind in school according to maternal education were stable until 2011 (a difference of around 2.6% percentage points) and somewhat declined after that (to a 2.2% difference). We return to this issue in the results section.

Sub-Samples Studied

A drawback of the ACS data is that due to the contemporaneous measurement of school progress and parental union's sex-composition, children who are observed to be behind in school might have been retained before they started to live within the current family (composition). We therefore also look at a subsample of children for whom we can reasonably assume that in the great majority of cases grade retention occurred after the current family composition took shape: Children aged 8 in households where the child, parent and partner all lived in the same home for at least one year.¹⁰

We also focus on the sub-sample of adopted children which are identified based on the reported relationship between the head of household and the child (resulting in 58,656 adopted children; 1,182 lived with same-sex couples). Given that we do not know the relationship to the partner of the child's parent, it could be that some children are jointly adopted by the parent and her or his partner, whereas other children could have been adopted by, for instance, a step-parent. The Current Population Survey (CPS) does provide information on the relationship of the child to the

¹⁰ We also exclude children aged 8 born in July-September, as the share of red-shirted among those behind in school might be larger for this age group.

‘father’ and ‘mother’, and additional analysis using the CPS indicated that in 84% of the cases where the child was adopted by the head of household, the head’s (different-sex) partner was also an adoptive parent of the child.¹¹ The lack of information on the relationship between children and the partners of their parents also prevents us from looking at other sub-samples of interest. For instance, step-children can be identified as such if the head of household is the step-parent, but not if the partner of the biological parent is the step-parent.

Demographic, Socioeconomic, and Structural Stigma Variables

Several additional variables are included in part of the analysis; many of which are related to both parental union sex-composition (Moore and Stambolis-Ruhstorfer 2013) and grade retention (Yang et al. 2018): logged equivalized household income (in 1999 dollars)¹²; the highest level of education observed for the parent(s) or her/his partner (No Qualifications/High School/Some College/Degree); census region and division; highest age of the parent or his/her partner; number of siblings (which might dilute parental resources, Steelman et al. 2002; top-coded at 6 siblings); a dummy for whether the child lives with a household member who is not a sibling or parent (which might dilute parental resources, but also provide them; 1 = yes); four dummies for whether children have a given disability (1) or not (0); sex and ethnicity (Black/Native/Asian/Hispanic/Other/White) of the child.

We complement the analysis with information on attitudes toward same-sex marriage in a household’s area. Since 2004, the General Social Survey (GSS) asks respondents to what extent

¹¹ In the CPS, the relationship to each parent is asked of respondents, but in the publicly available data this is recoded into the relationship to the father and mother, preventing us from calculating this percentage for same-sex couples.

¹²Equivalized through dividing household income by the square-root of the number of household members.

they agree with the statement “Homosexual couples have the right to marry one another” on a scale ranging from 1 (strongly agree) to 5 (strongly disagree). A household’s area was defined by dividing the 9 census regions into two categories based on whether the household was located in one of the 112 largest Standard Metropolitan Statistical Areas (both central cities or suburbs) or not. Using the GSS, the average answer to the above question was calculated for each of these 18 ‘geographical areas’ and year (using sample weights).¹³¹⁴

Sample Description

Table 1 provides descriptive statistics for the sample split by parental union sex-composition. Around 70% of children co-residing with a same-sex couple live with two women. Children of same-sex couple families are relatively similar to children of different-sex couple families, but have fewer siblings, more non-nuclear family members in the household, and are ethnically more diverse. They are also more likely to be the adopted or step child of the head of household. Among adopted children, those who live with a parent in a same-sex relationship are the most likely of all groups to have a reported disability, live in households with higher income, and have higher educated parents. A comparison of region of residence (not shown) indicated that children

¹³ The GSS data was only available on a biannual basis. Regional attitudes therefore either refer to the current or to the previous year. Figures E1 and E2 in the Online Appendix display distributions of these measures.

¹⁴ The GSS is designed to be representative on the national level, but might not necessarily be so for our area measure. Previous research has shown that calculating averages on the state-level based on GSS data produces relatively good indications of state-level attitudes (Brace et al. 2002). State identifiers were not available in (the publicly available) version of the GSS data. Given that census divisions aggregate states into larger categories, we are less concerned about the representativeness of the GSS data on the regional level. However, this is less clear for our division of each region into metro/non-metro areas. We therefore followed Brace and others’ (2002) procedure to investigate the representativeness of the GSS to these 18 areas. We correlated the share of college educated and Black persons in each area and year based on the GSS with the corresponding numbers calculated using the ACS. Correlations were high (0.63 & 0.83; Brace and others reported 0.77 & 0.93 for education and ethnicity respectively; once only using region we found correlations of 0.80 & 0.94) reducing concerns that the GSS is not representative for the areas used in the paper. We nonetheless produce results based on regional data only too (See Online Appendix E).

adopted by same-sex parents are relatively more likely to live in the Pacific, and less likely to live in the South as compared to other adopted children.

Table 1. Descriptive statistics for various sub-samples (averages/shares)

	All Children Living With A Partnered Parent		Adopted Children	
	Dif. Sex	Same-sex	Dif. Sex	Same-sex
Behind in school	.028	.031	.046	.041
Head of household female	.402	.703**	.329	.703**
Highest age among parent/parent's partner	43.8	43.9	48.9	49.8**
Child's age	12.0	12.0	12.0	11.6**
Child male	.488	.482	.526	.431**
Equiv. Household Income (<i>in 1999 dollars</i>)	35,592	35,632	38,347	55,211**
Number of siblings of child	1.64	1.48**	1.59	1.44**
Non-parent/non-sibling lives in household	.082	.149**	.102	.152**
Average disapproval toward same-sex marriage in area	-0.03	-0.17**	0.02	-0.41**
State where same-sex marriage is legal	.245	.276**	.214	.376**
<i>Child's Disabilities</i>				
Cognitive difficulties due to disability	.032	.059**	.096	.119**
Serious difficulty walking/climbing stairs	.005	.008**	.010	.012
Difficulty washing/bathing	.008	.011**	.016	.027**
Vision or hearing difficulty	.011	.016**	.018	.026
<i>Highest Education among Parent/Partner</i>				
No Qualifications	.069	.042**	.036	.013**
High School	.220	.212	.195	.080**
Some College	.266	.295**	.265	.149**
Bachelor degree or higher	.445	.451	.504	.758**
<i>Ethnicity of Child</i>				
Black	.080	.145**	.118	.151**
Native	.008	.013**	.018	.017
Asian	.054	.037**	.108	.084**
Hispanic	.142	.129**	.109	.105
Other	.103	.122**	.109	.186**
White	.613	.554**	.538	.457**
<i>Variables Used to Restrict Sample (shares indicate part of total unrestricted sample)</i>				
Head of household biological parent of child	.908	.725**	0	0
Head of household adoptive parent of child	.028	.145**	1	1
Head of household step-parent of child	.064	.130**	0	0
Low-quality sex/relationship measure parents	.001	.022**	.001	.010**
Child living in multi-generational household	.048	.058**	.061	.073
Residentially Stable, Aged 8 and not born in 3 rd quarter	.073	.063**	.068	.095**
<i>N</i>	1,944,698	7,792	57,474	1,182

Note: American Community Survey 2008-2015; Person sample weights included; only includes children whose parent is head of household and has a co-residential partner. Numbers starting with a period are shares. ** p < 0.01;

* p < 0.05 p-values for statistically significance of average differences between different-sex and same-sex couples.

Excludes foster children, children living in group quarters and children living with a single parent.

Procedure

The analysis consists of Logistic Regression Models explaining school progress.¹⁵ In the main text we report results expressed as odds ratios; average marginal effects are displayed in Online Appendix C and D. All models include sample weights.

Results

We commence the analysis by describing general differences in school progress between children living with a same-sex couple and children living with a different-sex couple. Model 1 of Table 2 displays how, across the whole period studied, the odds of being behind in school were 11 percent higher for children living with a same-sex couple as compared to their peers.¹⁶ This difference is not statistically significant (the 95% confidence interval ranged from 0.95 to 1.31). The same conclusion holds once accounting for socio-economic characteristics in Model 2. Models 3 and 4 replicate these results once excluding children that have an increased probability of having been miscoded as living with a same-sex couple; again only small and statistically insignificant differences are observed.

Models 5 and 6 present results for a subsample of children for whom it can be reasonably assumed that most grade retentions took place after the child started living with the current parents: children aged 8 who lived with the same parents for at least one year. Again, only small and statistically insignificant differences are observed according to parental union sex-

¹⁵ Using STATA's *logistic* procedure with the cluster option (by household id)

¹⁶ The corresponding marginal effect is 0.3 percentage points (Online Appendix C).

composition.¹⁷ Previous research noted that differences in school progress might be especially pronounced among adopted children (Rosenfeld 2013). Models 7 and 8 reveal that also among the subsample of adopted children no differences exist in school progress.

Table 3 compares school progress across more detailed family-types and adds children living with single parents to the analysis temporarily (i.e. these are not included in previous or later models). Children living with a same-sex couple were less likely to be behind in school compared to children living with a single father or mother. The sample size of the Census 2000 was criticized because no statistically significant differences were found between biological children living with a parent in a stable same-sex union and any other family type (Allen et al. 2013; but see Rosenfeld 2013). Here, however, most differences with single parent families were statistically significant at the 5% level. Results were very similar for male and female same-sex couple families.

¹⁷ Once also including children aged 9, for whom it is also likely that grade retentions took place after the current family composition took shape, odds ratios were robust: 1.00 (only controlling for age) and 0.99 (with all controls) respectively (based on 1,019 children living with a same-sex couple; not shown).

Table 2. Logistic Regression Models explaining being behind in school; Odds ratios (Standard errors)

	Sample							
	All children living with a partnered parent		Excluding possible miscodes & multi-generational households		Children aged 8, living with a partnered parent & residentially stable		Adopted children living with a partnered parent	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Living with Same-Sex Couple (Ref. Living with Different-Sex Couple)	1.11 (0.09)	1.04 (0.09)	1.06 (0.09)	0.99 (0.09)	1.20 (0.44)	1.04 (0.35)	0.95 (0.19)	1.00 (0.19)
Maximum age among parents		0.99** (0.00)		0.99** (0.00)		1.00 (0.00)		1.01* (0.00)
Number of own siblings		1.25** (0.01)		1.24** (0.01)		1.53** (0.03)		1.30** (0.03)
Non-sibling/parent in household		1.44** (0.03)		1.52** (0.04)		1.94** (0.14)		1.36** (0.11)
Max. education parents (Ref. = No Qualifications)								
High school		0.64** (0.01)		0.63** (0.01)		0.86 (0.07)		0.56** (0.07)
Some college		0.46** (0.01)		0.46** (0.01)		0.73** (0.07)		0.50** (0.06)
Bachelor or higher		0.31** (0.01)		0.31** (0.01)		0.59** (0.05)		0.49** (0.06)
Ln(Household income)		0.86** (0.00)		0.86** (0.00)		0.93** (0.02)		0.87** (0.02)
N (living with same-sex couple)	1,952,490 (7,792)		1,857,125 (7,128)		140,144 (483)		58,656 (1,182)	

Note: American Community Survey 2008-2015; All samples only include children whose parent is head of household and has a co-residential partner; foster children are excluded. Standard errors between brackets, clustered by household id. Person sample weights included. *Models 1 & 2*: All children living with a partnered parent. Model 1 controls for age and year; Model 2 controls for age, year, region, sex, disabilities and ethnicity. *Models 3 & 4*: Sample of Models 1 & 2 but excluding children living in multi-generational households and cases where 'data quality' for parents' sex and relationship was low. Model 3 controls for age and year; Model 4 controls for age, year, region, sex, disabilities and ethnicity. *Models 5 & 6*: Sample of Models 1 & 2 restricted to all children aged 8 who live

with a partnered parent, are not born in July-September, and who already lived in the same home and with both parent/parent's partner one year before measurement. Model 5 controls for age and year; Model 6 controls for age, year, region, sex, disabilities and ethnicity. ** p < 0.01; * p < 0.05; Ref. = Reference category. *Models 7 & 8:* Sample of Models 1 & 2 restricted to children adopted by head of household. Model 7 controls for age and year; Model 8 controls for age, year, region, sex, disabilities and ethnicity.

Table 3. Logistic Regression Models Explaining Being Behind in School

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
	<i>OR</i>	<i>OR</i>	<i>OR</i>
<i>Parental Union Type</i>			
Same-sex couple	Ref.	.	.
Male Same-sex couple	.	Ref.	.
Female Same-sex couple	.	.	Ref.
Different-sex couple	0.90 (0.07)	0.80 (0.11)	0.95 (0.10)
Single father, ever married	1.18† (0.10)	1.04 (0.15)	1.24* (0.13)
Single father, never married	1.84** (0.18)	1.63** (0.24)	1.94** (0.22)
Single mother, ever married	1.20* (0.10)	1.07 (0.15)	1.27** (0.13)
Single mother, never married	1.99** (0.17)	1.77** (0.25)	2.10** (0.22)
Constant	0.035** (0.003)	0.039** (0.005)	0.033** (0.003)
<i>N</i> (living w. same-sex)	2,511,498 (7,792)	2,506,071 (2,365)	2,509,133 (5,427)

Note: Ref. = Reference category. OR = Odds ratios. Standard errors between brackets, clustered by household id. Person sample weights included. Year dummies and age included but not shown. 'Ever married' include single parents who indicated being separated, divorced, or widowed. Sample includes children living with a (biological, step, or adoptive) single parent as well as children living with a (biological, step, or adoptive) partnered parent; excludes foster children and children not living with a parent/whose parent is not head of household. † $p < 0.10$ ** $p < 0.01$; * $p < 0.05$.

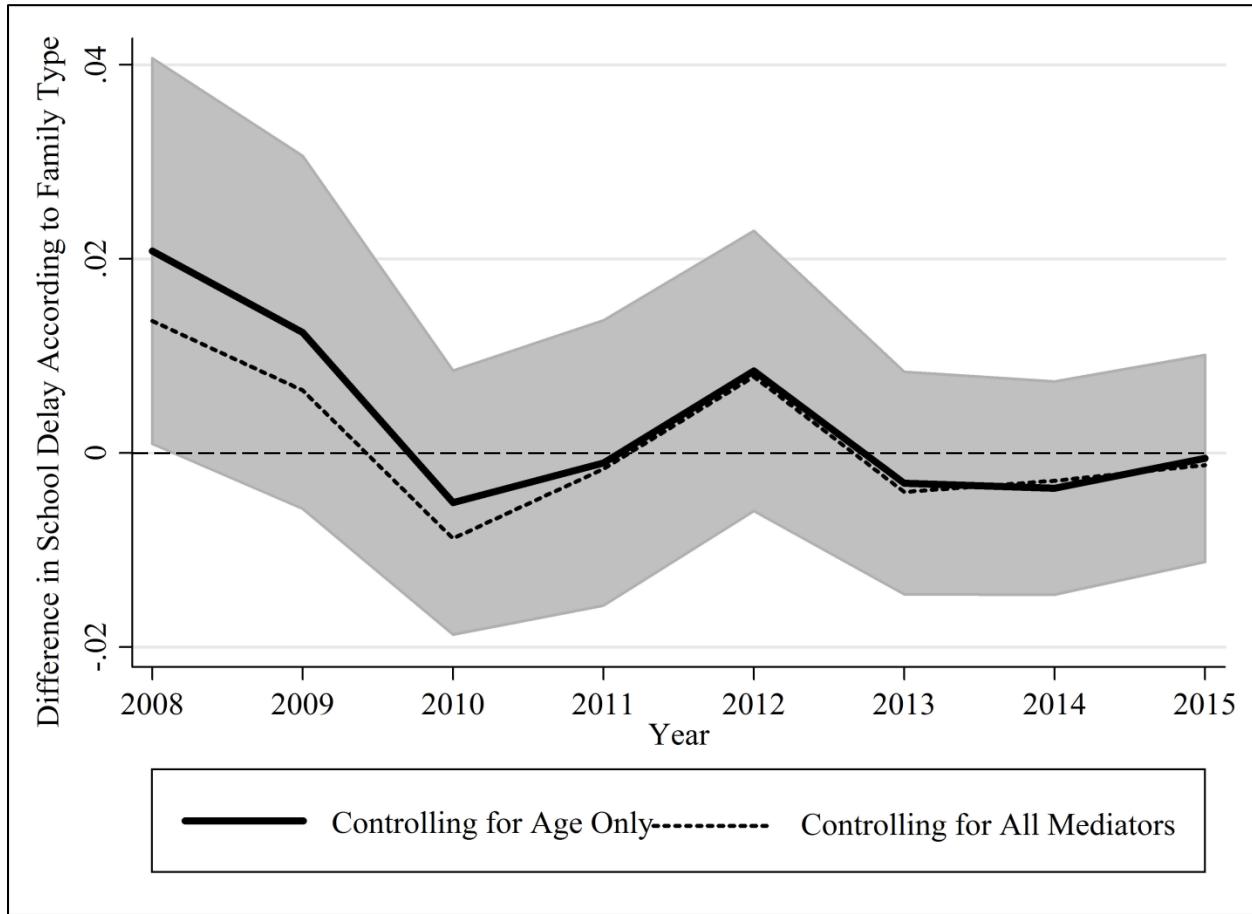
Changes over Time

Previous research found differences in school progress according to parental union sex-composition when either not restricting the sample to biological children living in stable families (Allen et al. 2013) or once not controlling for socio-economic characteristics (Rosenfeld 2010). That our results hold regardless of controls included and sample restrictions applied does not only overcome an important point of debate, it also suggests that the overall association between parental union sex-composition and school progress has changed over time. Figure 1 shows that this indeed happened between 2008 and 2015. The thick solid line of Figure 1 reflects the difference in the average predicted probability of being behind in school between children living with a same-sex couple and children living with a different-sex couple. In 2008 the probability of being behind in school was 5.1% for children living with a same-sex couple, as compared to 3.0% for those living with a different-sex couple. This corresponds to the 0.021 difference observed in Figure 1 (95% confidence interval: 0.001 – 0.040). Additional analysis based on logistic regression estimated the corresponding odds ratio of being behind in school to be 1.74 (95% confidence interval ranges from 1.15 to 2.60).

These initial differences observed in 2008 disappeared within a few years. Already in 2010 only 2.4% of children living with a same-sex couple was predicted to be behind in school compared to 2.9% of children living with a different-sex couple (corresponding to a difference of -0.005; 95% confidence interval ranged from -0.018 to 0.008). These changes hence took place before rates of being behind in school dropped in the sample overall (i.e. after 2011; see Online Appendix B). Table D1 in Online Appendix D shows how this change over time was statistically significant for

most years after 2009. This holds for both male and female same-sex couples, even though patterns are slightly less clear for the former.

Figure 1. Difference in the probability of being behind in school between children living with a same-sex couple and their peers living with a different-sex couple



Note: Lines indicate ('average predicted probability of being behind in school for children living with same-sex couple' – 'average predicted probability of being behind in school for children living with a different-sex couple'). Predicted probabilities are based on logistic regression models controlling for age. Only includes children whose parent is head of household and has a co-residential partner; foster children are excluded. Solid line based on Model 1 of Table D1 in the Online Appendix only controlling for age. Grey region indicates 95% confidence interval for solid line only. Variables included for the dashed line: parental age, number of siblings, presence of non-parent/sibling in the household; child's sex, ethnicity, and disabilities; region, family income and highest parental education. Sample weights included.

Figure 1 also displays an additional dashed line of predicted school progress once controlling for child and family characteristics, family income and parental education. Variables that partly explain changes over time in the effect of parental union sex-composition on school progress include number of siblings, parental education, and to a lesser extent, ethnicity and disabilities (See Table D2 in the Online Appendix).¹⁸ Most of the changes over time, however, remain unexplained.

The odds ratio of being behind in school for children living with a same-sex couple was 1.48 in 2008 after controls were included (not shown). The most comparable estimates based on the Census 2000 indicated that the odds of making normal progress through school were 35% higher for children living with a married different-sex couple as compared to those living with a different-sex couple after controlling for socioeconomic characteristics (Allen et al. 2013). That our estimate for 2008 is slightly higher compared to numbers from 2000 might indicate that the association increased temporarily. However, these different estimates are likely due to sampling error or because measurement error in the dependent variable was greater for the Census 2000, which might have biased coefficients downward.

Where and For Whom Did School Progress Change?

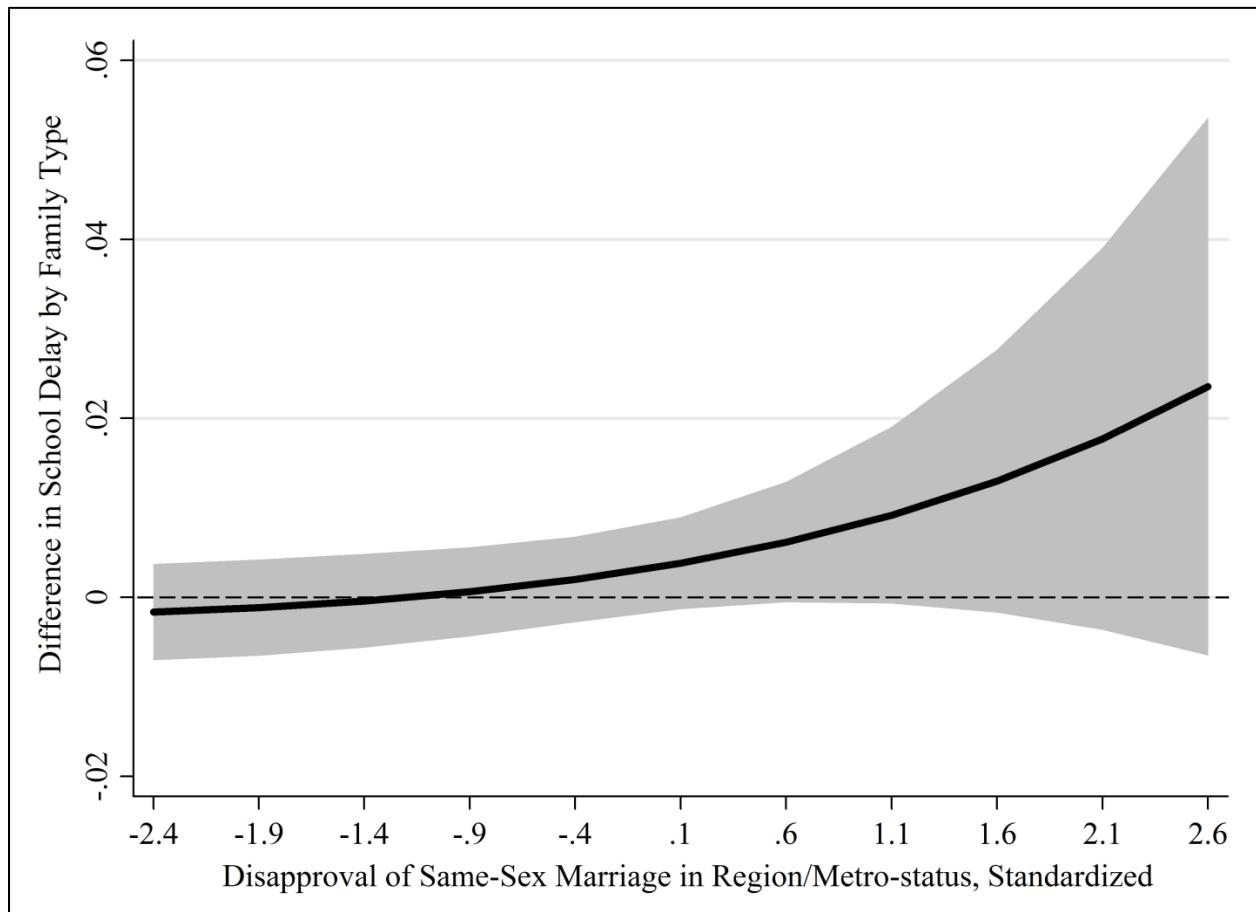
Besides changes in socioeconomic characteristics, two major explanations for a possible decline over time in the association between parental union sex-composition and child outcomes were

¹⁸ Whereas children of same-sex couples had more siblings and less educated parents compared to their peers in different-sex couple families in 2008, they had less siblings and more educated parents compared to their peers by the end of the observation period (Online Appendix C2). Changes in income appear unlikely to have mattered as income was slightly lower among same-sex couples until 2013, and only equalized in 2014 due to increases in income among dual-male couples (See Figures B4 and B5 in the Online Appendix).

offered in the literature review: a weakening of institutional discrimination and stigma, and the expansion of ‘new’ family formation routes. Even though properly testing for these two possibilities goes beyond the scope of this article, we examine variation across subgroups and geographical areas to place our results into the context of these two possible explanations.

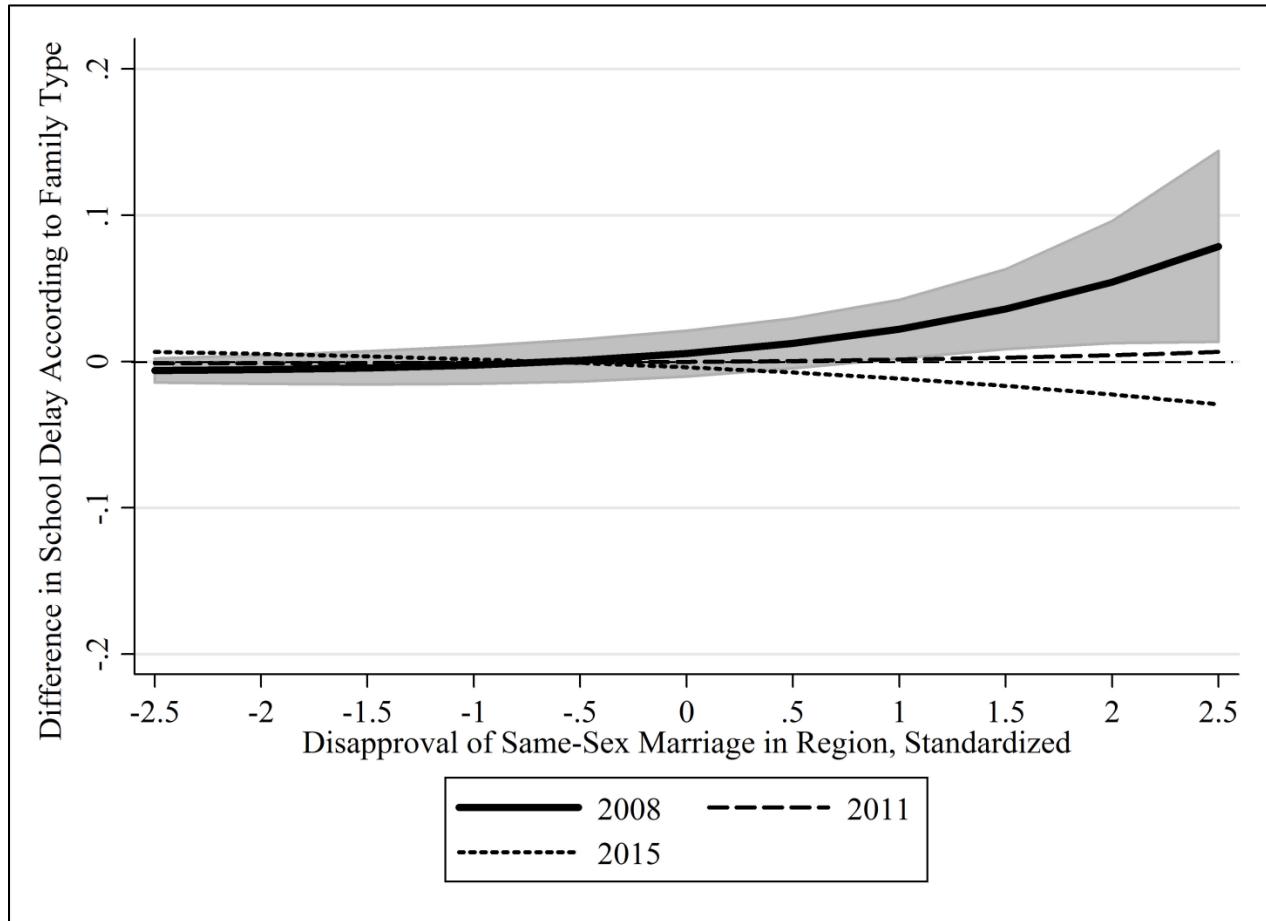
Firstly, we document differences in school progress according to structural stigma in a household’s area. To measure structural stigma (Link and Phelan 2001), we use data from the GSS to calculate the average approval of same-sex marriage in a household’s area. An inspection of trends in these values confirms an increasing approval of same-sex marriage over time (See Figure E5 in the Online Appendix; see also Rosenfeld 2017). Figure 2 shows that these changes have possibly been important as only children living with same-sex couples in places with low approval of same-sex marriage were more likely to be behind in school as compared to their peers living with different-sex couples. These differences across areas in the effect of parental union type are, however, not statistically significant (See Table E1 in the Online Appendix). Figure 3 shows how this interaction effect changed over time. In the beginning of the observation period, children of same-sex couples living in areas disapproving of same-sex marriage were more likely to be behind in school compared to their peers (statistically significant at the 5% level). However, for more recent years no differences in school progress according to parental union sex-composition are observed anywhere.

Figure 2. Differences in the probability of being behind in school between children living with same-sex and different-sex couples according to disapproval toward same-sex marriage in area



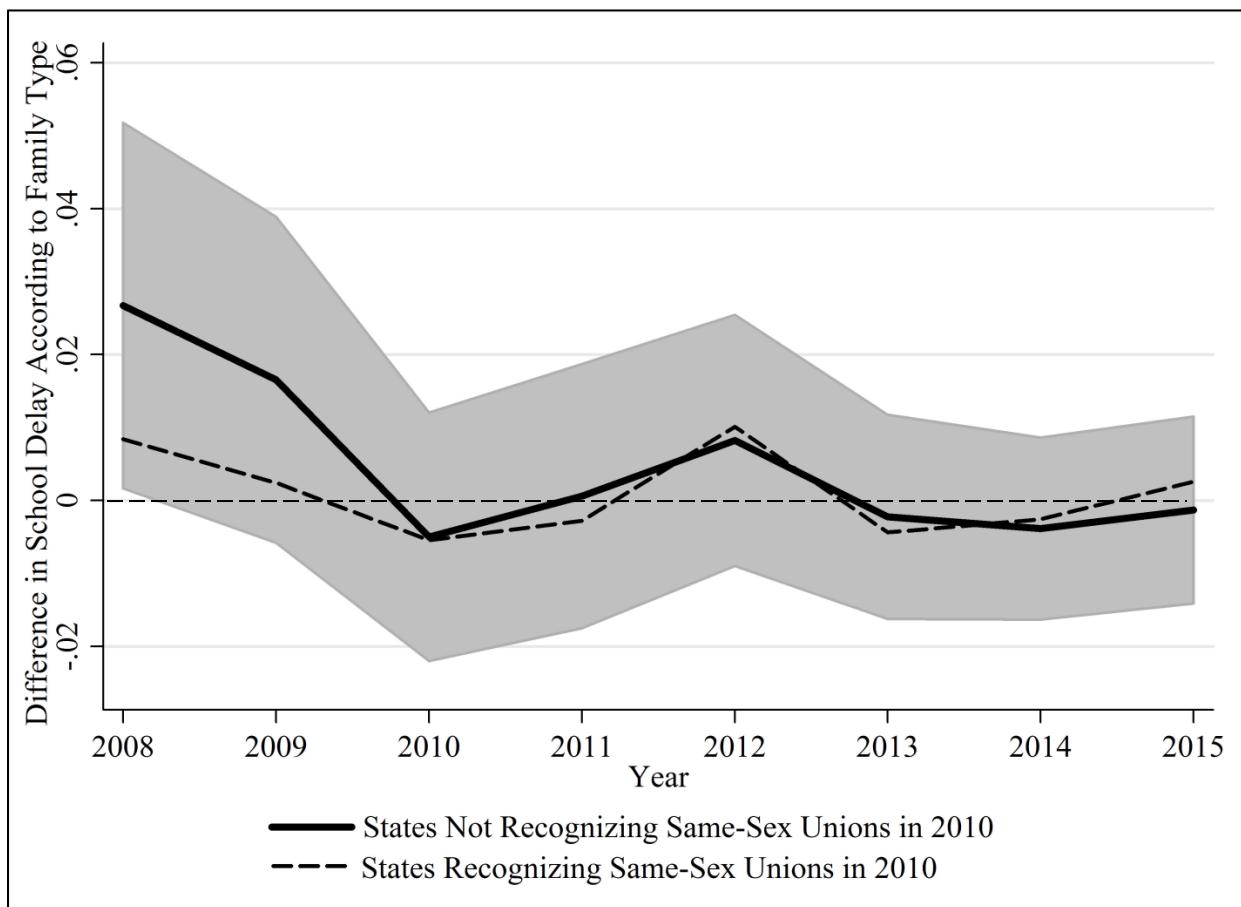
Note. Line indicates difference in predicted probabilities once predicting 'being behind in school' based on an interaction between attitudes (continuous) and living with a same-sex couple (dummy). Only includes children whose parent is head of household and has a co-residential partner; foster children are excluded. Controlling for child's age and year. Sample weights included. Grey region indicates 95% confidence interval. Disapproval based on average extent to which individuals in area disagreed with the statement "Homosexual couples have the right to marry" using GSS data.

Figure 3. Differences in the probability of being behind in school between children living with same-sex and different-sex couples according to year and disapproval toward same-sex marriage in area



Note. Line indicates difference in predicted probabilities once predicting 'being behind in school' based on an interaction between attitudes (continuous), living with a same-sex couple (dummy), and year (categorical) in a logistic regression. Only includes children whose parent is head of household and has a co-residential partner; foster children are excluded. Controlling for child's age. Sample weights included. Grey region indicates 95% confidence interval for solid line. Disapproval based on average extent to which individuals in area disagreed with the statement "Homosexual couples have the right to marry" using GSS data.

Figure 4. Differences in the probability of being behind in school between children living with same-sex and different-sex couples according to year and legalization of same-sex marriage in state



Note. Line indicates difference in predicted probabilities once predicting 'being behind in school' based on an interaction between recognition of same-sex marriage or civil union in 2010 in state (dummy), living with a same-sex couple (dummy), and year (categorical) in a logistic regression. Only includes children whose parent is head of household and has a co-residential partner; foster children are excluded. Controlling for child's age. Sample weights included. Grey region indicates 95% confidence interval for solid line.

A similar picture emerges once looking at state-level legislation. Figure 4 splits the sample into states that recognized same-sex unions in 2010 and states that did not.¹⁹ The association of parental union type with school progress only existed in states where same-sex unions were not recognized in 2010. However, the differences in school progress in these states disappeared already before 2010. The changes responsible for the improved school progress of children of same-sex couples therefore already took place before same-sex couple unions were legally recognized by the states they lived in.²⁰ Hence our results suggest that changes took place *within* areas that originally had no legal recognition of same-sex unions.

An alternative explanation examined regards changing routes into family formation. The information available in the ACS to look at family formation is limited to the relationship between the child and the head of household, namely, that of a biological, adoptive, or step-parent (i.e. information on past family events is not available). Across time, the share of children indicated to be adopted by a parent in a same-sex union remained relatively stable at around 12.5% from 2008 to 2011 and subsequently increased to 16.4% in 2015 (See Figure B6 in the Online Appendix). Given that children indicated to be adopted by the head of household were more likely to be behind in school than biological children (2.9% of biological children versus 4.8% of adopted children), changes in the share of children adopted cannot explain the improved school progress of children living with same-sex couples.

However, if reductions in structural stigma made it easier for same-sex couples to adopt children without special needs (Farr and Patterson 2013), differences in school progress might have

¹⁹ <http://www.hrc.org/state-maps/marriage-equality>; In 2010, 5 states issued marriage licenses (Connecticut, Iowa, Massachusetts, New Hampshire, and Vermont) and 6 provided equivalent civil unions to same-sex couples (California, District of Columbia, Nevada, New Jersey, Oregon, and Washington).

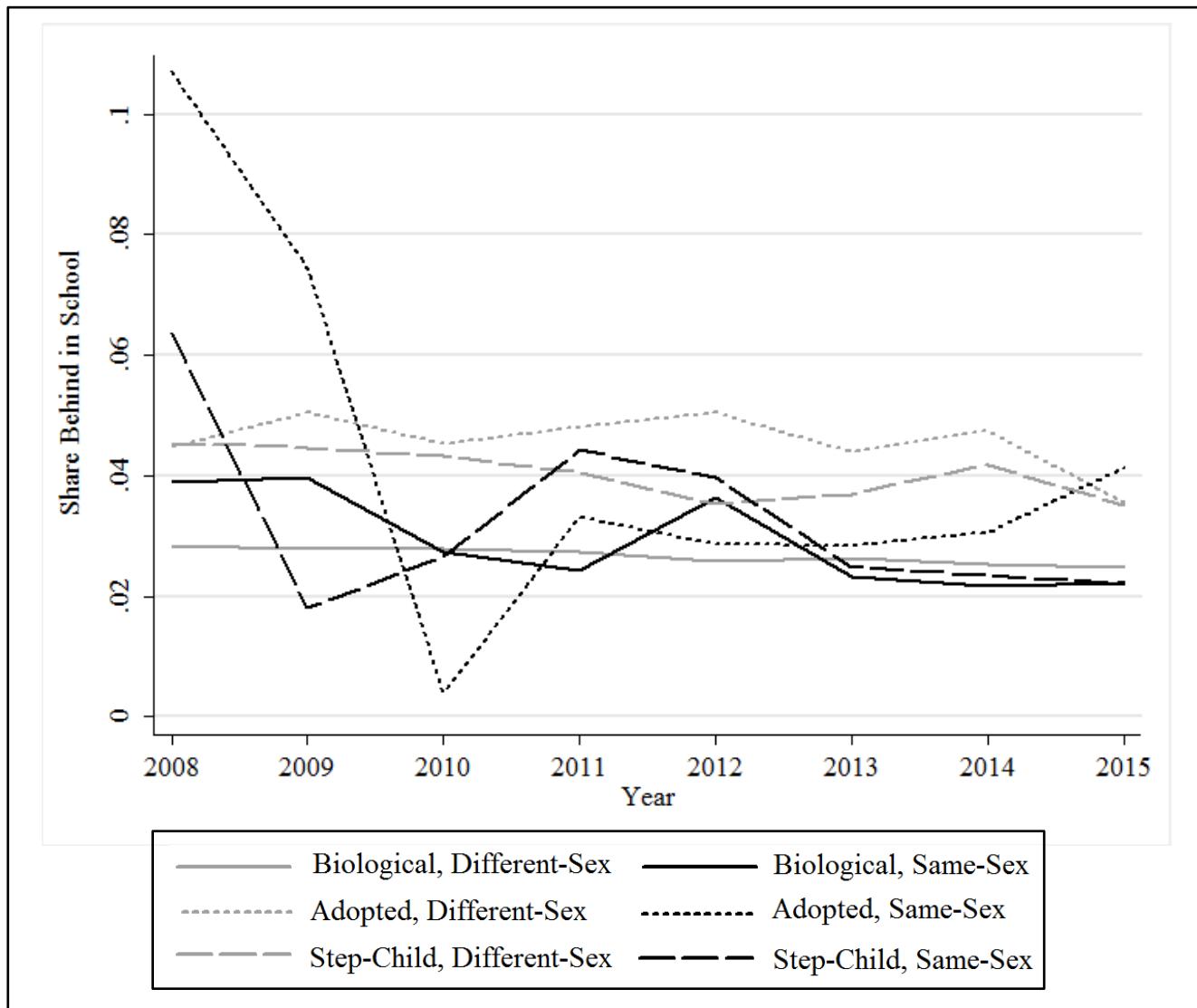
²⁰ The same conclusion emerges once looking at state-level legislation protecting same-sex couples in the adoption process, see Online Appendix G.

become smaller *among* adopted children. Similarly, if ever less biological children of same-sex parents experienced a parental separation (as same-sex parent families become more planned; Gates, 2015) this might have improved school progress among biological children of same-sex couples. Figure 5 therefore displays changes over time in school progress among various groups of children.

Even though all types of children living with same-sex couples showed improved outcomes over time, this trend was especially pronounced among adopted children.²¹ If initial differences in school progress among adopted children have been attributed to the discrimination of same-sex couples in the adoption process (Farr and Patterson 2013; Rosenfeld 2013), disappearing group differences might indicate decreases in the experience of such discrimination. Figure 6 confirms that also among adopted children, differences in school progress mainly existed in regions with unfavorable attitudes toward same-sex marriage; and that these differences disappeared over time. This might indicate that structural stigma indeed became less relevant over time. However, our analysis is based on a description of where and among which groups of children school progress changed. We therefore leave further interpretations for the discussion.

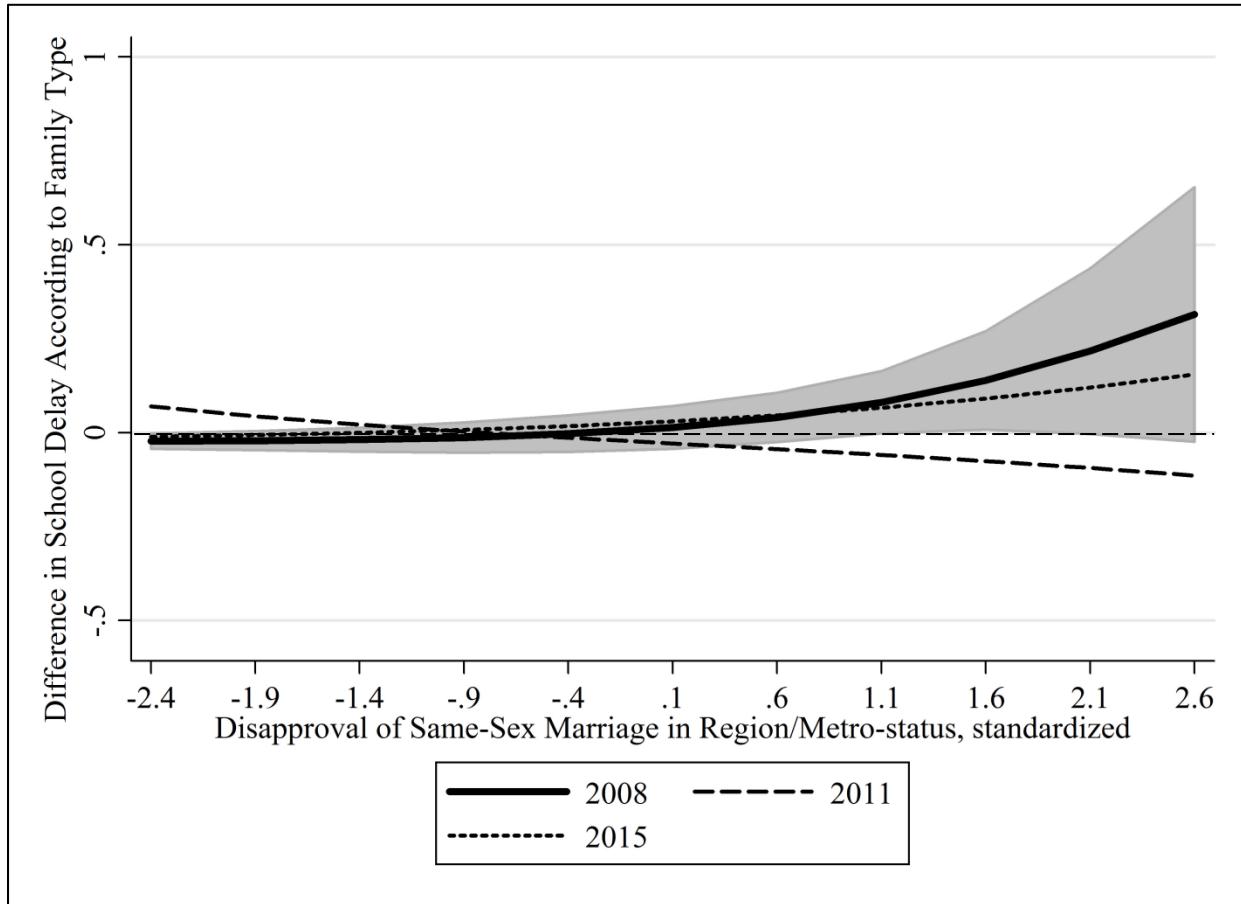
²¹ Figure F1 and Table A1 in the Online Appendix show how changes over time for adopted children were statistically significant. Online Appendix D also shows models controlling for socioeconomic characteristics. In 2008 a statistically significant effect of parental union sex-composition remained among adopted children once accounting for socioeconomic characteristics.

Figure 5. Probability of being behind in school according to family type and child/household head relationship



Note. Controlling for age. Sample weights included. Biological/adopted/step-child indicates the relationship of the child to the household head. Different-sex/same-sex indicates the sex-composition of the household head and the head's partner. Only includes children whose parent is head of household and has a co-residential partner; foster children are excluded.

Figure 6. Differences in the probability of being behind in school between adopted children of same-sex and different-sex couples according to year and disapproval toward same-sex marriage in area



Note. Line indicates difference in predicted probabilities once predicting 'being behind in school' based on an interaction between attitudes (continuous), living with a same-sex couple (dummy), and year (categorical) in a logistic regression. Controlling for child's age. Sample weights included. Grey region indicates 95% confidence interval for solid line. Disapproval based on average extent to which individuals in area disagreed with the statement "Homosexual couples have the right to marry" using GSS data. Only includes children whose adoptive parent is head of household and has a co-residential partner; foster children are excluded.

Discussion

The outcomes of children living with parents in a same-sex relationship have been a topic of debate in the social sciences (Aldén et al. 2017; Allen 2013; Allen et al. 2013; Amato 2012; Manning et al. 2014; Marks 2012; Potter 2012; Potter and Potter 2017; Rosenfeld 2010; 2015; Regnerus 2012a,b). The results of this study contributed to this debate in several ways. Firstly, no matter the sample restrictions applied, controls included, or other methodological choices made, we did not observe important differences in school progress between children living with parents in a same-sex relationship and their peers living with parents in a different-sex relationship. Methodological choices were the main reason why earlier research came to opposing conclusions based on the same data (Allen et al. 2013; Regnerus 2012b; Rosenfeld 2013; 2015). The results presented here therewith overcome important obstacles toward consensus that existed in the debate.

Our second main contribution has been to document changes over time exploiting the repeated cross-sectional data of the ACS. Even though in 2008 children living with a same-sex couple were more likely to be behind in school than their peers, these differences disappeared during the time window of this study. We identified three major possible explanations for changes over time in the literature review: changes in socioeconomic characteristics of same-sex couple families, changes in the routes toward family formation, and changes in structural stigma and discrimination.

Changes in observed socioeconomic characteristics of families played a minor but non-negligible role. In more recent years, children living in same-sex couple families had fewer siblings and relatively higher levels of parental education than before.

Our data contained relatively little information on how families were formed, and our results were therefore limited to observing an increase in the number of children adopted by same-sex couples. Given that adopted children were more likely to be behind in school, this could not explain why children living with same-sex couples had started to perform better over time. Future research is needed to investigate the role of family formation routes further. For instance, increasing access to reproductive technologies could have increased the number of same-sex couple families that are planned from birth onward. This might have reduced the number of parental separations experienced by children living with same-sex couples (Gates 2015) and led to improved school progress among same-sex couples' biological children.

Finally, our results hinted at a possible role played by structural stigma. Previous research has shown that attitudes toward same-sex couples have changed in an extremely fast manner as compared to other societal attitudes (Rosenfeld 2017), which fits the very rapid changes documented in this paper. If societal disapproval of same-sex couples rights is an indicator of more general stigma experienced by same-sex couple families, reductions in such disapproval could have improved children's school progress. In support of this explanation, differences in school progress according to parental union sex-composition existed in areas with high levels of disapproval of same-sex marriage. As time passed -and average disapproval decreased- these differences in school progress disappeared also in areas with initially less favorable attitudes toward same-sex marriage. Legal recognition of same-sex couples is unlikely to have been a key explanatory factor. In states where children living with same-sex couples initially performed worse, school progress equalized before same-sex unions were legally recognized there.

Further research is required to better investigate the role of changes in structural stigma in the processes observed. Due to the nature of the data employed in this article we were not able to

provide evidence on the actual mechanisms connecting structural stigma to children's school progress such as family stress and bullying. More specific investigations of attitudes toward adoption by same-sex couples would be fruitful too, as changes over time were observed most clearly for children adopted by same-sex couples in states with high levels of disapproval of same-sex marriage. The worse school progress of children adopted by same-sex couples had previously been ascribed to same-sex couples being more likely to adopt children with special needs (Rosenfeld 2013). Agencies specialized in the adoption of domestic infant children have been found to less often place children with same-sex couples as compared to agencies specialized in the adoption of children with special needs (Brodzinsky 2003; Farr and Patterson 2013). It is plausible that such obstacles in the adoption process have become smaller for same-sex couples. Increasingly favorable attitudes toward same-sex couples nationwide might have made adoption agencies more likely to place children without special needs with same-sex couples, also in less favorable environments. Another explanation could be that same-sex couples found their way around institutional obstacles by, for instance, adopting across (state) borders. Additional analysis investigated the role of geographical mobility by same-sex couples but found no differences in children's school progress depending on whether the parent or partner lived in a state that was different than the state where they were born (Online Appendix H).

A limitation of the data was that for certain groups of children we were not able to ensure that school delays took place before children started living within the family-type observed at the time of measurement. We were therefore not always able to separate differences in school progress that emerged before family formation from differences that emerged after family formation. However, given that children living with same-sex couples are more likely to have

experienced disadvantageous events before entering the family (Rosenfeld 2013), the conclusion that children living with a same-sex couple do not perform worse than their peers living with a different-sex couple is likely to be supported even more if such events could be accounted for. Indeed, our analysis suggests that the overall changing association between parental union sex-composition and school progress is to a large extent driven by a reduction in the share of adopted children who enter same-sex couple families with pre-existing disadvantages.

In sum, the results of this study show that the situation for children living with same-sex couples has improved in the United States. Previous research had already shown that children living with a biological parent in a stable same-sex relationship do as well in school as their counterparts living with a parent in a stable different-sex marriage, and, hence, that being raised by a same-sex couple per se does not have to matter for school outcomes (Rosenfeld 2010). However, this conclusion only held once controlling for socioeconomic characteristics, accounting for family stability and excluding adopted children. The evidence presented in this article suggests that the conclusion of ‘no differences’ now holds regardless of the controls included and sample restrictions applied. Today, the conclusion of ‘no differences’ is no longer limited to the arguably more advantaged groups of children living with a same-sex couple, but applies to all children, including those who are adopted. Reductions in structural stigma and changes in the selection of children adopted by same-sex couples are likely to have been important factors driving these trends.

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