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Same-Sex Parent Families and Children's Academic Achievement

Children in traditional families (i.e., married, 2 biological parents) tend to do better than their peers in nontraditional families. An exception to this pattern appears to be children from same-sex parent families. Children with lesbian mothers or gay fathers do not exhibit the poorer outcomes typically associated with nontraditional families. Studies of same-sex parent families, however, have relied on a static conceptualization of the family and discounted the importance of the timing and number of family transitions for understanding children's outcomes. To examine whether same-sex parent families represent an exception among nontraditional families, the author used data from the Early Childhood Longitudinal Study—Kindergarten cohort (N = 19,043) to create a dynamic indicator of children's family structure and tested its association with math assessment scores. The results indicated that children in same-sex parent families scored lower than their peers in married, 2-biological parent households, but the difference was nonsignificant net of family transitions.

The perceived dominance of the ''traditional'' family in the social landscape of America has increasingly been challenged as a larger number and proportion of individuals create more fluid and flexible family structures,
redefining what it means to be a family (Teachman, Tedrow, & Crowder, 2000). The term *family* is no longer reserved for households with children and two married biological parents but consists of an assortment of family structures, such as stepparents, single parents, and cohabiting parents. As these nontraditional families become more prominent, researchers have attempted to better understand how they affect children's outcomes (Powell, Bolzendahl, Geist, & Steelman, 2010). In general, previous research has found that children in nontraditional families do worse than their peers from married, two-biological parent families on several developmental outcomes, although, of particular interest for this study, are differences in academic achievement (Amato, 2001; Manning & Lamb, 2003; McLanahan & Sandefur, 1994). Children in traditional families have higher test scores, have steeper learning trajectories, and complete more years of education relative to children in divorced, single-parent, and stepparent families (Heard, 2007; Sun & Li, 2011). One family type that has received less attention, but increasing amounts in recent years, is same-sex parent households.

Lesbian mothers or gay fathers and their children are a small albeit notable and socially contentious example of a family structure whose influence on children's development continues to be debated (Powell et al., 2010). Critics of same-sex parent families contend that children need to be exposed to both-sex parents for healthy emotional and psychological development; therefore, households with two fathers or two mothers cannot provide necessary socialization experiences (Dobson,

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2004; Popenoe, 1996). Advocates argue that children's development is unaffected by living with same-sex parents and have cited mounting evidence supporting their claim (Fairtlough, 2008; Golombok et al., 2003). In general, research on same-sex parent families has found little to suggest that children are negatively affected by living in such a family structure, although this conclusion is based on a body of research whose methodological veracity has been challenged (Biblarz & Savci, 2010; Nock, 2001). Moreover, if children are developmentally unaffected by living in same-sex parent families, then this conclusion stands in contrast to an extensive body of research that has otherwise shown consistent disparities in the outcomes of children living in nontraditional families.

The seemingly exceptional outcomes of children in same-sex parent families relative to their peers in opposite-sex parent nontraditional families may in part be accounted for by differences in how these two lines of research have conceptualized the family. In most research on nontraditional families, the family is a dynamic entity, whereas studies on same-sex parent families have modeled the family as a static unit. For example, studies on the differences in children's outcomes associated with divorced parent, single parent, and stepparent families have found that disparities are often most notable during the time period immediately surrounding the change in family structure (Lansford et al., 2006). Moreover, prior research has shown that the mere change in family structure largely accounted for the disparities in children's outcomes, whereas the type of change that children experienced was of secondary importance (Fomby & Cherlin, 2007); that is, the primary reason that children from nontraditional families had lower academic achievement compared with children in traditional families was because of the instability and disruption that occurred prior to and during the formation of their nontraditional family. The type of newly formed family structure was less relevant. In comparison, studies of same-sex parent families have used a static conceptual model in which family structure is defined at a single point in time and have downplayed the importance of the timing and accumulation of family transitions in children's lives (Fomby & Cherlin; Lansford et al.). Same-sex parent families, however, are primarily created from the dissolution of prior opposite-sex parent relationships (Stacey, 2006; Telingator & Patterson, 2008); therefore, children experience changes to their family structure in the formation of these family units, which have not been considered by prior research. A dynamic model of the family could be applied to the study of same-sex parent families in order to more comprehensively examine the consequences associated with living in a same-sex parent household and explore whether the outcomes of these children vary from those in other opposite-sex parent nontraditional families.

In this study, I used a dynamic model of the family to explore the importance of the timing and accumulation of family structure transitions for shaping children's academic achievement in same-sex parent households. Specifically, I addressed two research questions: (a) What is the association between living in a same-sex parent family and children's academic achievement as measured by their mathematics assessment scores and (b) how does this association compare with the outcomes of children from other nontraditional families? To answer these questions, I applied a hierarchical linear modeling (HLM) growth curve model to data from the kindergarten through eighth-grade waves of the Early Childhood Longitudinal Study—Kindergarten cohort ($N = 19,043$) and examined the association between living in a same-sex parent family ($n = 158$) and children's math assessment scores.

LITERATURE REVIEW

Academic achievement is a central and important component of childhood and adolescence, because it correlates with numerous markers of later life success (Kingston, Hubbard, Lapp, Schroeder, & Wilson, 2003). Prior research has identified several predictors of children's academic outcomes, including male and female differences (Buchmann, DiPrete, & McDaniel, 2008), race/ethnicity (Fryer & Levitt, 2004; Riegle-Crumb & Grodsky, 2010), age (Grissmer & Eiseman, 2008), primary language used in the home (Forget-Dubois et al., 2009), and parents' educational attainment (Lee & Burkham, 2002). Family structure is another factor that has consistently been associated with academic achievement. Children from traditional families, typically described as households with two married biological parents, tend to do better than their peers from nontraditional families

(e.g., children living with divorced parents, a single parent, or stepparents) on several indicators of academic achievement (Amato, 2001; Tillman, 2007). For example, Sun and Li (2011) found that children from single-parent families, on average, had lower test scores and made fewer gains across the elementary school years than their peers living with two married biological parents. Recent studies also have indicated that the consequences of family structure are not limited to achievement in elementary school: Heard (2007) found that high school students who had spent time in mother-only households had lower grade-point averages, college expectations, and more behavior problems in school. Amato (2005) and McLanahan and Percheski (2008) summarized the research on nontraditional families and concluded that children from single-parent, divorced-parent, or stepparent households generally performed below their peers with two married biological parents. It is important to note that Amato and McLanahan and Percheski also concluded that this performance differential was a reflection of the transition process affiliated with the formation of nontraditional families and not indicative of inherent consequences of living in these family structures.

In addition to Amato (2005) and McLanahan and Percheski (2008), other scholars have described how the consequences of living in a nontraditional family often emerge from the changes, disruption, and insecurity experienced during the formation of new families (see also Cavanagh, Schiller, & Riegle-Crumb, 2006; Sun & Li, 2009, 2011). According to this perspective, ''children and their parents, whether single or partnered, form a functioning family system and [the] disruption of this system may be more distressing than its long-term continuation'' (Fomby & Cherlin, 2007, p. 182). Furthermore, changes in the family structure do not get easier if children experience repeated transitions; instead multiple changes tend to cumulatively disadvantage children (Kurdek, Fine, & Sinclair, 1995), and the extent of the consequences is often predicated on the previous (now dissolved) family type (Hetherington et al., 1992). It follows from this research that the disparities in children's outcomes associated with family structure become indicative of the changes preceding nontraditional families, and this pattern has been observed across divorced-parent, single-parent, stepparent, and cohabiting-parent families (Amato, 2005; Raley & Wildsmith, 2004). Largely missing has been consideration of same-sex parent families.

According to U.S. census data, in 2005 an estimated 270,000 children lived in households with two same-sex parents (Romero, Baumle, Badgett, & Gates, 2007). This represented less than 1% of all children in the country, and some scholars have suggested that the number may be much higher (Stacey & Biblarz, 2001); nevertheless, despite the fact that they comprise only a small portion of households, these families have generated a large amount of public fervor. At the center of the debate on same-sex parent families is the question of children's well-being (Alvare, 2005). Some opponents of the family structure have used religious or philosophical claims to suggest that same-sex parent families are unethical and harmful to children (e.g., Dobson, 2004); however, value-laden arguments do not lend themselves to social scientific investigation. More scientific critiques of these families have been offered by other researchers suggesting that children need to be exposed to both-sex parents—mother (female) and father (male)—for appropriate emotional and psychological development (e.g., Popenoe, 1996). Researchers have examined the ''essential father,'' and the male caregiver can play an important role in children's maturation (Blankenhorn, 1995; Booth & Crouter, 1998; Wilson, 2002), but such studies have not unequivocally proven that both sexes are required for healthy development (for a review, see Biblarz & Stacey, 2010). Indeed, a large portion of the evidence from the growing body of research on children in same-sex parent families suggests that concerns about possible detriment to their development may be unwarranted.

In general, prior studies have found that children living with same-sex parents were similar to their peers living with married, opposite-sex parents on several developmental outcomes (Anderssen, Amlie, & Ytteroy, 2002; Biblarz & Stacey, 2010; Tasker, 2005). For example, children in same-sex parent families adjusted equally well during the transition from home to school (Perry et al., 2004), displayed comparable levels of self-esteem, anxiety, and depression (Bos, van Balen, Sandfort, & van den Boom, 2006; Fulcher, Sutfin, & Patterson, 2008; Gartrell & Bos, 2010), and exhibited similarly low levels of risky and problematic adolescent behaviors (Bos, van Balen, & van den

Boom, 2007; Golombok et al., 2003; Wainright & Patterson, 2008; Wainright, Russell, & Patterson, 2004). There has also been no evidence that living in same-sex parent families compromises children's academic outcomes. For example, Wainright et al. found that youth living with lesbian mothers tended to feel more connected to school than their peers with opposite-sex parents, and there was no difference in children's grade-point average or disciplinary problems across family structures (see also Gartrell & Bos). Similarly, Rosenfeld (2010) examined children's early schooling careers and found that living in same-sex parent families did not disrupt or delay progression through elementary school. Any disparities in children's academic outcomes were relatively minimal and in some instances benefited children raised in same-sex parent families (Biblarz & Savci, 2010).

From this research, same-sex parent families appear unique compared with opposite-sex parent nontraditional families because there has been no indication that children were detrimentally affected by their family structure; however, these results have been challenged. Some scholars have questioned the methodological rigor of prior research (Biblarz & Savci, 2010; Nock, 2001) and correctly identified limitations with the size and representativeness of samples used in earlier studies. Beyond, and potentially more important than, concerns with the data has been the different conceptual models of the family unit used in prior research. Studies of opposite-sex parent nontraditional families have most often used a dynamic model of the family, but studies of same-sex parent families have usually relied on a static model that discounted family instability issues, such as the timing and number of transitions that children experienced.

Families are rarely static entities, especially for children in nontraditional families, and this includes the experiences of the majority of children in same-sex parent families. Same-sex parent families are primarily created through three scenarios: (a) children are brought to the new family from a previous opposite-sex parent relationship, (b) children are adopted by partners, or (c) same-sex couples use donor insemination or surrogate mothering (Stacey, 2006). Of these scenarios, the first (i.e., dissolution of previous opposite-sex relationship) is most prevalent (Stacey; Telingator & Patterson, 2008). The early lives of children in same-sex parent families are defined by change and instability, but despite the family transitions in the lives of these children, much of the research has not fully incorporated how changes in the family structure may be relevant to understanding their outcomes. There is reason, however, to expect that these early life experiences with changes to the family may alter the outcomes of children in same-sex parent families, as evidenced by personal accounts of parent's coming-out experiences. In a recent study, Welsh (2011) interviewed 14 adolescents who had lived in same-sex parent families and found that these youth experienced a ''sense of loss . . . and a perceived lack of control over life during early and mid-adolescence'' (p. 65) that was attributed to the changes in individuals' family structures, and compounded by the simultaneous attempt to develop a differentiated sense of self.

Parents also were challenged by the changing family unit. Hequembourg (2004) interviewed 40 lesbian mothers and concluded that a core struggle faced by these parents was ''integrating lesbian stepmothers into family relationships'' (p. 743), because of disagreements related to parenting styles, authority roles, and attachment with the children. Children and parents entering same-sex parent families faced changes and transitions to their families that were disruptive and distressing, which could be expected to contribute to poorer academic outcomes. Moreover, the struggles faced by children and parents as they transitioned into same-sex parent families were in many respects similar to the struggles of children and parents who experienced divorce, remarriage, or other changes to their family structures, albeit with the added challenge of navigating potentially difficult social environments given the parent's newly acknowledged sexuality (Goldberg, 2010). Children in same-sex and opposite-sex parent nontraditional families may share many of the same types of experiences during the reconstitution of their families, but prior research has not typically compared the outcomes of children living in these families.

Incorporating a dynamic definition of the family into the study of same-sex parent, traditional, and opposite-sex parent nontraditional families will provide a more realistic representation of the early life experiences of children in these families. Moreover, the symmetry in transitions experienced by children in same-sex parent and opposite-sex parent nontraditional families

suggests that comparisons between these families may be useful for determining the presence or absence of consequences unique to children in same-sex parent households. In this study, I applied a dynamic framework typically used to examine the association between opposite-sex parent nontraditional family structures and children's outcomes to specifically consider the relationship between living in a same-sex parent household and children's academic achievement. I then compared the association across different nontraditional family structures to determine whether the outcomes of children in same-sex parent families were different from their peers in other nontraditional, but opposite-sex parent households. My goal was to provide insight into the association between same-sex parent families and children's outcomes and offer an additional comparison across different nontraditional family structures.

Method

Data for this analysis came from the Early Childhood Longitudinal Study—Kindergarten cohort (ECLS–K). Sponsored by the National Center for Educational Statistics, the ECLS–K is a seven-wave panel study that collected data from more than 20,000 children during kindergarten in the fall of 1998 and followed them through their eighth-grade year (Tourangeau, Nord, Le, Pollack, & Atkins-Burnett, 2006). Data for this study were collected when most children were in kindergarten, first grade, third grade, fifth grade, and eighth grade. The sample was originally designed as a three-stage stratified random sample, with students nested in schools that were nested in counties. Extensive data were collected from multiple sources, including the focal child and a parent or guardian, to provide an encompassing view of the children's home and educational experiences.

Family structure was coded as a time-varying measure, and at each wave children were classified into one of eight categories: (a) married, two biological parents; (b) divorced; (c) stepparent; (d) single parent; (e) cohabiting; (f) widowed; (g) other; and (h) same-sex parent. Same-sex parent families were identified by means of roster data provided by the parent/guardian at each wave of the study. Respondents were asked to list the adults and children who normally lived in the household and were explicitly asked to exclude anyone who only temporarily resided

with the family. They also were asked to provide the person's name, whether the person was male or female, the age of the person, and to categorize the relationship the person had with the focal child. The respondent was given 13 options for how to categorize the relationship (e.g., mother, father, sister, brother, etc.) and was required to choose one. For each wave of data collection, ECLS–K programmers performed several validations of the roster data to ensure that inconsistencies were addressed during the data collection phase (for a discussion of ECLS–K data management, see Westat, 1999, pp. 6–2 and 6–5). For example, cases that originally reported a ''male mother'' or a ''biological mother over age 80'' were investigated to determine the accuracy of the coding, and during the kindergarten wave 231 out of 235 inconsistencies were resolved (Westat). Subsequent waves were similarly successful addressing inconsistencies. The extensive checks and data validation performed by the ECLS–K programmers increased the likelihood that the data could be used to confidently identify same-sex parent families.

Families were labeled as ''same-sex'' if they satisfied one of six conditions: (a) two ''mother/female guardian'' members, (b) two ''father/male guardian'' members, (c) a ''mother/female guardian'' and ''girlfriend/partner of parent/guardian,'' (d) a ''father/male guardian'' and ''boyfriend/partner of parent/guardian,'' (e) a ''mother/female guardian'' and a female ''other nonrelative'' between 21 and 49 years old, or (f) a ''father/male guardian'' and a male ''other nonrelative'' between 21 and 49 years old. Adult respondents were not asked to report their sexual orientation, so after identifying cases that met one of these conditions, each was visually inspected to verify its structure. For example, if a household was identified as having a ''father/male guardian'' and a ''boyfriend/partner of parent/guardian,'' it was visually inspected to determine whether any other adult lived in the household, such as an adult female or girlfriend, which might suggest a family arrangement other than a same-sex parent family. After completing the visual inspection, 158 children were classified as living in a same-sex parent family during at least one wave of the study.

To capture the dynamic nature of children's families, I created a time-varying measure by dummy coding the eight categories of the family structure variable for each wave. The

dummy variable associated with a child's family structure was coded as 1, and the variables associated with all other family structures were coded as 0. If a child's family structure changed between waves, the variable corresponding to the newly formed structure would be coded as 1 during the first wave the change was reported and remained coded as 1 for all subsequent waves the child stayed in that family structure. This coding process created a set of variables that captured the timing of children's family transitions. Because of the ongoing transitions in children's family structure, the number of children living in each type of family varied by wave, but during the kindergarten wave there were 11,304 married, two-biological parent; 1,152 stepparent; 2,879 divorced-parent; 1,870 single-parent; 157 widowed-parent; 880 cohabiting-parent; 792 other-parent; and 72 same-sex parent families. The distribution of children across the family structures by grade in the study is reported in Table 1.

As a complement to the time-varying measure of children's family structure, I created a count variable of children's cumulative number of family transitions that made it possible to differentiate between the type of change to the family structure and the total number of changes children had experienced. The cumulative measure was time varying and summed together the total number of changes to the family structure children had experienced during the current and all preceding waves.

The final family structure variable included in the analysis indicated the type of family in which children lived at kindergarten entry. In order to mirror the categories used in the time-varying measure, I dummy coded an eight-category indicator of family structure with a married, two-biological parent household set as the reference group. Controlling for children's baseline family structure enabled the models to isolate the extent that children's academic achievement was associated with the current family structure, changes to the family structure, and prior family structure (Hetherington et al., 1992).

Academic achievement was measured by means of children's math assessment scores, which prior research has linked to other indicators of educational attainment, such as high school graduation and college entry (Entwisle, Alexander, & Olson, 2005). Children's scores were based on a paper-and-pencil direct assessment administered to children during the school day and designed specifically for the ECLS–K study. Items on the assessment were, however, drawn from other large-scale studies of elementary and middle-school-age children, such as the National Assessment of Educational Progress (http://nces.ed.gov/nationsreportcard/), the National Education Longitudinal Study of 1988 (http://nces.ed.gov/surveys/nels88/), and the Education Longitudinal Study of 2002 (http://nces.ed.gov/surveys/els2002/). The specific items on the assessment changed across waves of the data collection to reflect children's growing knowledge, although there was some overlap to assist in the scaling efforts of programmers; specifically, ECLS–K programmers used item response theory to calculate scores that were comparable between students, as well as across time for the same student (for a more detailed discussion, see Tourangeau et al., 2006). I examined the association between family structure and children's math assessment scores between kindergarten and eighth grade. Note that identical analyses were performed to estimate children's reading assessment scores, but because of larger standard errors many of the substantive patterns shared with the math models were not statistically significant. The results from the reading models are presented in the Appendix.

I included a set of control variables associated with children's academic achievement in the models to further clarify the relationship between family structure and children's academic achievement. The number of control variables was limited by the relatively small cell sizes associated with the time-varying measure of family structure, and to avoid issues of endogeneity only select traits and characteristics that existed prior to kindergarten entry were used. I included control variables for female (1 = *yes*), race/ethnicity (1 = *African American*), age at kindergarten (in months), first-time kindergartener status (1 = *yes*), and non-English language in the home (1 = *yes*). I used parents' educational attainment to control for differences in children's relative social position, a variable that was based on the highest level of schooling completed by either parent (1 = *high school diploma or less*). All the control variables were time invariant.

Missing Values

For most of the covariates in the model, I dealt with missing values using multiple

Table 1. *Number and Percentage Distribution of Level 1 Family Structure and Means and Standard Deviations of the Cumulative Number of Family Transitions and Academic Achievement, by Grade (N = 19,107)*

Variable	Kindergarten		Grade 1		Grade 3		Grade 5		Grade 8	
	n	%	n	%	n	%	n	%	n	%
Total	19,107	100.0	15,891	100.0	13,676	100.0	10,620	100.0	8,342	100.0
Family structure										
Married, two biological parents	11,304	59.2	9,611	60.5	8,277	60.5	6,456	60.8	5,058	60.6
Stepparent	1,152	6.0	1,055	6.6	1,079	7.9	852	8.0	798	9.6
Divorced	2,879	15.1	2,376	15.0	2,105	15.4	1,731	16.3	1,401	16.8
Single-parent	1,870	9.8	1,383	8.7	1,022	7.5	659	6.2	411	4.9
Widowed	157	0.8	137	0.9	162	1.2	126	1.2	119	1.4
Cohabiting	880	4.6	621	3.9	431	3.2	319	3.0	165	2.0
Other	792	4.1	646	4.1	570	4.2	454	4.3	369	4.4
Same-sex parent	72	0.4	61	0.4	31	0.2	22	0.2	22	0.3
	M	SD	M	SD	M	SD	M	SD	M	SD
Cumulative no. family transitions	0.190	0.393	0.269	0.522	0.376	0.675	0.458	0.804	0.530	0.903
Math assessment scores	35.606	11.821	60.694	18.026	98.132	24.783	122.834	25.052	141.115	22.347
Reading assessment scores	45.664	13.485	76.412	23.564	125.672	28.288	149.144	26.588	169.507	28.094

Note: Details may not sum to total because of rounding. All estimates are weighted. Math and reading assessment scores were calculated using an item response theory technique that allowed for comparison of scores over the waves of data collection. Differences in the mean assessment scores thus reflect gains in children's academic achievement. Higher scores indicate better performance.

imputation via the ICE command (Royston, 2007) in Stata. Five data sets were imputed, and all variables in the models were used to estimate the missing values. The amount of missingness per variable ranged from 0% for female status and race/ethnicity to 14% for first-time kindergartener status. To ensure that certain variables took on only positive values during the imputation process (e.g., age), I used the natural log of all nonnegative interval variables for imputing and then exponentiated them to original scale for analysis.

I did not use multiple imputation to handle missing values for family structure; instead, I used a set of logic rules to fill in waves without valid responses. Specifically, if the first valid response did not appear until a later wave (e.g., all waves before third grade were invalid), then the later value was applied retrospectively to earlier waves, which corrected 1,213 missing values. Second, if a wave had a missing value but the preceding and subsequent waves had the same family structure classification, then the missing value was replaced with the value from the neighboring waves, which corrected 1,344 missing values. Finally, if the preceding and subsequent waves had different values, the value of the preceding wave was used to replace the missing value, which corrected 542 missing values. Missingness in the family structure variables was allowed to remain if there was never a valid response and for all waves following the last valid response (e.g., if there was no valid response after the first grade wave, then Grades 3, 5, and 8 were allowed to remain missing). The logic rules were able to fill in a portion of the missing values for all but the final wave of data collection: 49% in kindergarten, 21% in first grade, 13% in third grade, and 3% in fifth grade. I tested alternative-logic rules to ensure that the reported results were not products of the decisions made for handling missing values, and results from these sensitivity checks were largely indistinguishable from the results reported herein. From the original sample of 21,210 children, cases were dropped if they had a nonvalid value for the sampling weight ($n = 705$, 3.3%) or if they were missing information on the child's family structure for all waves of data collection ($n = 1,398$, 6.6%). Finally, during the analysis cases were dropped if they did not have valid math assessment scores ($n = 64$, 0.3%).

Analytic Strategy

I used an HLM growth curve to examine the association between family structure and children's math assessment scores. HLM growth curve models are able to incorporate time-varying (Level 1) and time-invariant (Level 2) measures, which was important given the way family structure was measured. For this analysis, the time-varying measures ($N = 66,124$) were nested within children ($N = 19,043$), and all estimates were weighted to adjust the standard errors for clustering, as well as to correct for the oversampling of certain racial/ethnic groups. Descriptive statistics were computed in SPSS, and I used HLM software to perform the analysis. I used a three-model strategy with stepwise variable entry. Model 1 included the time-varying measures of family structure and established a baseline association between children's family type and math assessment scores. Model 2 included the control variables (e.g., female status, race/ethnicity, age) to determine whether select sociodemographic factors accounted for the association. Finally, Model 3 introduced the measure of cumulative family transitions and family structure at kindergarten entry to distinguish the type of changes children experienced to their family structure from the number of changes they had experienced. The equations for Model 3 are as follows:

Level 1:

$$Y_{ti} = \pi_{0i} + \pi_{1i} \, (\text{Time}_{ti}) + \pi_{2i} \, (\text{Time}_{ti})^2 \\ + \pi_{ni} \, (\text{FamStr}_{ti}) + \pi_{ki} \, (\text{FamTran}_{ti}) + e_{ti}$$

Level 2:

$$\pi_{0i} = \beta_{00} + \beta_{01} \, \text{FamStrK}_i + \beta_{0p} \delta_i + r_{0i}$$
$$\pi_{1i} = \beta_{10} + r_{1i}$$
$$\pi_{2i} = \beta_{20} + r_{2i}$$
$$\pi_{ni} = \beta_{n0}$$
$$\pi_{ki} = \beta_{k0},$$

where Y was math assessment scores, FamStr was a vector of the time-varying dummy variables for children's family structure, and FamTran was the cumulative number of family transitions. Preliminary analyses revealed a nonlinear trend in children's math assessment

scores from kindergarten to eighth grade; therefore, all models contained Time and Time^2 to estimate the convex functional form of children's academic gains. In the Level 2 equations, FamStrK was the measure of children's family structure at kindergarten entry, and δ was a vector of the Level 2 control variables (e.g., female status, race/ethnicity, age). To address the first research question regarding the association between living in a same-sex parent family and children's math assessment scores, the reference group for the Level 1 variable of family structure was children living in married, two-biological parent households. Alternatively, to answer the second research question and determine whether the association between family structure and children's academic achievement was different for children in same-sex parent families compared with children living in opposite-sex parent nontraditional families, I set as the reference group children in same-sex parent families. Consequently, π_{ni} represents the instantaneous change in children's math assessment scores associated with living in the n type of family structure relative to children living in married, two-biological parent families in the first set of models and relative to children living in same-sex parent families in the second set.

The small number of children identified as living in same-sex parent families during each wave resulted in inflated standard errors of the estimates for this group and made it difficult to find statistically significant associations. To avoid making a Type II error (i.e., reporting a false negative), I present the results using a slightly elevated significance level, $p < .10$, and discuss them with special attention given to the direction of the estimated slope coefficients. In addition, p values are reported in the text to provide readers with additional information regarding the described associations.

RESULTS

Descriptive statistics are presented in Table 1 for the Level 1 variables and Table 2 for the Level 2 variables. The data in Table 1 report the distribution of children across the eight types of family structures for each grade as well as the mean number of cumulative transitions in family structure. By the final wave of the study, children had experienced an average of 0.53 transitions or, put differently, one out of every

Table 2. *Means and Standard Deviations of Time Invariant (Level 2) Covariates and Family Structure at Kindergarten Entry (*N = 19,107)

Variable	M	SD
Age (months)	74.765	4.475
Female	0.483	0.500
Race/ethnicity		
African American	0.166	0.372
First-time kindergartener	0.950	0.218
Non-English language in home	0.129	0.335
Parents' educational attainment		
High school or less	0.389	0.488
Family structure at kindergarten entry		
Married, two biological parents	0.609	0.488
Divorced	0.133	0.339
Stepparent	0.058	0.233
Single parent	0.111	0.314
Cohabiting	0.040	0.195
Widowed	0.006	0.076
Other	0.041	0.199
Same-sex parent	0.003	0.055

Note: Details may not sum to total because of rounding. All estimates are weighted.

two children had experienced a change to their family structure by the eighth grade.

In Table 3 I report the regression coefficients from the HLM analyses estimating the association between family structure and children's math assessment scores. Model 1 included only the time-varying indicators of family structure and provided a baseline association between family type and math assessment scores relative to children in married, two-biological parent households. The math scores for children in same-sex parent families were 3.4 points lower, on average ($p = .001$). Select sociodemographic characteristics were included in Model 2 and reduced the size of the coefficient for same-sex parent families, but children were still expected to score lower than their peers from married, two-biological parent families by approximately 1.8 points ($p = .060$). In the final math model, the cumulative number of family transitions and family structure at kindergarten entry were introduced, and the coefficient for children in same-sex parent families reversed sign, as children in these families were expected to score about 1 point higher than their peers in married, two-biological parent households, although the association was not statistically significant ($p = .486$). On the basis

Table 3. *Hierarchical Linear Modeling Growth Curve Estimates of the Association Between Family Structure and Children's Math Assessment Scores Relative to Married, Two-Biological-Parent Families (N = 19,043)*

	Model 1		Model 2		Model 3	
	b	*SE*	*b*	*SE*	*b*	*SE*
Level 1 coefficients						
Time	25.01**	0.08	25.04**	0.08	25.13**	0.08
Time^2	−1.52**	0.01	−1.53**	0.01	−1.53**	0.01
Family structure						
Divorced	−3.05**	0.21	−2.18**	0.20	0.05	0.31
Stepparent	−3.04**	0.30	−2.45**	0.29	0.92*	0.46
Single parent	−4.74**	0.27	−2.17**	0.28	0.86†	0.45
Cohabiting	−4.85**	0.29	−2.96**	0.29	−0.32	0.43
Widowed	−3.64**	0.63	−2.32**	0.60	−0.68	0.72
Other	−4.34**	0.40	−3.27**	0.41	0.99	0.74
Same-sex parent	−3.41**	0.98	−1.77†	0.94	0.82	1.17
Cumulative family transitions					−1.31**	0.19
Level 2 coefficients						
Family structure at kindergarten entry						
Divorced					−4.00**	0.47
Stepparent					−4.20**	0.58
Single parent					−1.88**	0.39
Cohabiting					0.74	1.36
Widowed					−3.29**	0.62
Other					−5.25**	0.88
Same-sex parent					−0.50	2.17
Age (months)			0.62**	0.02	0.62**	0.02
Female			0.64**	0.18	0.65**	0.18
Race/ethnicity						
African American			−3.53**	0.24	−3.15**	0.25
First-time kindergartener			3.55**	0.52	3.48**	0.52
Non-English language in home			−5.02**	0.26	−5.09**	0.26
Parents' educational attainment						
High school or less			−5.48**	0.19	−5.27**	0.19
Intercept	37.68**	0.12	36.66**	0.52	36.96**	0.52
−2LL	−261,091.56		−259,669.64		−259,572.54	

Note: All estimates are based on analyses that used the spring kindergarten sampling weight. LL = log likelihood.

$^†p < .10.$ $^*p < .05.$ $^{**}p < .01.$

of these results, children in same-sex parent families appeared to have lower baseline math scores, on average, than their peers in married, two-biological parent families, and this association was robust to select sociodemographic factors. On further examination, however, the negative relationship between same-sex parent families and children's assessment scores does not appear to be a result of the type of family structure but instead a reflection of the transitions affiliated with these families.

It is interesting that the association between family structure and children's math assessment scores was similar across the different types of nontraditional families. In Model 1, there was a negative association between each of the nontraditional structures and children's math assessment scores. On average, the scores for children from divorced and stepparent families were approximately 3 points lower and children in single-parent and cohabiting-parent families were nearly 5 points lower than children in married, two-biological parent households. Moreover, controlling for select sociodemographic characteristics explained away part of the gaps (see Model 2), and inclusion of the cumulative

number of transitions and kindergarten entry family structure reduced most of the negative relationships to statistical nonsignificance and, in some cases, statistically significant but positive associations (see Model 3). The outcomes for children in opposite-sex parent nontraditional families substantively resemble those described for children in same-sex parent families; I examine this similarity in more detail next.

In Table 4 I report the regression coefficients from the models estimating children's math assessment scores with same-sex parent families set as the reference group. The redefined reference group helped determine whether the outcomes of children from same-sex parent families were unique relative to children in other nontraditional families. If the estimated coefficients for other nontraditional family structures were statistically significant in these models, this indicated that the relationship between that family structure and children's math assessment scores was measurably distinct from the association observed for children in same-sex parent families. None of the coefficients for other nontraditional families were statistically significant, and in some models several of the coefficients were trending negative (e.g., divorced, single parent, and cohabiting),

indicating that children in same-sex parent families were expected to do slightly better than children in these opposite-sex parent nontraditional family structures. The presented results indicate that children in same-sex parent families experienced declines in their math scores comparable to their peers in other nontraditional families.

Additional evidence of the associations described herein was found in the models estimating children's reading assessment scores (see Appendix). Children in same-sex parent families had lower baseline scores relative to their peers in married, two-biological parent households; this association was largely explained away by the transitions children had experienced, however (see Appendix Table A1). Moreover, there was no evidence that the outcomes of children in same-sex parent families were unique relative to their peers from opposite-sex parent nontraditional families (see Appendix Table A2). The presented findings therefore indicate that the consequences of living in a same-sex parent family were similar to those associated with living in divorced, stepparent, and cohabiting parent families: There was evidence that these children did worse than their peers from traditional families, but

Table 4. *Hierarchical Linear Modeling Growth Curve Estimates of the Association Between Family Structure and Children's Math Assessment Scores Relative to Same-Sex Parent Families (N = 19,043)*

	Model 1		Model 2[a]		Model 3[b]	
	b	*SE*	*b*	*SE*	*b*	*SE*
Level 1 coefficients						
Time	25.01**	0.08	25.04**	0.08	25.13**	0.08
Time^2	−1.52**	0.01	−1.53**	0.01	−1.53**	0.01
Family structure						
Two biological parents	3.41**	0.98	1.77†	0.94	−0.82	1.17
Divorced	0.36	0.98	−0.41	0.94	−0.77	1.16
Stepparent	0.37	1.00	−0.68	0.97	0.11	1.18
Single parent	−1.33	1.01	−0.40	0.97	0.04	1.18
Cohabiting	−1.44	1.01	−1.19	0.97	−1.13	1.20
Widowed	−0.23	1.14	−0.55	1.10	−1.50	1.32
Other	−0.93	1.04	−1.51	1.01	0.17	1.31
Cumulative family transitions					−1.31**	0.19
Intercept	34.26**	0.98	34.89**	1.07	37.78**	1.27
−2LL	−261,091.56		−259,669.64		−259,572.54	

Note: All estimates are based on analyses that used the spring kindergarten sampling weight. LL = log likelihood.
[a]Included Level 2 control variables (e.g., gender, age, race/ethnicity, etc.). [b]Included Level 2 control variables and the Level 2 measures of family structure at kindergarten entry.
$^\dagger p < .10.$ ** $p < .01.$

the apparent detriment does not reflect the family structure and instead was indicative of disruptions, instability, and changes associated with the transitions accompanying the formation of these nontraditional family types.

DISCUSSION

Differences in academic achievement associated with living in traditional and nontraditional families are largely reflective of the transitions and changes that accompany the formation of such households and less clearly indicative of any inherent deficiencies in these family structures. On the basis of the findings presented herein, the academic achievement of children living in same-sex parent families conforms to this pattern, in that baseline disparities in children's assessment scores were accounted for by the transitions that children experienced. These results contrast with those of earlier studies that found no evidence of worse performance by children in same-sex parent families, even at a baseline level (Bos et al., 2007; Gartrell & Bos, 2010; Wainright & Patterson, 2006, 2008; Wainright et al., 2004), but the dynamic model of the family used in this study aligns these results with other research on opposite-sex parent nontraditional families (Cavanagh et al., 2006; Fomby & Cherlin, 2007; Sun & Li, 2009, 2011). Same-sex parent families are often created through a series of changes to and transitions in children's family structure; therefore, the view of the family incorporated into this study provides a more realistic account and reflection of the experiences of these children (Stacey, 2006; Telingator & Patterson, 2008). Nonetheless, not all same-sex parent families are created from dissolved opposite-sex relationships, and other research, in particular, the U.S. National Longitudinal Lesbian Family Study, continues to offer invaluable information regarding the outcomes of children in same-sex parent families and the benefit that a consistent family structure can have on the development of children regardless of parents' sexual orientation (Gartrell & Bos).

The results presented herein also reveal important similarities between same-sex and opposite-sex parent nontraditional families; specifically, there was evidence of score gaps for children from each type of nontraditional family relative to their peers from traditional families. The disparities were, however, measurably indistinguishable across nontraditional families. In addition, controlling for the cumulative number of family transitions and kindergarten-entry-family structure was important for understanding the score gaps associated with each of the nontraditional family types. The reported findings do not prove that the processes in all nontraditional families are the same, but they do highlight shared experiences in these families that are not typically discussed and that may be important to consider in research moving forward.

The results from this analysis can be used to inform several bodies of research, in particular, research on same-sex parent families and research on the consequences of family instability. All the findings reported herein, however, must be considered within the context of the study's limitations. First, the parents in the families identified by this study were not self-proclaimed lesbian mothers or gay fathers, and although the ECLS–K did not have a policy prohibiting same-sex parent households from participating in the data collection (G. Mulligan, personal communication, January 22, 2010), future research is needed that better details parents' residential and romantic relationships. Furthermore, this study identified same-sex parents only in two-parent households and thus leaves unanswered questions about children living with a single lesbian mother or gay father, or children in more complex family structures that might consist of joint parenting by lesbian, gay, and heterosexual parents. Moreover, of the families identified as same-sex parent, the majority (90%) were lesbian mothers, which is similar to prior research that has primarily concentrated on two-female parent households. Nonetheless, additional research is needed to examine possible uniqueness related to living with gay fathers and other family structures consisting of one or more gay or lesbian parents (Biblarz & Stacey, 2010).

The process for identifying children's wave-by-wave family structure placed additional constraints on this study that will, hopefully, be overcome in future research; specifically, the decision to replace missing values with the score preceding it may have obscured the timing of changes in children's family structure and mistakenly attributed lower assessment scores to the wrong family structure. Alternative-logic rules were tested and returned substantively similar results. It is also possible that the decision to retrospectively apply the first valid

measure of family structure to all preceding waves inadvertently produced false consistency for the family structures of certain children, and future studies that are able to provide more complete data are needed to confirm or correct reported patterns.

Finally, this study was able to classify more than 150 children as living in same-sex parent families, but these children were spread across five time points, which resulted in prohibitively small cell sizes. The small cell sizes resulted in larger standard errors and limited the number of control variables that could be included in the model. I controlled for a select set of sociodemographic variables that prior research had identified as important for understanding children's academic achievement, but it was not an exhaustive set. There are other characteristics of children that may help further explicate the disparities in assessment scores associated with family structure, such as children's mental and physical health, adoption status, and quality of family environment. Moreover, the primary explanatory variables (cumulative number of family transitions and kindergarten entry family structure) helped differentiate between the type and the number of changes children experienced, but were not the specific mechanisms connecting family transitions to children's poorer outcomes. Other factors associated with change in the family structure, such as lower family income, less parental supervision, or poorer psychosocial well-being in children, may account for the negative association, and future research with larger samples and more data will provide the statistical power researchers need. These limitations notwithstanding, this study pushes forward research on children in nontraditional families by offering a dynamic view of the family structure that captures the timing and transitions of children in same-sex parent households. Future research will likely benefit from more comparisons across different types of nontraditional families and a greater consideration of the experiences these families share.

Note

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APPENDIX

Table A1. *Hierarchical Linear Modeling Growth Curve Estimates of the Association Between Family Structure and Children's Reading Assessment Scores Relative to Married, Two-Biological-Parent Families (*N = *18,898)*

	Model 1		Model 2		Model 3	
	b	*SE*	*b*	*SE*	*b*	*SE*
Level 1 coefficients						
Time	31.89**	0.09	32.00**	0.09	32.13**	0.09
$Time^2$	−2.10**	0.01	−2.12**	0.01	−2.12**	0.01
Family structure						
Divorced	−4.48**	0.26	−3.38**	0.26	−0.41	0.42
Stepparent	−4.63**	0.39	−3.82**	0.38	0.56	0.64
Single parent	−6.49**	0.35	−3.65**	0.37	0.31	0.62
Cohabiting	−5.80**	0.41	−3.70**	0.41	0.26	0.61
Widowed	−4.17**	0.83	−2.48**	0.83	0.07	1.03
Other	−6.08**	0.51	−4.78**	0.52	−1.03	1.11
Same-sex parent	−4.43**	1.69	−2.15	1.57	0.95	1.90
Cumulative family transitions					−2.03**	0.25
Level 2 coefficients						
Family structure at kindergarten entry						
Divorced					−5.15**	0.68
Stepparent					−5.06**	0.78
Single parent					−2.19**	0.50
Cohabiting					−5.14**	0.82
Widowed					0.07	1.78

Table A1. *Continued*

	Model 1		Model 2		Model 3	
	b	*SE*	*b*	*SE*	*b*	*SE*
Other					−4.17**	1.24
Same-sex parent					0.84	2.60
Age (months)			0.43**	0.03	0.43**	0.03
Female			2.97**	0.23	3.01**	0.23
Race/ethnicity						
African American			−2.59**	0.33	−2.11**	0.33
First-time kindergartener			2.86**	0.65	2.77**	0.65
Non-English language in home			−5.04**	0.39	−5.07**	0.39
Parents' educational attainment						
High school or less			−7.57**	0.25	−7.26**	0.25
Intercept	48.09**	0.16	46.99**	0.66	47.31**	0.66
−2LL	−274,679.06		−273,758.50		−273,650.36	

Note: All estimates are based upon analyses that used the spring kindergarten sampling weight. LL = log likelihood.
** $p < .01$.

Table A2. *Hierarchical Linear Modeling Growth Curve Estimates of the Association Between Family Structure and Children's Reading Test Scores Relative to Same-Sex Parent Families (N = 18, 898)*

	Model 1		Model 2[a]		Model 3[b]	
	b	*SE*	*b*	*SE*	*b*	*SE*
Level 1 coefficients						
Time	31.89**	0.09	32.00**	0.09	32.13**	0.09
Time^2	−2.10**	0.01	−2.12**	0.01	−2.12**	0.01
Family structure						
Two biological parents	4.43**	1.69	2.15	1.57	−0.95	1.90
Divorced	−0.05	1.68	−1.23	1.57	−1.36	1.86
Stepparent	−0.19	1.70	−1.67	1.59	−0.39	1.89
Single parent	−2.06	1.71	−1.50	1.60	−0.64	1.90
Cohabiting	−1.36	1.72	−1.54	1.60	−0.69	1.92
Widowed	0.26	1.90	−0.33	1.79	−0.88	2.14
Other	−1.64	1.75	−2.62	1.64	−1.98	2.13
Cumulative family transitions					2.03**	0.25
Intercept	43.66**	1.68	44.84**	1.69	48.26**	2.01
−2LL	−274,679.06		−273,758.50		−273,650.36	

Note: All estimates are based on analyses that used the spring kindergarten sampling weight. LL = log likelihood.
[a]Included Level 2 control variables (e.g., gender, age, race/ethnicity, etc.). [b]Included Level 2 control variables and the Level 2 measures of family structure at kindergarten entry.
** $p < .01$.