Consequences of Low Fertility: China's One-Child Policy and Personality

One consequence of low fertility is that children are more likely to grow up without siblings. Historically, children who grow up without siblings have been thought to lack key experiences that are essential to the development of desirable personalities (Falbo & Polit, 1986). Despite this, China instituted in 1979 a family planning policy that strongly encouraged parents to have just one child. One of the goals of this policy was to reduce China's rate of population growth and it has been regarded as successful in meeting this goal (Hesketh & Xing, 2005). However, starting in the 1990s, and continuing to the present day, the TFR's of China have dipped below replacement levels and may have stayed there, placing China into what some Chinese demographers consider a low fertility trap (Morgan, Guo, & Hayford, 2009). Even though the OCP has been relaxed somewhat to allow more couples to have a second child, recent studies suggest that Chinese couples often stay with one child (Cai, 2010). Consequently, the near future of China may continue to contain a high percentage of one-child families.

In view of this likely continuation of low fertility in China, it is important to determine if the historic views of only children are applicable to contemporary China, that is, that their personalities are harmed by their lack of sibling experience. In the Chinese vernacular, children who are the product of the OCP have been described as Little Emperors, egocentric and willful (Wang & Fong, 2009). Given popular concern about Little Emperors, almost 200 studies have been conducted to compare only children to their peers with siblings (Falbo & Hooper, under review). The results have been mixed. Some studies have found that only children have stronger academic skills (Falbo & Poston, 1993), while other studies have found that their personalities to be undesirable (Jiao, Ji, & Jiang, 1986.). Then, in early 2013, Cameron and her colleagues (Cameron, Erkal, Gangadharan, & Meng, 2013) reported in *Science* that Beijing adults who grew up

without siblings were less trusting, conscientious, and optimistic than their peers with siblings. They arrived at this conclusion based on data they collected in 2010 Beijing and analyzed using Instrumental Variable (IV) analyses (Bloom, 2012; Imbens & Angrist, 1994). The IV technique requires that data be collected before and after the initiation of a policy, and Cameron et al. had data from Beijing adults, born in 1975, 1978, 1980, and 1983.

The goal of this study is to report the results of IV analyses on personality data collected in 1990 from representative samples of third and sixth graders in four provinces: Anhui, Beijing, Gansu and Hunan (*N* = 4000). When results were first reported, multivariate analyses of covariance were used to analyze these data in order to compare the scores of only children to firstborns and later-borns within province. Note that these data were originally collected and analyzed before the IV approach to regression discontinuity designs was invented.

This study aims to replicate and extend the work of Cameron et al (2013), by applying two-step, fixed-effects IV analyses similar to analyses done by Cameron et al. to the 1990 data. In this way, we will determine if this analytical technique reveals personality effects related to the OCP and being an only child, effects that were not identified when these data were originally analyzed using multivariate analyses of covariance. The results of this study will extend the work of Cameron et al by applying two-step IV analyses to data collected from representative samples of schoolchildren from four provinces, not just urban Beijing, where Cameron et al. located their data collection.

Method

Sample. The project that collected data from four provinces in China in 1990 used a multi-stage cluster sampling approach to collect data from 1000 schoolchildren in

each province. A more complete description of the sampling method was presented in Falbo and Poston (1993). Half of the schoolchildren were in the third grade (presumably born after 1979) and half of the schoolchildren were in the sixth grade (presumably born before 1979). From each of the randomly selected schools, one third-grade and one sixth-grade classroom were randomly selected. Within each selected classroom, five boys and five girls were randomly selected to participate. The final sample consisted of 4,000 schoolchildren from 200 schools.

Personality Assessment. The 1990 data included assessments of the personalities of schoolchildren by using The 32 Attributes Checklist, a checklist developed from Chinese standards of what desirable attributes for schoolchildren should be. The checklist was used by parents, teachers, peers, and the children themselves to determine whether the target child possessed the 32 personality attributes, such as respecting elders or exhibiting sympathy for others. We combined all the positive evaluations given by each judge (self, peer, parent, teacher) into a single score reflecting each of the four perspectives on the same individual. In this way, we were able to use the checklist evaluations from four different evaluators to triangulate the differences between only children and their peers with siblings.

Preliminary Analyses. The IV approach is an offshoot of Regression Discontinuity Designs (RDD: Cook, 2008) and has been more commonly used by economists than experts on human development. According to IV experts (e.g., Bloom, 2012), a first step in the process of applying IV analyses involves graphing the data to identify a discontinuity, which would represent the effect under study, in this case, the effect of the OCP. If we find no discontinuity between the frequency of only children born before and after the OCP in our 1990 data, then there would be no OCP effect to estimate. Since the OCP began in 1979, we assumed that there would be an observable *increase* in the

percentage of only children born after 1979, compared to the percentage of those born before 1979. However, as shown in Figure 1, we could not find a sharp cut-off between 1978 and 1979, despite the fact that the OCP was initiated in 1979. The graph reflects the birth years of all the schoolchildren in the 1990 data by their only-child status collapsed across province. Although the percentage of only children within each birth year increased after 1979, the percentage of only children born in 1978 was *higher* that that of 1979. Thus, in our search for a discontinuity, we found a fuzzy cut-off (Bloom, 2012), with the percentages of only children in our sample born in 1978 to be higher than the percentage born in 1979.

How can we explain this? Scholars of the OCP have pointed out that, although the OCP was initiated in 1979, it was built upon the LATER LONGER FEWER birth-planning program (LLF), which began in 1971. Feng, Cai, & Gu (2012) have argued that the LLF actually brought about a steeper drop in fertility in China than the OCP. Under the LLF, young Chinese couples were strongly pressured to wait later in their lives to start their families, and wait longer for the next child, and in general, have fewer children. According to our data, collected in 1990, couples that became parents in 1978 were waiting for permission to have a second child, but the OCP intervened, leaving them with just one child. More importantly, according to our 1990 data, **over 90% of the parents of only children born in 1978 reported having the one-child certificate**, which provided benefits to families in exchange for agreeing to have just one child (Falbo & Poston, 1994). This means that some children, born before 1979, became participants in the OCP.

The 1990 data had been collected in third and sixth grade classrooms, with the assumption that most of the children within each grade would have similar birth years. However, we discovered that there was a fairly wide range of birth years for each grade

level, with the birth years of schoolchildren in the sixth grade ranging from 1974 to 1981, and the birth years for the third graders ranging from 1976 to 1983. Because the personality scores might have been affected by being overage or underage for grade level, we decided to eliminate from our IV analyses students that were not "at grade level." Specifically, we restricted the sample to students in the sixth grade who were born between January 1, 1976 and December 31, 1977, and to students in the third grade who were born between January 1, 1980 and December 31, 1981. In this manner, we eliminated from our sample students who had been born in 1978 or 79, resulting in a reduction of our sample by 25%, as shown in Table 1. Another benefit of this elimination of students born in 1978 and 1979 was that we enhanced the sharpness of the cut-off, creating a clear discontinuity.

Fixed-Effects IV Analyses. After adjusting our sample to include only schoolchildren "at grade level" in terms of their age, we were able to observe a clear discontinuity, with the proportion of only children born after the OCP being much higher than the proportion of only children born before the OCP.

Table 2 reports the proportion of only children in the reduced sample in the Pre-OCP and Post-OCP cohorts, stratified by province and region. It can be seen that the OCP had larger effects in urban areas than in rural areas, except for Beijing, where the effect in rural areas is markedly larger than found in the rural areas of other provinces. In order to evaluate the degree of these discontinuities, we allowed the policy effects to vary by region (urban, rural) and between Beijing and the other provinces (Beijing, other), for a total of four instruments. In a model with fixed effect for each school and additional controls for student sex and mother's education, the instruments were found to have a joint *F*-statistic of 53.7. Allowing the effect to vary across the other provinces

has minimal additional explanatory power (p = 0.93). These findings support the strength of the instruments.

In order to estimate the effect of the OCP on the personalities of the schoolchildren, we ran another set of analyses, linear regressions of the four personality measures on the policy indicator, student's gender, indicators of mothers' level of education, and fixed-effects for each school in the sample. The four personality scores were re-scaled to have unit standard deviations so that the estimates can be interpreted as standardized mean differences.

The results of the IV analyses examining the effects of the OCP on personality are presented in Table 3 and they indicate that the policy effects are discrepant across the different personality measures. The effects are statistically indistinguishable from zero for the self-report and teacher-report measures. However, the results indicate that the policy decreases the number of desirable personality attributes reported by parents by about -0.1 sd and by peers by about -0.2 sd. Both effects are distinguishable from zero.

Next, we continued our fixed-effects IV analyses to estimate the average effect of being an only child on the personality scores. The results are presented in Table 4 and indicate that the only-child effect on self-reported, parent-reported, and teacher-reported personality scores were moderate in magnitude and statistically insignificant. However, being an only child appears to have reduced peer-reports of desirable personality attributes by a substantial amount, estimated to be about -0.37 sd.

Finally, we continue the fixed effects IV analyses, to examine if the only-child effects observed in Table 4 can be found to vary across the provinces and regions. In this section, we repeat the IV analysis but allow the effect of being an only child to vary

by province and urbanicity. Note that this necessitates interacting the instrument by province and urbanicity as well.

The results are reported in Table 5. In the urban regions, the only-child effect was estimated for each province; in the rural regions, a separate effect was estimated for Beijing but the effect for the remaining provinces was pooled. Results for rural areas other than Beijing should be interpreted with considerable caution due to the weakness of the instrument.

The results presented in Table 5 indicate substantial heterogeneity of only-child effects not only across the four personality scores, but also across provinces and region. Among self-ratings, the results in Table 5 indicate that only children in the urban part of Beijing actually gave themselves *higher* ratings than did their peers with siblings. Otherwise, there were no only-child effects within self-ratings. Among parent-ratings, only children received lower ratings in urban Anhui than their peers with siblings. Otherwise, there were no only-child effects within parent-ratings. No significant only-child effects were found in teacher ratings. Peer-ratings yielded the largest number of only-child effects, with significant disadvantages found for only children compared to their peers with siblings in rural Beijing, as well as the pooled rural areas of the other three provinces. Also, only children received lower peer evaluations from peers in urban Hunan.

Discussion

One consequence of low fertility is the increased likelihood that children will grow up without siblings. Traditional views of human development have argued that experiences with siblings are essential for desirable personality development. The results of the IV analyses reported here suggest that there *were* effects of China's one-child policy on the personalities of schoolchildren. However, we found that these effects varied substantially by type of personality evaluation, as well as region and province.

In particular, in urban Beijing, only children described themselves as having *more positive* attributes than did their peers who grew up with siblings. No other only-child effects were found among self-evaluations from schoolchildren residing in the other provinces and regions. For parent-evaluations, only children in the urban part of Anhui province were found to receive *lower* parent evaluations. However, analyses of parent scores from the other provinces and regions did not produce a significant only-child effect. Note that the results of the analyses of the evaluations of teachers did not yield any significant only-child effects at all. Nonetheless, the results of analyses of peer evaluations yielded several only-child effects. In rural areas (in Beijing and elsewhere), only children received *lower evaluations* from their peers, but these results should be considered with caution since the instrument was relatively weak in rural regions. The instrument in urban provinces were stronger and, in one urban province, Hunan, only children were evaluated significantly *lower by their peers* than were schoolchildren who grew up with siblings.

Taken as a whole, these findings are <u>not</u> consistent with the overwhelmingly negative only-child effects that Cameron et al reported. How can we explain this? There are several possibilities. First, and most obviously, the Cameron sample consisted of adults, who had responded to an advertisement and came to a testing site in the Beijing business district. It is possible that only-child effects vary over the life-course, and therefore, negative only-child effects on personality may not emerge until adulthood. Second, members of the present sample were all schoolchildren, and data about these randomly selected children were collected from their parents in their homes, and teachers, classmates, and the children themselves within their own classrooms. The schoolchildren came from four distinct provinces, sampling within the urban and rural regions within each province. It is possible that the self-selected sample used by Cameron et al introduced biases that we can only speculate about. Only future research

based on data from representative samples of adults can provide a resolution for the discrepancy.

Overall, the results reported here reflect substantial heterogeneity across regions and provinces in terms of OCP and only-child effects on personality. These findings suggest that the next step in the application of IV analyses to these data is to apply random-effects IV analyses, following an approach described by Raudenbush, Reardon, & Nomi (2012). In this way, we will be able to estimate more carefully school and county-level effects on the four personality scores within these data, as we proceed to evaluate only-child effects within each province and region.

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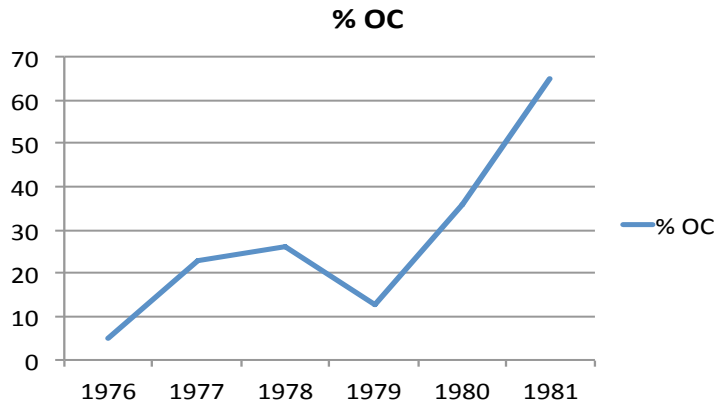

Figure 1. Percentage of only children within sample (N=4000) by birth year.

Table 1: Reduced Sample by Province and Pre/Post OCP

Province	Born Pre OCP	Born Post OCP	Sum
Anhui	199	310	509
Beijing	351	467	818
Gansu	302	344	646
Hunan	303	363	666
Sum	1155	1484	2639

Table 2: Proportion of Only Children and Difference by Province and Region

Province	Region	Pre OCP	Post OCP	Difference
Anhui	Urban	.108	.661	.553
	Rural	.022	.115	.093
Beijing	Urban	.542	.848	.306
	Rural	.095	.447	.382
Gansu	Urban	.167	.620	.454
	Rural	.038	.125	.087
Hunan	Urban	.373	.812	.438
	Rural	.023	.058	.035

Table 3. OCP Effects on Four Personality Scores

Personality Score	Estimate	Standard Error	*p*-value	*n*
Self	-0.042	0.050	0.407	2590
Parent	-0.104	0.043	0.015*	2609
Teacher	-0.019	0.062	0.760	2607
Peer	-0.186	0.048	0.000*	2594

* $p < .05$

Table 4. Only-Child Effects on Four Personality Scores

Personality Score	Estimate	Standard Error	*p* value	*n*
Self	-0.134	0.183	0.463	2590
Parent	-0.212	0.148	0.153	2609
Teacher	-0.173	0.214	0.419	2607
Peer	-0.366	0.166	0.028*	2594

* $p < .05$

Table 5. Only-Child Effects on Four Personality Scores by Province and Region

Province/Region	Estimate	Standard Error	P Value
Self			
Rural: Beijing	-0.112	0.504	0.823
Rural: Other	-0.596	1.705	0.727
Urban: Anhui	-0.439	0.347	0.205
Urban: Beijing	+0.736	0.287	0.011*
Urban: Gansu	-0.518	0.353	0.143
Urban: Hunan	-0.186	0.486	0.702
Parents			
Rural: Beijing	-0.257	0.334	0.441
Rural: Other	-3.251	1.948	0.095
Urban: Anhui	-0.671	0.291	0.021*
Urban: Beijing	+0.180	0.311	0.562
Urban: Gansu	-0.169	0.264	0.522
Urban: Hunan	-0.419	0.413	0.310
Teacher			
Rural: Beijing	+0.170	0.609	0.780
Rural: Other	+0.650	2.112	0.758
Urban: Anhui	-0.063	0.329	0.848
Urban: Beijing	-0.383	0.465	0.409
Urban: Gansu	-0.174	0.384	0.651
Urban: Hunan	-0.284	0.563	0.614
Peer			
Rural: Beijing	-0.977	0.410	0.017*
Rural: Other	-5.197	2.296	0.024*
Urban: Anhui	-0.170	0.311	0.584
Urban: Beijing	-0.270	0.343	0.431
Urban: Gansu	-0.093	0.260	0.721
Urban: Hunan	-1.016	0.476	0.033*

Note. The proportion of only children in rural parts of Beijing was similar to the proportion in urban Bejing, therefore data from this rural region was analyzed separately. Data from the other rural regions were pooled across provinces because they exhibited substantially smaller proportions of only children than their urban counterparts.

* $p < .05$