Playing Well with Others in China: The Benefits of Having No Siblings at Home

Recently, Downey & Condron (2004) investigated the influence of growing up with siblings on the social and academic skills of American kindergarteners, based on a nationally representative sample. Consistent with previous research (Falbo & Polit, 1986), Downey & Condron found that kindergarteners that lived without siblings (i.e., only children) were found to outperform children with two or more siblings on reading and mathematics skills. Contrary to previous research (Falbo & Polit, 1986), however, Downey & Condron found that only children scored lower on teacher ratings of interpersonal skills than children with one, two, or three siblings. Likewise, Downey & Condron reported that, according to their teachers, only children expressed more externalizing problem behaviors and less social control than children with siblings. When the evaluations of parents were considered, Downey and Condron reported that parents rated their only children as well or better than children with siblings, although they agreed with teachers that only children exhibited higher levels of externalizing behaviors. Given their results, Downey and Condron argued that the presence of siblings hinders the acquisition of academic skills, while benefiting the acquisition of social skills, although they acknowledged that they could not discount the possibility that other factors, such as parent selectivity, were contributing to these differences between only children and others.

These findings have implications for China, where the one-child policy has been in effect for over 20 years and where many urban residents born since 1979 grow up without siblings. In 1990, Falbo and Poston (1993) conducted a survey of a representative sample of third and sixth graders from four provinces in China in order to

evaluate the social and academic skills of only children. The sample of 4000 schoolchildren, equally divided between four provinces (Anhui, Beijing, Gansu, and Hunan) reflected the frequency of only children in third grade (N=818) as well sixth grade (N=418) at that time. Teachers, parents, and the children themselves evaluated their attributes, using a checklist. Teachers provided the school-based evaluations of the students' language and math skills for the previous two semesters.

Previous analyses of these data indicated that the differences between only children and others were most commonly found in academic skills and infrequently found in social skills. When differences were found, they were small, even if statistically significant. The biggest differences were found in academic skills, with only children outscoring others. Contrary to the findings of Downey and Condron (2004), however, the predominant finding regarding the social skills of only children was that at least in three out of the four provinces, only children were evaluated similarly to those who grew up with siblings.

The present study represents a reanalysis of these data in order to deepen our understanding of only-child effects in social and academic skills, particularly focusing on the moderating influences of province, region, grade level, and the child's sex. In terms of outcomes, we consider school-based academic evaluations, in Chinese language and mathematics, and social skills evaluations, made by parents, teachers, and the children themselves. Finally, we examine some characteristics of only children and their families, in order to help us understand the only-child effects we observe.

Method

Sampling Procedure

We employed a multistage cluster sampling approach to select the sample of 4000 schoolchildren, drawn from primary schools. Our goal in each province was to choose a sample of one thousand children, 500 from the third grade and 500 from the sixth grade. We desired this distribution by grade because the sixth graders would have been born just before the beginning of the one-child policy, while the third graders would have been born just after the initiation of this policy. We ascertained the percentage of the province that was classified as urban and selected the capital city of each province, plus an additional two to five randomly selected urban districts from which to draw our samples of urban children. The remaining children were drawn from randomly selected rural counties. We then obtained a list of all elementary schools in each of the sampled urban districts and rural counties. We randomly selected schools and asked the principal for permission to select randomly one third- and one sixth-grade classroom from which to draw students for our sample. If the principal agreed, then we randomly selected 10 children from the selected third and 10 children from the selected sixth grade classrooms. Half of each classroom sample had to be female. If the principal declined, then we randomly selected another school to approach from the list of all schools within the selected urban district or rural county. We continued randomly selected schools until we had received permission from enough schools to satisfy our sampling goals. Data were collected by Chinese colleagues near the end of the school year.

Instruments

Academic Skills. The main classroom teachers of our sampled children were asked to report the Chinese language and mathematics grades they had given these children during the last two grading periods. For each student, these scores were

averaged to reflect the degree of academic success the children had recently achieved in math and verbal skills.

Social Skills. A checklist was developed in order to assess the traits and behaviors of Chinese schoolchildren (see Falbo & Poston, 1993). The checklist was presented in terms of opposites, with a positive statement of an attribute on one side and its reverse on the other side. The order of these 32 attributes was randomly presented on a sheet of paper, and the respondent was asked to check the attribute that best described the designated child. One of the child's parents, the child's main classroom teacher, and each child completed his or her own copy of this checklist.

Data Analysis Plan. In order to evaluate the only-child effect in academic and social skills, several multivariate analyses of covariance were conducted. At first, we considered as dependent variables, scores representing two types of academic skills, and in the second analysis, we considered as dependent variables, scores representing the two types of social skills. In all of our analyses, the independent variables were Province (Anhui, Beijing, Gansu, Hunan), Region (urban, rural), Grade Level (third or sixth grade), Sex (boy or girl), as well as Only Children (only child vs. all others, only vs. one sibling, or only vs two or more siblings), and we also considered in our model all the two-way interaction effects between the only-child variable and the other independent variables in the model. We used as covariates family income and parents' education.

Results

Description of Sample. Table 1 presents the percentage of only children found in

Table 1
Percentages of Only Children by Province and Grade Level

	Grade Level

Province	Third	Sixth
Anhui	29	12
Beijing	72	40
Gansu	33	15
Hunan	30	16

each province's third and sixth grade sample. Overall, Beijing Municipality had the highest percentage of only children (56%), while Anhui (21%), Gansu (24%), and Hunan (23%) had similar, lower percentages. Only children were much more common in the third than sixth grade.

Factor Analysis. In order to measure more specific aspects of the students' social skills, we conducted three principal components analyses, one each for the parents', teachers' and students' self-evaluations, using a varimax rotation with Kaiser normalization. The first two factors produced by these three factor analyses were highly similar. For parents, teachers, and students, the following attributes loaded heavily on the first factor: independent, persistent on tasks until completed, confident, determined, works on homework on own, and resolute. The following attributes loaded heavily on the second factor: cooperative, follows direction well, compliant with teacher, careful while handling objects, honest, and good manners. Within rater, we summed the evaluations of the attributes loading on the first factor, and labeled it autonomy, and we summed the evaluations of the attributes loading on the second factor, and labeled it cooperativeness. Thus, we created three scores that represented, respectively, the parents', teachers', or students' assessments of the students' autonomy, and three scores representing,

respectively the parents', teachers', and students' assessment of the students' cooperativeness. Characteristics of these six scores are presented in Table 2 along

Table 2

Characteristics of the Scores Used as Dependent Variables

Score Type	Low Score	High Score	Unadjusted Mean Score	Alpha Coefficient
Achievement				
Verbal	8	100	78.77	
Math	11	100	79.23	
Social				
Autonomy				
Parents	0	6	4.00	.6874
Teachers	0	6	3.49	.8180
Students	0	6	4.47	.5849
Cooperative				
Parents	0	6	4.14	.6508
Teachers	0	6	4.40	.7405
Students	0	6	4.33	.6617

with the characteristics of the academic skills scores.

Academic Skills. According to the multivariate analyses of covariance results, expressed here as Wilk's Lambda, only children scored higher than their peers with siblings in academic skills, F (2, 3867) = 6.46, p = .0016. This only-child advantage was statistically significant when only children were compared to children from two-child families, F (2, 2532) = 3.36, p = .0355. Likewise, the only-child advantage was statistically significant when only children were compared to children from three or more child-families, F (2, 2520) = 4.62, p = .023. Furthermore, in terms of the univariate results for language skills, only children scored higher than children with siblings, F (1, 3868) = 11.06, p = .0009. For math skills, the only-child effect also produced a significant univariate F (1, 3868) = 9.89, p = .002. The means and standard deviations for only children and their counterparts are presented in Table 3, as well as the Cohen's d

Table 3

Language and Math Skills: Means and Effect Sizes for Only Children vs. Others

Academic Skill	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	*Cohen's d*
	N=1202	N = 2682	
Language Skills	83.22 (10.94)	76.93 (12.45)	.54
Math Skills	84.51 (12.35)	77.07 (15.42)	.53
	$M_{Only\ Children}$ (standard deviation) N = 1202	$M_{One\ Sibling}$ (standard deviation) N = 1347	
Language Skills	83.22 (10.94)	78.91 (12.04)	.38
Math Skills	84.51 (12.35)	79.35 (14.79)	.38

	$M_{Only\ Children}$ (standard deviation) N=1202	$M_{Two+\ Siblings}$ (standard deviation) N=1335	
Language Skills	83.22 (10.94)	74.93 (12.54)	.70
Math Skills	84.51 (12.35)	74.77 (15.70)	.69

(Cohen, 1977), a statistical expression reflecting the magnitude of the difference between only children and others. For comparison purposes, the unadjusted means of schoolchildren from two-child families, and from three or more child families, are included in Table 3. Overall, the information in this table suggests that the only-child advantage in school achievement is of moderate size overall, but greatest when only children are compared to children from larger families.

In addition, the multivariate results indicated that third graders received higher scores than sixth graders, F (2, 3867)= 26.89, $p < .0001$, and girls scored higher than boys, F (2,3867) = 40.94, $p <.0001$. Academic skills varied significantly by province, F (6, 7734) = 50.81, $p < .0001$, with students from Beijing scoring higher than students from the other three provinces.

We considered whether the only-child effect in academic skills varied by region, grade level, sex, or province. We found that all the two-way multivariate interactions between the only-child variable and the other independent variables to be statistically significant, except for the nonsignificant interaction between the only-child and region variables.

In terms of the univariate analyses of language scores, we found the only-child variable interacted significantly with grade, school, and province. Specifically, the

interaction between the only child and grade level variables yielded a significant univariate effect, F (1, 3868) = 15.03, p = .0001. The means are presented in Table 4 and

Table 4

Mean Language Skills: Only Children by Grade Level

Grade Level	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	*Cohen's d*
Third Grade	84.43 (10.39)	76.97 (13.80)	.61
Sixth Grade	80.84 (11.63)	76.81 (11.40)	.35

indicate that the only child advantage was greater for third graders than sixth graders. Finally, the interaction between the only-child variable and province was significant, F (3, 3868) = 10.02, $p < .0001$. Table 5 presents the means and effect sizes, indicating that the only child advantage varied from moderate levels in Anhui, Gansu and Hunan, to levels so low as to be nonexistent in Beijing.

Table 5

Mean Language Skills: Only Children by Province

Province	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	*Cohen's d*
Anhui	80.45 (11.16)	76.42 (11.64)	.35
Beijing	86.12 (10.89)	85.89 (10.63)	.02
Gansu	79.78 (9.94)	73.06 (12.06)	.61
Hunan	82.29 (10.05)	76.12 (12.16)	.55

In terms of the univariate analyses of math scores, we found that the only-child variable interacted significantly with sex and province. As presented in Table 6, the interaction of the only child and sex was significant, F (1, 3868) = 5.55, p = .0185, and indicated that the only-child advantage was somewhat larger in girls than boys.

Table 6

Mean Math Skills: Only Children by Sex

Sex	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	Cohen's d
Boys	83.58 (12.85)	77.53 (15.35)	.43
Girls	85.49 (11.72)	76.62 (15.47)	.65

Finally, the only-child effect varied by province, F (3, 3868) = 8.75, p <.0001. The means are presented in Table 7 and suggest that the only-child advantage exists in Anhui, Gansu, and Hunan, but not Beijing.

Table 7

Mean Math Skills: Only Children by Province

Province	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	*Cohen's d*
Anhui	81.66 (13.62)	75.71 (15.65)	.41
Beijing	87.86 (10.83)	88.07 (11.44)	-.02
Gansu	80.88 (12.10)	73.70 (14.60)	.54
Hunan	82.74 (12.84)	75.52 (15.23)	.51

Social Skills. According to the multivariate analyses of covariance results, expressed here as Wilk's Lambda, only children scored lower than children with siblings on social skills, F (6, 3803) = 6.52, $p < .0001$. The univariate analyses revealed that this only-child effect was statistically significant for parents' autonomy scores, and the cooperativeness scores of teachers, parents, and the students themselves. This multivariate only-child effect was statistically significant when only children were compared with children from two-child families, F (6, 2475) = 4.24, $p = .0003$. The subsequent univariate analyses indicated that this only-child effect was significant for parents' autonomy scores and the cooperativeness scores of parents and students. Likewise, the multivariate only-child effect was statistically significant when only children were compared to children from three or more child-families, F (6, 2473) = 7.15, $p < .0001$. The univariate analyses indicated that this only-child effect was significant for parents' autonomy scores and the cooperativeness scores of teachers, parents, and students. The means and standard deviations for only children and their counterparts are presented in Table 8.

Table 8

Social Skills: Means and Effect Sizes for Only Children vs. Others

Social Skill	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	*Cohen's d*
	N=1166	N = 2658	
Autonomy			
Parents	3.50 (1.72)	4.23 (1.65)	-.43
Cooperativeness			

Teachers	4.16 (1.76)	4.52 (1.68)	-.21
Parents	3.72 (1.72)	4.33 (1.59)	-.37
Students	4.08 (1.67)	4.43 (1.57)	-.22
	$M_{Only\ Children}$ (standard deviation) N = 1166	$M_{One\ Sibling}$ (standard deviation) N = 1330	
Autonomy			
Parents	3.50 (1.72)	4.11 (1.67)	-.36
Cooperativeness			
Parents	3.72 (1.72)	4.18 (1.62)	-.28
Students	4.08 (1.67)	4.33 (1.57)	-.15
	$M_{Only\ Children}$ (standard deviation) N=1166	$M_{Two+\ Siblings}$ (standard deviation) N=1328	
Autonomy			
Parents	3.50 (1.72)	4.34 (1.62)	-.50
Cooperativeness			
Teachers	4.16 (1.77)	4.67 (1.62)	-.30
Parents	3.72 (1.72)	4.47 (1.55)	-.46
Students	4.08 (1.67)	4.54 (1.56)	-.28

In addition, the multivariate results indicated that third graders generally scored lower on social skills than sixth graders, F (6, 3803)= 15.09, $p < .0001$; girls scored

higher than boys, F (6,3803) = 47.34, p <.0001; and rural children scored higher than urban ones, F (6, 3803) = 16.21, p <.0001. Social skills evaluations varied significantly by province, F (18, 10757) = 7.30, p < .0001

We considered whether the only-child effect in social skills varied by region, grade level, sex, or province. In social skills, the only-child variable interacted significantly with province only, F (18, 10757), 1.74, p = .03. Univariate analyses of covariance indicated that the only-child variable interacted significantly with province only for the students' own ratings of cooperativeness, F (3, 3808) = 4.10, p = .007. The means are presented in Table 9.

Table 9

Mean Self-Ratings of Cooperativeness: Only Children by Province

Province	$M_{Only\ Children}$ (standard deviation)	$M_{Not\ Only\ Children}$ (standard deviation)	*Cohen's d*
Anhui	3.77 (1.80)	4.30 (1.59)	-.31
Beijing	4.47 (1.50)	4.47 (1.46)	0
Gansu	3.57 (1.70)	4.26 (1.69)	-.41
Hunan	4.01 (1.67)	4.72 (1.44)	-.46

Covariates & Only Children. In order to determine if the parents of only children differed from parents of more children, we examined some possible characteristics that might differentiate one-child families from others. First, we compared only children to other students on mothers' or fathers' education (ranging from 1, none, to 8, graduate degree). We found that mothers of only children (M = 4.36) had substantially more

education than the mothers of multiple children (M=2.88). Similarly, we found that fathers of only children (M = 4.68) had more education than fathers of multiple children (M = 3.75). We also compared only children to others in terms of total family income for the last year (ranging from 1, less than 1000 yuan, to 10, more than 5000 yuan). We found that parents of only children (M = 6.40) reported more income than did parents of more children (M = 4.99).

Discussion

The results of this study regarding Chinese only children are largely consistent with those of Downey & Condron (2004) regarding American only children. That is, we found that Chinese only children are advantaged in academic skills, but disadvantaged in social skills. In the present analyses, we found that the only-child advantage in academic skills and the only-child disadvantage in social skills was obtained regardless of whether only children were compared to children from two or three or more child families. Furthermore, these only-child effects were found regardless of our controlling for characteristics we knew distinguished one-child families from others, notably parents' education and family income.

While there are similarities in the results of both studies, there are also differences, particularly in measurement of academic and social skills, and the presence of moderators in the analyses. The academic skills considered here consisted of the students' two most recent scores on their language and mathematics achievement, as measured by the teachers in their schools. In contrast, the academic scores in the American study were based on standardized tests of "readiness." Clearly, the Chinese

data reflect academic achievement, while the American data reflect intellectual abilities involved in schoolwork.

The social skills scores in the Chinese data represent a subset of attribute evaluations made by parents, teachers, and the schoolchildren, themselves, while the American study focused largely on the social skills ratings of teachers, while minimizing the findings about the ratings of parents. Specifically, Downey and Condron reported that the teacher ratings of only children's interpersonal skills were lower than those of children with at least one sibling, while the parent ratings of only children's interpersonal skills were similar to those of parents of two or three children and better than that of parents of four or more children. In contrast, in the present study, only parents evaluated their only children as lower in autonomy, while teachers and students evaluated them similarly to students with siblings. In terms of cooperativeness, however, all three evaluators rated only children lower than they evaluated children with siblings.

Furthermore, while it is tempting to equate autonomy and cooperativeness with the scale scores considered by Downey and Condron, it is important to note that the items on the Chinese autonomy and cooperativeness scales are not the same as the items on the interpersonal, social control, or externalizing scales of the American study. The cooperativeness scale here reflects the degree to which the targeted child cooperated with teachers and behaved well in the classroom. The autonomy scale here reflects the degree to which the targeted child had acquired an approach to schoolwork that was successful and independent of teacher and peer assistance. Thus, the results of the present study clearly indicates that only children were regarded as less cooperative than children with

siblings, but the results regarding autonomy are not as clear, since the finding appeared to be limited to parent and not teacher or student ratings.

While it is tempting to conclude that our results are proof that the presence of siblings hinders school achievement and enhances social development, we regard our results as offering clues as to additional explanations for these only-child effects. In academic skills, we found the only-child advantage was moderated by grade level, sex, and province. The degree of only-child advantage varied by grade level and sex. However, in one province, Beijing, there was no only-child effect at all. In social skills, we found the only-child disadvantage was moderated only by province, not sex, grade level, or region. In social skills, the multivariate interaction between the province and only-child variable was also statistically significant, but our univariate results indicated that this interaction was significant only for the students' self-ratings of cooperativeness. In this one aspect of social skills, the only-child disadvantage in social skills was of moderate magnitude in all provinces except Beijing, where the difference between onlies and others did not exist.

Note that Beijing had the highest percentage of only children in its sample, with over half of all students being only children, while the prevalence of only children in the other samples was lower, averaging 22.6% of these samples. Indeed, an outside observer might have assumed that an even higher percentage of these students would have been only children, given China's one-child policy (Banister, 1987). The relatively higher percentage of only children in Beijing suggests that the government's one-child policy was more effective here, thereby reducing the parent selectivity effects in Beijing. We did try to remove the variance associated with objective differences between parents of one

child versus parents of larger families, namely, parents' education and family income. Our only-child effects prevailed despite the use of these variables as covariates in our analyses. However, in light of the failure to find strong differences between only children and others in Beijing, where only children predominated, we suspect that there are subjective differences between parents of one versus more children that we have not considered yet, and that these subjective differences bring about the only-child advantage in school achievement and disadvantage in social skills. Future research will be aimed at uncovering these subjective differences.

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