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China's Only Children and Psychopathology: A Quantitative Synthesis

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Abstract

The goal of this study is to synthesize quantitatively the results of studies of psychopathology among Chinese only children. Since 1979, China's one-child policy has generated large numbers of only children, especially in large urban centers, where the one-child family has become a social norm. Motivated by concern for mental health, 22 studies, based on the SCL-90, have been published that compare the scores of only children to their peers with siblings. The raw effect sizes generated by each study underwent adjustments in order to enhance the reliability of the findings, including the identification and replacement of outliers, and weighting by inverse-sample size. In addition, analyses were conducted to evaluate the degree of publication bias exhibited by this collection of studies and the results from the SCL-90 studies were compared to studies using alternative measures of anxiety and depression. Overall, the synthesis found small, but significant advantages for only children compared to their peers with siblings, regardless of subscale. However, moderators of this only-child effect were also found: only children as college students reported significantly fewer symptoms, regardless of subscale; while only children as military recruits reported more symptoms, although the findings about military recruits received less support from the analyses. Furthermore, the size of the only-child advantage was found to be greater for only children born after the policy. Conclusions based on this synthesis are limited by the fact that this body of studies is based on convenience samples of relatively successful youth.

Since 1979, China's national family planning program has been known outside of China as the one-child policy (OCP). The OCP has been so successful that the one-child family has become a social norm in urban China (McIntyre, 1998; McLoughlin, 2005; Wang & Fong, 2009). However, the policy was never intended to apply to everyone living in China (Chen & Kols, 1982; Greenhalgh, 2010) and currently applies to only about 60% of Chinese couples (Gu & Cai, 2011). The percentage of women, aged 35 to 44 in 2005, with just one child ranges from nearly 80% in big cities, such as Shanghai and Beijing, to less than 20% in western provinces, such as Yunnan and Tibet (Feng, Cai, & Gu, 2012). Rural families throughout China have been allowed to have two children, especially if the first child is a girl (Short, Xu, & Liu, 2013). To understand the impact of the OCP on families and children, one needs to appreciate that the OCP was launched alongside other national policies aimed at accelerating the economic development of China (Fong, 2004; Liu,

Munakata, & Onuoha, 2005). Together, this package of policies has been successful in reducing the rate of population growth, while at the same time, expanding the economy of China, so that it now has the second largest economy in the world (Feng et al. 2012).

Nationally, the OCP was framed as a trade-off between quality and quantity (Chen & Kols, 1982; Short et al. 2013). Specifically, young, married couples were told that instead of having two or more children, they should have just one child, but a child of higher quality. Parents who committed themselves to having just one child were given benefits, such as extra pay and priority at schools and clinics (Falbo & Poston, 1994). These benefits were intended to reward parents and also to enhance the quality of the single children. There is evidence that one-child parents invested in their children more than did parents of more children. For example, based on their analyses of interview data from the 1993 China Health and Nutrition Survey (CHNS), Short, Zhai, Xu, & Yang (2001) found that among preschool-aged children, those with no siblings were more likely to receive care from both their mothers and fathers, and low-income parents were more likely to send their single children to preschool than were their peers with more children. Furthermore, Short et al. (2013) drew a sample from the 2004 CHNS and found that children growing up without siblings were advantaged in many ways, including having parents with higher levels of education and wealth. Even after adjusting for these advantages, Short et al found that only children were more likely to report participating in formal extra-school activities, eating more vegetables and fruits, and exercising more frequently than did their peers with siblings (Short et al. 2013).

Soon after the OCP began, critics of the policy complained that it would create a generation of Little Emperors, that is, young people who were spoiled, lacking self-discipline, and having no adaptive capabilities (McLoughlin, 2005; Wang & Fong, 2009). The theory that the OCP created Little Emperors was based on the assumption that only children would be overindulged and overprotected by their two parents and four grandparents, leading the children to develop undesirable personalities and poor mental health. In response to widespread concern about Little Emperors, many studies were conducted to examine the mental health of the Chinese children, comparing them to their peers with siblings, on a variety of outcomes, including psychopathology (e.g., Tao, 1998; Tseng et al. 1988; Wang & Fong, 2009; Yang et al. 1995). The purpose of this study is to synthesize quantitatively the results of these studies of psychopathology. Because most of these studies were conducted by Chinese scholars and published in Chinese journals, this body of work would otherwise not be easily accessible to scholars outside China.

This predominance of publications from Chinese journals raises questions about the quality of this body of empirical research.¹ We address these concerns about quality throughout

¹Standards of academic publishing have been different in China, compared to the U.S. For example, Chinese journal articles rarely cite more than six articles in each published study. Historically, this stems from limited access to the research literature generated internationally as well as within China. One consequence of this limitation is that the impact factor scores for all Chinese journals are low, compared to American journals. We obtained the impact factor scores for the most prestigious Chinese journals in psychology and found that they range from 0.265 to 1.528. We obtained the impact factor scores of the journals that published the studies included in our meta-analyses and found that they are within this range (0.25 to 1.37). In addition, we investigated the use of peer review by visiting the web sites of the journals that published the studies synthesized here. We discovered that almost all of them described using some form of peer review in selecting articles for publication.

these meta-analyses, conducting tests that identify outlying values and then replacing them (Barnett & Lewis, 1994) and then weighting the effect sizes to allow for greater influence of larger samples (Hedges & Olkin, 1985). Furthermore, we evaluate the degree of publication bias (Rothstein, Sutton, & Borenstein, 2005) present in our collection of Chinese only-child studies. We also compared our results based on one measure of psychopathology to the results based on other measures of psychopathology. Finally, we conduct tests for potential moderators of the only-child effect.

Hypotheses

Despite the popular belief in the Little Emperor, there are several reasons why only children in China would be expected to report fewer symptoms of psychopathology than their peers with siblings. First, the one-child family has been promoted in China, and parents who have just one child are regarded as contributing to the national goal of achieving world-class wealth and power. Only children have been expected to become the vanguard of China's emergence as a world leader (Fong, 2004). Second, in addition to prestige, the one-child family has become a social norm in urban China. Third, Chinese parents of one child generally have more education and wealth. Consequently, they have had the resources to enhance the education and health of their single children. Given all the advantages of only children in China, it seems likely that *Chinese only children will exhibit fewer symptoms of psychopathology than their peers with siblings.*

One potential moderator of this general advantage of only children is academic success. College attendance has been a hallmark of success for youth in China (Liu, 2006). When the OCP started, fewer than 15% of youth had the opportunity to attend college; however, during the 1990s, the demand for higher quality citizens as part of economic development led to the expansion of higher education in China (Liu, 2006; Yang, 2004). Today, it is estimated that about 60% of high school graduates go on to post-secondary education (Levin, 2010). Given that only children are more likely to have grown up with better-educated parents, it seems likely that only children as college students would experience a more comfortable fit between their home and college environments. *Consequently, in a college environment, only children are expected to report fewer symptoms of psychopathology than their peers who grew up with siblings.*

However, it is inevitable that some only children in China will experience challenges to their achievement of academic success. Wu (1996) interviewed families in a variety of Chinese cities and found parents of only children made more attempts to control and correct their only children than did parents of multiple children. Sun and Zhao (2006) reported that 22% of a national sample of adolescent only children felt their parents pressured them too much to be successful in school. Indeed, Wang and Fong (2009) have expressed concern for the mental health of those only children who fail to meet the elevated expectations explicit within the OCP.

Fortunately for youth who lack the academic excellence or financial ability to attend college, there is another, socially acceptable option: enlisting in the People's Liberation Army (PLA). According to Zhang (2014), China maintains the world's largest army, and military service

continues to be regarded as a viable pathway to social mobility. The PLA portrays itself as selective, accepting only those men who have graduated from high school and have the right combination of physical attributes and political character. Zhang (2014) reported that PLA men are more likely to come from multi-child families, particularly those from the red class, that is, the children of poor workers and peasants. Given the prevailing PLA culture that prefers men from the red class, it seems likely that only children as military enlistees would experience a less comfortable fit between their home and military environments. *Consequently, in a military environment, only children are expected to report more symptoms of psychopathology than their peers with siblings.*

Another potential moderator of the only-child effects in psychopathology is birth cohort. The OCP was built upon a previous national family planning program that promoted waiting later for the first child, placing longer intervals between children, and having fewer children overall (Gu & Cai, 2011). Demographers have argued that this previous program, beginning in 1971, actually brought about a steeper decline in China's total fertility rate than did the OCP (Feng et al. 2012). Nonetheless, growing up without siblings during the 1970s was uncommon, and the early years of the OCP were associated with highly publicized negative consequences, including high rates of female infanticide and forced abortions (Aird, 1990). However, starting in 1985, and continuing until today, the OCP has received more popular acceptance as urban families have generally experienced an improvement in the quality of their lives, making visible the payoff for the sacrifice of having just one child. A poll conducted in China in 2008 found that 76% approved of the OCP, with approval highest (84%) among urban residents (Pew Global Attitudes Project, 2008).

The research literature comparing only children to their peers provides some evidence that the relative status of only children's psychological outcomes has varied over time. One of the earliest studies (Jiao, Ji, & Jing, 1986), based on a sample of Chinese children born before 1979, found that these only children were more egocentric and less popular than their peers with siblings. A decade later, these same investigators (Jiao, Ji, & Jing, 1996) collected data from children born after the OCP and found that only children had better cognitive abilities than their peers with siblings. Elaborating on the changes in psychological development of only children born after the OCP, Wang, Leichtman, and White (1998) found evidence that the self-processes of Chinese only children had become more like those of Western children generally. These authors interpreted their findings in terms of parent-child interactions. They argued that in response to pressure for modernization and economic development, Chinese parents of just one child began to nurture the child's individual achievement, self-reliance, and personal expression. *Based on these findings, we expect only children born before the OCP to express more symptoms of psychopathology, while only children born after the OCP to express fewer symptoms of psychopathology than their peers with siblings.*

Method

Literature Search Procedures

This synthesis was restricted to studies based on samples from the Peoples Republic of China, because the OCP was implemented there and nowhere else. Consequently, studies

using samples of Chinese immigrants to North America, Europe, or Australia, for example, or samples of Hong Kong or Taiwanese residents were excluded from the synthesis.

We started our search for research studies of only children from the People's Republic of China with an open search for any scientific study of Chinese only children, regardless of the outcomes studied. This first step involved computer searches of several English language databases, PsycINFO, ERIC, and Google Scholar as well as Chinese language databases—Zhiwang and Wanfang. Various combinations of the terms (in English or Chinese) were used. In English, these terms were: *one child/only child/onlies/singleton, one-child policy, child development, China, siblings, firstborn, last-born, family size*. The second step involved a manual search of Chinese leading psychological journals, including *Acta Psychological Sinica* (心理学报), *Psychological Development and Education* (心理发展与教育), *Journal of Psychological Science* (心理科学), and *Advances in Psychological Science* (心理科学进展). The third step involved examining the reference lists of all retrieved articles and identifying studies relevant to our study of Chinese only children. The fourth step involved emailing the authors of studies to inquire if they had additional research results about only children to report. Finally, we included in our synthesis only those studies providing information that allowed for the computation of an effect size.

The result of our open search for studies of Chinese only children was the identification of 196 published studies, 86% of them published in Chinese language journals. Most of the research participants were students, with the largest group of participants being college students. In terms of outcomes studied, there were many, spanning outcomes such as pro-social behavior, school performance, and physical health. In general, the outcomes were measured with many, different research tools, including peer evaluations, ability tests, and physical tests. Note that this synthesis of the only-child literature focuses solely on those studies comparing only children to their peers with siblings on measures of psychopathology.

Psychopathology Studies

SCL-90 Studies—Within this larger group of 196 studies, one collection of studies stood out because not only did they use the same instrument, the Symptom Check List-90 (SCL-90: Derogatis, Lipman & Covi, 1973), but also all the research participants were about the same age, late adolescence to emerging adulthood. The characteristics of these studies are summarized in Table 1. Overall, we found 22 studies, comparing only children to their peers with siblings, based on SCL-90 data. The original, English version of the SCL-90 had been translated into Chinese (Wang, 1984) and early studies of the use of the SCL-90 on Chinese participants reported that the instrument was appropriate for them (Jin, Wu, & Zhang, 1986). Since then, the SCL-90 has been widely used in China. For example, Xia & Qian (2001) tested models of parent-child relations and symptoms of psychological distress by using the SCL-90. In addition, the SCL-90 has been used to assess levels of trauma after natural disasters, such as earthquakes (Wang et al. 2000).

As shown in Table 1, there were 22 SCL-90 publications, yielding data from 23 samples. These studies did not typically report separate results for the two genders, although the largest number of studies included both male and female participants. The largest group of

studies was based on college student samples, but studies of enlisted men and students at military colleges were also included. Samples from North and South China were more common than samples from Central China. Studies of only children born just after the OCP were the most common; nonetheless, the SCL-90 samples included respondents born before the OCP as well as during the later period, from 1985 to 1990.²

Alternate Studies of Anxiety and Depression—Within the larger group of studies, we found six studies of only children and psychopathology, specifically studies of anxiety and depression, which assessed symptoms using instruments other than the SCL-90. We calculated effect sizes for these studies and compared them to the results produced by the anxiety and depression subscales of the SCL-90.

Coder reliability—Two Chinese graduate students read all the psychopathology articles and coded the information gleaned from them. The agreement between two coders was 93.9%. Among 17,526 total codes, 16,459 codes were the same between the coders. The coders discussed the discrepancies and reached a final agreement.

Overall Analysis Plan

We followed the approach described by Cooper, Hedges, and Valentine (2009): (1) we calculated raw effect sizes for each subscale within sample, and then we checked these effect sizes for outlying values; (2) we replaced outliers with the closest value within subscale generated by the other samples and we weighted these effect sizes by the inverse of the sample's size, (3) we combined the weighted effect sizes across samples and generated a mean effect size for each subscale, based first on fixed-effects and then random-effects models; (4) we tested the mean effect sizes to determine if we could reject the null hypothesis; (5) we ran tests for publication bias; (6) we compared the results from the SCL-90 studies to the results from studies that used instruments different from the SCL-90, (7) we tested for potential moderators.

Effect Size Estimation—The *d*-index (Cohen, 1988) was used to estimate the difference between only children and their peers with siblings. Calculating the basic, raw *d*-index involved dividing the difference between the means of the two groups by their standard deviation. This calculation resulted in a measure of the difference between the means expressed in terms of their common standard deviation. In the syntheses conducted here, the means produced by non-only children were subtracted from the mean produced by only children. Therefore, a negative effect size would indicate that only children had lower scores on psychopathology than their peers did. The basic, raw *d* score indicates the strength of the effect, with an effect size of 0.25 or lower indicating a small effect, effect sizes around 0.50 indicating a medium effect, and effect sizes greater than 0.75 indicating a large effect (Cohen, 1988).

Outlier Detection and Replacement—We examined our array of effect sizes (23 samples by nine subscales) in order to identify outliers, using a test created by Grubbs

²We estimated the average birth year of the sample by subtracting the average age of the participants from the year of data collection (if reported) or publication.

(1950). Once outliers were detected at the .05 level, they were replaced (Winsorized) by their nearest value, within subscale.

Averaging Effect Sizes—After outlier effect sizes were identified and replaced, the resultant effect sizes were weighted by the inverse of the sample size before they were combined across samples. An inverse-weighting procedure was used (Hedges & Olkin, 1985).

Testing Significance—We calculated the means of these weighted effect sizes, generating means based on the fixed-effects model as well the random-effects model. We computed 95% confidence intervals to check if the null hypothesis, that only children and their peers with siblings were not different, was retained or rejected.

Fixed-Error and Random-Error Models—Both fixed- and random-effects statistical models were used when calculating mean effect sizes. The fixed-effects model assumes the differences observed in effect sizes is due solely to the sampling error and there is only one true effect size shared by all observed effect sizes.³ The random-effects model assumes the differences in observed effect sizes is not only due to the sample variation, but also due to random variation found in the larger population.⁴ Thus, the fixed-effects model is used to make inferences only about the observed studies, while random-effects model is used to make inferences about the population where the observed studies are sampled (Hedges & Vevea, 1998).

Publication Bias—This bias is evident when the collection of studies synthesized fails to represent the population of completed studies (Rothstein et al. 2005). To reduce the likelihood that we missed studies about psychopathology and only children in China, we employed the Duval and Tweedie (2000a, 2000b) trim-and-fill procedure that is based on the assumption that effect sizes produced by studies are normally distributed. The trim and fill procedure tests the effect sizes generated by the meta-analysis to see if they are normally distributed. If the distribution of effect sizes around the mean suggests that some scores are “missing,” using first the fixed-effects model, and then the random-effects model, then the number of such “missing” values and their estimated size are indicated. Finally this procedure fills in the imputed “missing values,” and recalculates the mean effect size. By comparing the re-calculated effect sizes to the original mean effect sizes, we can estimate the nature of the publication bias.

Moderators—In order to determine whether moderators were likely, we tested the homogeneity of the effect sizes by using a within-class goodness-of-fit statistic (Q_w), which has an approximate chi-square distribution with $k-1$ degrees of freedom, where k equals the number of effect sizes. A significant Q_w statistic indicates heterogeneity and suggests that moderator variables should be examined (Cooper, 1998).

³The effect sizes based on the fixed-effects model were calculated as follows: Weight for each sample = $1/\text{within-sample variance}$; the weighted combined effect size = sum of the products of weight and effect size for each sample, divided by the sum of the weights.

⁴The effect sizes based on the random-effects model were calculated as follows: Weight for each sample = $1/(\text{within-sample variance} + \text{between-sample variance})$; the weighted combined effect size = sum of the products of weight and effect size for each study/sum of the weights.

When we found a significant Q_W , we then used another homogeneity analyses to determine whether multiple levels within a moderator varied more than predicted by sampling error. This approach is similar to testing for group mean differences in an analysis of variance. Specifically, statistical differences were tested by computing the between-class goodness-of-fit statistic (Q_b), which has a chi-square distribution with $p-1$ degrees of freedom, where p equals the number of groups. A significant Q_b statistic indicates that average effect sizes vary between levels within the moderator variable more than predicted by sampling error alone.

Software—We used the Comprehensive Meta-Analysis (CMA) statistical software package to carry out our analyses (Borenstein, Hedges, Higgins, & Rothstein, 2005).

Results

This section will test the first hypothesis and then examine the possibility of publication bias. The results from the SCL-90 studies will be compared to the results from studies using alternative assessments of psychopathology. Finally, the results examining the moderators of the only-child effect will be presented in terms of the testing the remaining hypotheses.

Hypothesis One

This hypothesis stated that only children would report lower levels of psychopathology than their peers with siblings. To test this hypothesis, we first calculated the effect sizes generated by the 23 SCL-90 samples. A description of these studies is presented in Table 2, along with the effect sizes generated by each of the 23 samples. Because one study (Zhang & Yu, 2008) reported results from two samples – incoming students in the years 2005 and 2006, we present 23 sets of effect sizes. The authors, the socioeconomic and educational statuses of sample members, the sizes of the only child and non-only child samples, and the effect sizes are listed in Table 2.

The effect sizes presented in Table 2 are the result of adjustments to the raw effect sizes. In these adjustments, we used Grubb's test to identify outliers among the raw effect sizes for each of the SCL-90 subscales, replacing them with the effect size closest in value within subscale.⁵ Then these effect sizes were weighted by the inverse of the sample size.

In terms of the first hypothesis, note that 67% of the effect sizes presented in Table 2 are negative, 28% are positive, and 5% are zero. This suggests that the SCL-90 research literature about Chinese only children presents a mixed picture, but negative effect sizes

⁵The process of replacement is described here. For the Anxiety subscale, we identified one outlier on the left side of the distribution ($d = -1.00$; Yao & Zhao, 1998) and we replaced it (Winsorized it) to its nearest neighbor ($d = -.27$ Deng & Yao, 2004). Similarly, for the Depression subscale, we identified one outlier on the right side of the distribution ($d = +.55$; Cui et al., 1998) and we Winsorized it to its nearest neighbor ($d = +.34$; Chen et al., 2005). Likewise, for the Interpersonal Sensitivity subscale, one outlier on the right side of the distribution was detected ($d = +.64$; Cui et al., 1998) and it was Winsorized to its nearest neighbor ($d = +.41$; Liu, 2002). For the Paranoid Ideation subscale, we identified one outlier on the right side of the distribution ($d = +.77$; Cui et al., 1998) and we Winsorized it to its nearest neighbor ($d = +.28$; Jiang & Zhan, 2000). For the Psychoticism subscale, we identified one outlier on the right side of the distribution ($d = +.77$ Cui et al., 1998) and we Winsorized it to its nearest neighbor ($d = +.22$; Liu, 2002). For the Somatization subscale, we identified one outlier on the right side of the distribution ($d = +.68$; Cui et al., 1998) and we Winsorized it to its nearest neighbor ($d = +.60$; Chen et al., 2005). No outliers were detected for the Hostility, Obsessive-Compulsive, and Phobic Anxiety subscales.

were the most common, indicating that only children reported fewer symptoms of psychopathology than did their peers with siblings.

When we collapse the effect sizes across samples, calculating the mean scores, separately by subscale, we find more support for the first hypothesis, as shown in Table 3. All the fixed-effects values in Table 3 were significantly different from zero, indicating that for all the subscales of the SCL-90, the combined research supported the conclusion that only children reported less distress. The random-effects values were generally smaller in magnitude than the fixed-effects values, but still negative, and significantly different from zero for all subscales, except Somatization. Overall, however, the effect sizes were small, reflecting only a small advantage for only children.

Publication Bias

To test the possibility that the body of work we synthesized was missing some possible studies of psychopathology and only children in China, we conducted trim and fill analyses for each subscale. These analyses were conducted on the effect sizes reported in Table 2 and the results are presented in Table 4. “Missing” effect size values were counted, estimated, and combined with the “found” effect sizes, based on fixed-effects models first and then random-effects models. The resultant recalculated mean effect sizes are reported for each subscale on Table 4. For example, for Anxiety, we found seven missing values, using the fixed-effects model. We estimated these missing values and combined them with the found effect sizes, again using fixed-effects models, resulting in the recalculated effect size of $-.16$, under both fixed-effects and random-effects models. Continuing this example, when we combined the found and missing effect sizes, using the random-effect models, one missing value was identified and the resulting recalculated effect size was $-.12$, under fixed-effects and $-.09$ under random-effect models.

When we compare all the recalculated effect sizes reported in Table 4, subscale by subscale, to the effect sizes presented in Table 3, we see no difference in direction or magnitude. Continuing the example about the Anxiety subscale, the effect size, calculated based on the fixed-effects model and reported in Table 3 was $-.13$. Likewise, the effect size, calculated based on random-effects model and reported in Table 3 was $-.08$. The effect sizes in Table 3 and the recalculated effect sizes in Table 4 are highly similar. This similarity suggests that the results of our syntheses were not biased in terms of direction or magnitude.

Comparing to Alternatives

We identified six studies comparing only children to their peers that measured anxiety and depression with instruments other than the SCL-90. A description of these studies is presented in Table 5. The participants in these alternative studies were primary, secondary, or post-secondary students. All but one of these studies measured both anxiety and depression and reported separate scores. Two of the studies, Edwards et al. (2005) and Yang, Ollendick, Dong, Xia, and Lin (1995), were published in English-language journals.

The raw effect sizes generated by these studies were examined for outliers, using Grubb's method, but no outliers were detected. Then the effect sizes were weighted by the inverse of their sample size, and these weighted effects sizes were combined across the samples, based

on fixed- and then random-effects models, yielding mean effect sizes for anxiety and depression.

Of the 11 raw effect sizes presented in Table 5, 73% were negative, indicating that only children had lower anxiety and depression scores than their peers with siblings. We tested the difference between the mean effect size for anxiety, as assessed by the SCL-90 and shown in Table 3, and the mean effect size for anxiety, as assessed by alternate instruments, $d = -.11$ ($-.14$), based on fixed effects (or random effects) models. The results indicated that the difference was not significant, $Q_b = .22$ (.42), $p = .63$ (.42). We also tested the difference between the mean effect size for depression, as assessed by the SCL-90 and presented in Table 3, and the mean effect size for depression, as assessed by the alternate instruments, $d = -.22$ ($-.26$), based on fixed effects (or random-effects) models. Again, we found the difference to be not significant, $Q_b = 3.23$ (2.48), $p = .07$ (.12). These findings suggest that the differences found between only children and their peers in terms of anxiety and depression are consistent across assessment instruments.

Hypotheses Two and Three

These two hypotheses focused on potential moderators of the only-child effect. The significant Q_w statistics presented in Table 3 indicate that there was substantial heterogeneity within the effect sizes generated for each subscale of the SCL-90. This finding justified our search for potential moderators and we focused first on the educational status of the sample participants.

The second hypothesis stated that only children as college students would report fewer symptoms of psychopathology. As shown in Table 6, 16 SCL-90 studies had college students as participants. When we combined the effect sizes by subscale, using the fixed-effects model, the means were *negative*, small, and all significantly different from zero, regardless of subscale. When we combined the effect sizes by subscale using the random-effects model, the means were *also negative*, small, and all significantly different from zero, regardless of subscale. These findings support the second hypothesis that only children as college students express less distress than their peers with siblings.

The third hypothesis stated that only children as military recruits would report more symptoms of psychopathology than their peers with siblings. As shown in Table 6, there were five studies with enlisted men as research participants. When we combined the effect sizes by subscale, using the fixed effects model, the means were *positive*, small, and all significantly different from zero, except for the Psychoticism subscale. Similarly, when we combined the effect sizes by subscale, using the random-effects model, the mean scores were still *all positive*, and small, but only four were significantly different from zero. These findings provide only some support for the second hypothesis that only children, as military recruits, would express more distress than their peers with siblings.

We wondered whether participants who were students at military colleges would exhibit an only-child effect more like college students or enlisted men. There were solely two studies of students in military colleges, but the results, shown in Table 6, indicated that military college students exhibited an only-child effect more like college students than military

recruits. That is, the mean effect sizes, based on the fixed-effects model, were negative, and significantly different from zero. However, the mean effect sizes, based on the random-effects model, were much smaller, and not significantly different from zero.

Hypothesis Four

This hypothesis was focused on identifying another potential moderator of the mean effect sizes presented in Table 3. In the fourth hypothesis, we predicted a birth cohort effect, expecting only children born before the OCP to be disadvantaged, while only children born after the OCP to be advantaged relative to their peers with siblings. Mean effect sizes generated by studies of participants born just before, just after, and long after the OCP were calculated based on the fixed-effects and then random-effects models and presented in Table 7. Contrary to expectation, all the effect sizes in Table 7 were negative, indicating that only children reported lower levels of psychological distress regardless of birth year. Furthermore, the Q_b statistic was not significant for the Hostility and Somatization subscales, suggesting that birth year was unrelated to variations in the effect sizes comparing only children to their peers with siblings in these two subscales.

However, the pattern of results presented in Table 7 suggests that the only-child advantage in psychopathology was stronger for participants if they were born after the OCP. Specifically, of the 18 mean effect sizes (nine subscales by fixed and random models), representing people born before the OCP in Table 7, only three were large enough to be statistically significant. In contrast, 10 of the 18 mean effect sizes generated by participants born just after the OCP were large enough to be considered statistically significant. Finally, 16 of the 18 mean effect sizes generated by participants born much after the OCP were large enough to be considered statistically significant. Overall, this pattern of findings suggests that the advantage that Chinese only children had in psychopathology before the OCP was weak, but this advantage was larger for people born after the OCP. Still, *none* of the effect sizes in Table 7 could be considered moderate or large in magnitude.

Discussion

This study has synthesized the results of studies of psychopathology, comparing Chinese only children to their peers with siblings. In general, these studies were motivated by concern that China's one-child policy was creating a generation of Little Emperors. The results of this synthesis challenge this dismal view yet reveal a complex picture of Chinese only children and psychopathology.

The reliability of the findings reported here is strengthened by two characteristics of the studies that contributed to the primary synthesis. First, these studies were based on data from Chinese participants who were around the same age, late adolescence to emerging adulthood. Second, the studies used the same instrument, the SCL-90, which provided data assessing nine subscales of psychopathology. Furthermore, we used every known technique to enhance the quality of the information presented in this collection of studies: we identified outlying effect sizes and replaced them and we weighted the effect sizes by the inverse of the sample size. When we combined effect sizes across studies, our calculations were based on fixed-effect and random-effect models.

Given the controversial nature of the one-child policy, we had expected to find evidence of publication bias in our collection of studies of only children and psychopathology. To test this possibility, we conducted analyses to identify the missing publications from our body of studies. When we combined the “missing” effect sizes to those we had generated from our primary synthesis, we found very little difference in these recalculated mean effect sizes across all nine subscales. Essentially, the recalculated effect sizes were highly similar to those we generated from our primary synthesis, suggesting that the publication bias we identified would have had little impact on the overall results of our synthesis.

We also identified six studies of Chinese only children and psychopathology measured with other instruments than the SCL-90. These six studies focused on anxiety and depression and yielded mean effect sizes that were not significantly different from the mean effect sizes produced by the SCL-90 subscales of anxiety and depression. This finding further supports the reliability of our findings.

Despite our attention to enhancing the quality of the information generated by this synthesis, we acknowledge that it is limited by the fact that all the studies were based on convenience samples of relatively successful youth. In our search for research studies, we did not find studies of only children and their peers based on samples of youth who did not make it into college or the army, and therefore, we do not know how only children within this group fared, compared to their peers with siblings.

With the advent of the one-child policy, Chinese only children have had advantages and this is reflected in our finding that they reported lower levels of psychological distress compared to their peers with siblings. When the effect sizes from 23 samples were combined, we found that only children reported significantly lower levels of symptoms across all nine subscales, although the size of this advantage was small.

Our search for moderators of the above generalizations about Chinese only children led us to identify three. The first moderator was educational status. Many studies included college students as participants, and we expected only children as college students to be relatively comfortable in their college environment. Consistent with this expectation, we found only children as college students to report fewer symptoms than their peers with siblings did.

However, the results of this synthesis also suggest that some Chinese only children have faced challenges that are reflected in their higher levels of psychological distress. We expected that military enlistment would present a less comfortable environment for only children than for their peers with siblings, because the Chinese military prefers men who come from the red class, that is, poor workers and peasants, and men from this class are likely to have siblings. Consistent with our expectation, we found only children as military recruits to report more symptoms of distress than their peers with siblings did. Note that support for this conclusion was supported by the results based on fixed-effects, but not random-effects models.

When we considered the results from studies of men in military colleges, we found that only children in these samples reported fewer symptoms than their peers with siblings did, although this finding was based solely on the results from two studies and only the effect

sizes based on the fixed-effect model were significantly different from zero. Nonetheless, these findings suggest that only children as college students, even military college students, report lower levels of psychopathology, while only children as military enlisted men report higher levels of psychopathology than their peers with siblings.

We also examined the possible moderator of birth cohort. We hypothesized that those only children born before the one-child policy would report more symptoms of psychopathology, while only children born after the one-child policy would report fewer symptoms. Contrary to this expectation, however, we found that the effect sizes generated by this synthesis were all negative and small, across all nine subscales, regardless of birth cohort, although many of these effect sizes were not significantly different from zero. However, we did observe that the effect sizes comparing only children to their peers were very small for those participants born before the OCP and larger for those participants who were born after the OCP, especially during 1985-1990, the most recent birth years represented in the sample. This suggests that the small advantage experienced by Chinese only children, compared to their peers with siblings, was more obvious for those who were born after the policy.

The implications of these findings suggest that China's one-child policy did not create an entire generation of Little Emperors, as feared, but rather, the policy may have had a negative impact on the mental health of a limited subset of Chinese youth. Only children who were able to meet the challenge of college attendance appeared to have fewer symptoms than their peers, while only children who enlisted in the Chinese army reported more symptoms than their peers. Nonetheless, the fact that we found no studies of psychopathology among adolescents and young adults in China who did not enroll in college or enlist in the army, suggests that more studies are needed in order to complete a picture of the psychopathology of only children in China.

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Table 1
Characteristics of SCL-90 Studies Comparing Only Children to Peers

Characteristics	Number or Mean
Number of studies	22
Number of samples (No.Samples)	23
Gender (No.Samples)	
Combined ^a	15
Both ^b	2
All males	5
All females	1
Educational status (No.Samples)	
College Student ^c	16
Military Enlisted ^d	5
Military College ^e	2
Geographic region (No.Samples)	
North ^f	7
South ^g	8
Central ^h	2
Mix	3
Subjects' age (<i>M</i>)	20
Birth cohort (No.Samples)	
1975-1979	5
1980-1984	11
1985-1990	7
Year of publication (<i>M</i>)	2003
Only-child sample size (<i>M</i>)	706
Non-only child sample size (<i>M</i>)	1866

Note. All studies were based on convenience samples.

^a *Combined* means that there were two genders in the sample, but separate means were not presented.

^b *Both* means that separate means for male and female participants were presented.

^c *College students* indicates that sample consisted of college students.

^d *Military Enlisted* indicates that sample consisted of enlisted men.

^e *Military College* indicates that the sample consisted of college students who were training to be military officers.

^f *North* indicates data were collected in Beijing, Hebei, Shandong, Liaoning, or Heilongjiang provinces;

^g *South* indicates data were collected in Shanghai, Sichuan, Jiangxi, Guangdong, Zhejiang, or Jiangsu provinces;

^h *Central* indicates data were collected from Hubei province.

Table 2
Overview of SCL-90 Studies Comparing Only Children to Peers

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Chen & Chen (2004) ^a	Mixed Incomes Both Urban & Rural	College	308	533	A	-0.14
					D	-0.21
					H	-0.08
					I	-0.12
					OC	-0.14
					PI	-0.09
					PA	-0.21
					P	-0.16
					S	-0.11
Chen, et al. (2005)	Mixed Incomes	Military College	93	219	A	+0.16
					D	+0.34
					H	+0.22
					IS	+0.11
					OC	+0.17
					PI	+0.18
					PA	+0.16
					P	+0.06
					S	+0.60
Cui, et al. (1998)	Mixed Incomes	Military Recruits	259	1259	A	-0.04
					D	+0.55
					H	+0.10
					IS	+0.64
					OC	+0.28
					PI	+0.77
					PA	+0.04
					P	+0.77

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Dai, et al. (2005)	Mixed Incomes	College Student	730	754	S	+0.68
					A	0.00
					D	-0.40
					H	0.00
					IS	-0.18
					OC	-0.20
					PI	-0.20
					PA	0.00
					P	-0.25
					S	-0.25
Deng & Yao (2004)	Both Urban & Rural	College	297	1092	A	-0.27
					D	-0.23
					H	-0.04
					IS	-0.32
					OC	-0.14
					PI	-0.13
					PA	-0.19
					P	-0.15
					S	-0.13
Duan, et al. (1997)	Both Urban & Rural	College	218	1202	A	-0.21
					D	-0.16
					H	-0.06
					IS	-0.23
					OC	-0.20
					PI	-0.19
					PA	-0.11
					P	-0.29
					S	-0.13

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Fu & Liu (2006)	Both Urban & Rural	College	174	892	A	-0.19
					D	-0.20
					H	-0.20
					IS	-0.24
					OC	-0.42
					PI	-0.13
					PA	-0.16
Ha, et al. (2004)	Both Urban & Rural	College	541	591	P	-0.16
					S	-0.10
					A	-0.21
					D	-0.19
					H	-0.09
					IS	-0.22
					OC	-0.20
					PI	-0.14
					PA	-0.15
					P	-0.21
Han, et al. (2001)	National ^b	Military College	2017	10817	S	-0.10
					A	-0.11
					D	-0.14
					H	-0.07
					IS	-0.22
					OC	-0.12
					PI	-0.09
					PA	-0.11
					P	-0.20
					S	-0.14
Huang, et al. (2000)	Urban Middle Income	College	234	458	A	-0.11

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Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Jiang & Zhan (2000) ^c	Mixed Income	College	93	40	D	-0.12
					H	0.00
					IS	-0.15
					OC	-0.03
					PI	+0.07
					PA	0.00
					P	-0.11
					S	-0.07
					A	-0.04
					D	+0.02
Li, et al. (2002)	Both Urban & Rural	Military Recruits	232	305	H	+0.01
					IS	+0.31
					OC	+0.23
					PI	+0.28
					PA	-0.44
					P	-0.04
					S	-0.41
					A	+0.15
					D	+0.20
					H	+0.10
Liu (2002)	Both Urban & Rural	Military Recruits	43	51	IS	+0.18
					OC	0.00
					PI	-0.03
					PA	+0.06
					P	-0.02
					S	-0.02
					A	+0.25
Liu (2002)	Both Urban & Rural	Military Recruits	43	51	D	+0.15

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Liu, et al. (2002) ^d	Mixed Incomes	Military Recruits	434	7051	H	+0.18
					IS	+0.41
					OC	+0.03
					PI	-0.07
					PA	+0.37
					P	+0.22
					S	+0.23
					A	+0.21
					D	+0.11
					H	+0.10
					IS	+0.10
					OC	+0.19
					PI	+0.15
					PA	+0.17
					P	+0.12
					S	+0.10
Wang, et al. (2004)	Mixed Incomes	College	486	340	A	+0.02
					D	-0.09
					H	+0.06
					IS	-0.09
					OC	+0.05
					PI	+0.02
					PA	0.00
					P	0.00
					S	+0.12
Xia & Chen (2007)	Mixed Incomes	Military Recruits	216	643	A	-0.09
					D	+0.02
					H	+0.02

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Yang, et al. (2005)	Both Urban & Rural	College	3111	4270	IS	+0.08
					OC	+0.06
					PI	+0.02
					PA	-0.14
					P	-0.05
					S	-0.10
					A	-0.25
Yang, et al. (2002)	Both Urban & Rural	College	1673	622	D	-0.28
					H	-0.07
					IS	-0.36
					OC	-0.27
					PI	-0.15
					PA	-0.29
					P	-0.36
					S	-0.17
					A	-0.07
					D	-0.17
Yao & Zhao (1998)	Both Urban & Rural	College	232	198	H	-0.05
					IS	-0.21
					OC	-0.15
					PI	0.00
					PA	-0.24
					P	-0.20
					S	-0.11
Yao & Zhao (1998)	Both Urban & Rural	College	232	198	A	-1.00
					D	-0.16
					H	-0.22
					IS	+0.02

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Zhang, et al. (1999)	Both Urban & Rural	College	95	436	OC	-0.07
					PI	-0.10
					PA	-0.05
					P	-0.15
					S	-0.22
					A	+0.24
					D	-0.22
					H	-0.21
					IS	-0.07
					OC	-0.57
Zhang & Yu (2008)	Mixed Incomes	College	2218	5477	PI	-0.09
					PA	-0.14
					P	-0.17
					S	0.00
					A	-0.14
					D	-0.16
					H	-0.06
					IS	-0.22
					OC	-0.12
					PI	-0.10
Zhang & Yu (2008)	Mixed Incomes	College	2150	5459	PA	-0.18
					P	-0.17
					S	+0.03
					A	-0.15
					D	-0.13
					H	-0.02
					IS	-0.23
					A	-0.15
					D	-0.13
					H	-0.02

Author (Year)	SES	Educational Status	Sample		Subscale	Effect Size
			Only	Peer		
Zhang (2001)	Mixed Incomes	College	289	205	OC	-0.11
					PI	-0.06
					PA	-0.17
					P	-0.15
					S	-0.13
					A	-0.08
					D	-0.16
					H	-0.02
					IS	-0.13
					OC	-0.12
					PI	-0.03
					PA	-0.14
					P	-0.18
					S	-0.10

Note. The SES column describes the samples in terms of their socioeconomic status. Mixed Incomes indicates that the authors reported that their samples contained people from a wide range of family incomes. Both Urban & Rural indicates that the authors reported that their samples contained people from urban and rural regions. The Educational Status column designates the sample as consisting of college students, military recruits, or military college students.

A= Anxiety, D= Depression, H= Hospitality, IS= Interpersonal Sensitivity, OC= Obsessive-Compulsivity, PI= Paranoid Ideation, PA= Phobic Anxiety, P= Psychoticism, S= Somatization.

The Effect Size column presents the effects sizes for each subscale within sample after they have been Winsorized and weighted by the inverse of the sample size.

^aThe sample of this study was collected from a post-secondary vocational school;

^bNational means that the sample members came from many, different provinces;

^cThe sample of this study was selected from a pre-school teacher training school;

^dThis study compared only-child military recruits to norms for military recruits.

Table 3
Mean Effect Sizes: Difference between Only Children and Peers on SCL-90

SCL-90 Subscale	k	d	95% confidence interval		Q _w
			Low estimate	High estimate	
Anxiety	23	-.13** (-.08**)	-.15(-.14)	-.11(-.03)	131.82***
Depression	23	-.16*** (-.11***)	-.18(-.17)	-.14(-.06)	138.74***
Hostility	23	-.04* (-.03***)	-.06(-.06)	-.02(-.00)	39.39*
Interpersonal Sensitivity	23	-.21*** (-.11***)	-.23(-.17)	-.19(-.05)	158.93***
Obsessive-compulsivity	23	-.13*** (-.09**)	-.15(-.15)	-.11(.03)	172.16***
Paranoid	23	-.08*** (-.06**)	-.10(-.10)	-.06(-.02)	62.85***
Phobic Anxiety	23	-.15*** (-.10**)	-.17(-.15)	-.13(-.04)	134.34***
Psychoticism	23	-.19*** (-.14***)	-.21(-.19)	-.17(-.08)	122.49***
Somatization	23	-.07*** (-.04)	-.09(-.10)	-.05(.02)	140.59***

Note. The effect sizes based on the fixed-effects model were calculated as follows: Weight for each sample = 1/within-sample variance; the weighted combined effect size = sum of the products of weight and effect size for each sample, divided by the sum of the weights. The effect sizes based on the random-effects model were calculated as follows: Weight for each sample = 1/(within-sample variance + between-sample variance); the weighted combined effect size = sum of the products of weight and effect size for each study/sum of the weights. Fixed-effects values are presented outside of parentheses and random-effects values are within parentheses. The significant Q_w statistic justifies a search for moderators.

† p<.10.

* p<.05.

** p<.01.

*** p<.001

Table 4
Results from Trim-and-Fill Analyses by Subscale

Subscale	FE trim and fill	RE trim and fill
Anxiety	7 missing values FE: $d = -.16$; CI = -.18, -.14 RE: $d = -.16$; CI = -.21, -.10	1 missing value FE: $d = -.12$; CI = -.15, -.11 RE: $d = -.09$; CI = -.14, -.03
Depression	7 missing values FE: $d = -.19$; CI = -.20, -.17 RE: $d = -.19$; CI = -.25, -.13	None missing
Hostility	4 missing values FE: $d = -.05$; CI = -.07, -.03 RE: $d = -.05$; CI = -.08, -.01	2 missing values FE: $d = -.04$; CI = -.06, -.02 RE: $d = -.04$; CI = -.07, -.00
Interpersonal Sensitivity	10 missing values FE: $d = -.24$; CI = -.26, -.23 RE: $d = -.23$; CI = -.30, -.17	2 missing values FE: $d = -.21$; CI = -.23, -.19 RE: $d = -.13$; CI = -.19, -.07
Obsessive compulsive	10 missing values FE: $d = -.16$; CI = -.18, -.14 RE: $d = -.16$; CI = -.23, -.10	1 missing values FE: $d = -.13$; CI = -.15, -.11 RE: $d = -.10$; CI = -.16, -.03
Paranoid Ideation	6 missing value FE: $d = -.10$; CI = -.12, -.08 RE: $d = -.10$; CI = -.14, -.05	1 missing value FE: $d = -.08$; CI = -.10, -.06 RE: $d = -.06$; CI = -.10, -.02
PhobicAnxiety	8 missing values FE: $d = -.19$; CI = -.20, -.17 RE: $d = -.18$; CI = -.24, -.12	None missing
Psychoticism	9 missing values FE: $d = -.21$; CI = -.24, -.20 RE: $d = -.21$; CI = -.27, -.15	1 missing value FE: $d = -.19$; CI = -.21, -.17 RE: $d = -.14$; CI = -.20, -.09
Somatization	1 missing value FE: $d = -.07$; CI = -.10, -.06 RE: $d = -.06$; CI = -.12, -.00	3 missing values FE: $d = -.06$; CI = -.08, -.04 RE: $d = -.01$; CI = -.07, .05

Note: FE = Based on a fixed-effects model; RE = Based on a random-effects model; CI = represents a 95% confidence interval.

Table 5

Overview of Alternative Anxiety and Depression Studies

Author (Year)	Education Status	Sample Size		Anxiety or Depression	Instrument	Effect Size
		Only	Peer			
Edwards, et al. (2005)	College	423	711	A	SAS	+0.05
				D	SDS	0.00
Li (2001)	Middle School	172	24	A	MHT	+0.02
Liu (2008)	College	218	218	A	CCSMHS	-0.26
				D	CCSMHS	-0.30
Liu (2011)	Middle School	1304	614	A	MSSMHS	-0.10
				D	MSSMHS	-0.25
Qu (2008)	High School	127	39	A	MSSMHS	-0.19
				D	MSSMHS	-0.27
Yang, et al. (1995)	Primary & Secondary	562	169	A	RCMAS	-0.35
				D	CDI	-0.51

Note. All studies were based on convenience samples. The Effect Size column presents the raw effects sizes.

A = Anxiety; D = Depression; SAS = Self-Rating Anxiety Scale; SDS = Self-Rating Depression Scale; MHT = Mental Health Test; CCSMHS =Chinese College Student Mental Health Scale; MSSMHS = Middle School Student Mental Health Scale; RCMAS = Revised Children's Manifest Anxiety Scale; CDI = Children's Depression Inventory.

Table 6
Results of Analyses Considering Educational Status as Moderator of Only-Child Effect on SCL-90

Subscale	Ed.Status	k	d	95% confidence interval		Qb
				Low estimate	High estimate	
Anxiety	Student	16	-0.16***(-0.13***)	-0.18(-0.19)	-0.14(-0.08)	55.96*** (8.65*)
	Recruit	5	0.09** (0.08)	0.03(-0.06)	0.16(0.22)	
	MColl	2	-0.1** (0)	-0.14(-0.26)	-0.05(0.25)	
Depression	Student	16	-0.2***(-0.19***)	-0.22(-0.24)	-0.17(-0.15)	77.94*** (41.19***)
	Recruit	5	0.13** (0.14**)	0.06(0.05)	0.2(0.23)	
	MColl	2	-0.12** (0.09)	-0.17(-0.38)	-0.07(0.56)	
Hostility	Student	16	-0.05***(-0.05***)	-0.08(-0.08)	-0.03(-0.03)	17.72*** (17.12***)
	Recruit	5	0.09* (0.09*)	0.02(0.02)	0.15(0.15)	
	MColl	2	-0.06* (0.05)	-0.11(-0.23)	-0.02(0.33)	
Interpersonal Sensitivity	Student	16	-0.24***(-0.19***)	-0.26(-0.24)	-0.22(-0.14)	91.03*** (42.23***)
	Recruit	5	0.13** (0.14**)	0.06(0.05)	0.2(0.22)	
	MColl	2	-0.21** (-0.08)	-0.26(-0.4)	-0.16(0.24)	
ObsessiveCompulsivity	Student	16	-0.16***(-0.16***)	-0.19(-0.21)	-0.14(-0.1)	86.5*** (23.85***)
	Recruit	5	0.16** (0.14*)	0.09(0.03)	0.22(0.24)	
	MColl	2	-0.11** (0)	-0.16(-0.28)	-0.07(0.28)	
Paranoid Ideation	Student	16	-0.1***(-0.09***)	-0.12(-0.13)	-0.08(-0.05)	23.56*** (9.87*)
	Recruit	5	0.09* (0.07)	0.01(-0.03)	0.16(0.17)	

Subscale	Ed.Status	k	d	95% confidence interval	Qb
Phobic Anxiety	MColl	2	-0.08** (0.02)	-0.12(-0.24)	-0.03(0.28)
	Student	16	-0.19***(-0.15***)	-0.21(-0.2)	-0.16(-0.1)
	Recruit	5	0.08*(0.07)	0.01(-0.07)	0.14(0.2)
	MColl	2	-0.1** (0)	-0.15(-0.27)	-0.06(0.26)
Psychoticism	Student	16	-0.21***(-0.19***)	-0.24(-0.24)	-0.19(-0.13)
	Recruit	5	0.06(0.06)	-0.01(-0.03)	0.14(0.15)
	MColl	2	-0.19** (-0.1)	-0.24(-0.35)	-0.15(0.14)
					22.72*** (5.68)
Somatization	Student	16	-0.08***(-0.1***)	-0.1(-0.15)	-0.06(-0.04)
	Recruit	5	0.08*(0.14)	0.01(-0.06)	0.15(0.34)
	MColl	2	-0.11** (0.22)	-0.16(-0.5)	-0.07(0.94)

Note. Ed. Status indicates if sample consists of college students (Student), military recruits (Recruit), or military college students (MColl). Fixed-effects values are presented outside of parentheses and random-effects values are within parentheses. A significant Qb statistic indicates that average effect sizes vary between levels within the moderator variable more than predicted by sampling error alone.

† p<.10.

* p<.05.

** p<.01.

*** p<.001

Table 7
Results of Analyses Considering Birth Year as Moderator of Only-Child Effect on SCL-90

Subscale	Birth Years	k	d	95% confidence interval		Q_b
				Low estimate	High estimate	
Anxiety	1975-1979	4	-0.13*** (-0.08)	-0.2(-0.27)	-0.05(0.1)	20.84*** (1.65)
	1980-1984	12	-0.07** (-0.05)	-0.1(-0.14)	-0.04(0.04)	
	1985-1990	7	-0.17** (-0.12**)	-0.19(-0.2)	-0.14(-0.05)	
Depression	1975-1979	4	-0.09(-0.06)	-0.19(-0.28)	0(0.16)	17.99*** (1.13)
	1980-1984	12	-0.11** (-0.09*)	-0.14(-0.17)	-0.08(-0.02)	
	1985-1990	7	-0.19** (-0.15**)	-0.22(-0.25)	-0.17(-0.05)	
Hostility	1975-1979	4	-0.05(-0.08)	-0.13(-0.24)	0.03(0.07)	0.54(1.1)
	1980-1984	12	-0.03* (-0.02)	-0.06(-0.06)	0(0.03)	
	1985-1990	7	-0.05** (-0.04)	-0.07(-0.08)	-0.02(0)	
Interpersonal Sensitivity	1975-1979	4	-0.09(-0.02)	-0.19(-0.23)	0.01(0.18)	25.56*** (3.06)
	1980-1984	12	-0.16** (-0.09)	-0.19(-0.18)	-0.12(0.01)	
	1985-1990	7	-0.25** (-0.18**)	-0.28(-0.27)	-0.22(-0.09)	
Obsessive Compulsivity	1975-1979	4	-0.05(-0.13)	-0.13(-0.46)	0.03(0.2)	21.43*** (2.58)
	1980-1984	12	-0.08** (-0.05)	-0.11(-0.13)	-0.05(0.03)	
	1985-1990	7	-0.17** (-0.14**)	-0.19(-0.23)	-0.14(-0.06)	
Paranoid Ideation	1975-1979	4	-0.11* (-0.09)	-0.21(-0.23)	-0.01(0.05)	10.2* (3.37)
	1980-1984	12	-0.04* (-0.02)	-0.07(-0.08)	-0.01(0.04)	
	1985-1990	7	-0.11** (-0.1**)	-0.13(-0.15)	-0.08(-0.04)	

Subscale	Birth Years	k	d	95% confidence interval	Q _b
Phobic Anxiety	1975-1979	4	-0.05(-0.05)	-0.13(-0.13)	29.42*** (2.57)
	1980-1984	12	-0.09** (-0.08)	-0.13(-0.17)	
	1985-1990	7	-0.19** (-0.14**)	-0.22(-0.22)	
Psychoticism	1975-1979	4	-0.2*** (-0.17*)	-0.3(-0.32)	15.43*** (1.68)
	1980-1984	12	-0.14** (-0.1*)	-0.17(-0.18)	
	1985-1990	7	-0.22** (-0.18**)	-0.25(-0.27)	
Somatization	1975-1979	4	-0.02(0.05)	-0.12(-0.26)	1.83(0.56)
	1980-1984	12	-0.08** (-0.06)	-0.12(-0.13)	
	1985-1990	7	-0.07** (-0.04)	-0.09(-0.14)	

Note. We estimated the average birth year of the sample by subtracting the average age of the participants from the year of data collection (if reported) or year of publication. Fixed-effects values are presented outside of parentheses and random-effects values are within parentheses. A significant Q_b statistic indicates that average effect sizes vary between levels within the moderator variable more than predicted by sampling error alone.

† p<.10.

* p<.05.

** p<.01.

*** p<.001