When the Load Lightens: Academic Burden and Children's Mental Health*

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Abstract

Children's mental health presents a major global challenge, with excessive academic pressure as a key driver. This study provides novel causal evidence on the mental health effects of large-scale educational burden-reduction reform by evaluating China's Double Reduction Policy. Using a difference-in-differences approach, we find the policy significantly improved adolescent mental health: depressive symptom scores decreased by 0.079 standard deviations, and the likelihood of reaching diagnostic thresholds fell by 2.2 percentage points, especially among students under greater pre-reform pressure. Beyond estimating policy impacts, we systematically explore a rich set of underlying mechanisms and analyze the institutional design factors that explain the reform's relative success. Improvements occur through reduced academic workload, enhanced rather than reduced learning engagement, strengthened academic self-efficacy, improved socioemotional relationships, and healthier lifestyle behaviors. We also document heterogeneous parental responses, with higher anxiety among more educated parents. Our findings carry global implications that coordinated burden-reduction policies can effectively safeguard youth mental health without undermining educational motivation.

Keywords: Mental health; Academic pressure; Education reform

*We thank Jin Feng, Wei Huang, Junsen Zhang, and seminar participants at Fudan University and Shanghai University of Finance and Economics for useful comments. The authors are listed alphabetically by last name and contributed equally to the work.

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1 Introduction

Children's mental health has emerged as one of the most pressing public health challenges of our time (Currie, 2025). This crisis is not unique to China but a shared international concern. Globally, approximately one in seven adolescents suffers from a diagnosable mental disorder.[1] The crisis has been intensifying, with suicide rates among individuals aged 15–19 surging by 70 percent since 2007, making suicide the second leading cause of death for this age group (Hansen et al., 2024). Adolescent mental health shocks also impose long-lasting and far-reaching consequences. Nearly half of all adult mental health disorders originate in childhood (Kessler et al., 2005). Poor mental health during youth is also consistently associated with adverse long-term outcomes, including poorer physical health (Currie et al., 2010), lower educational attainment, and weaker labor market performance in adulthood (Biasi et al., 2021; Busch et al., 2014; Cornaglia et al., 2015; Currie and Stabile, 2006; Fletcher, 2010).

Despite being widely recognized as a major source of adolescent psychological distress, intense academic competition has become a global phenomenon. Across OECD countries, approximately 66% of students report significant stress over their grades, and more than half experience severe anxiety during examinations, even when well prepared.[2] This pressure is especially pronounced in East Asia. In South Korea, nearly 75% of children participate in after-school programs, with families spending an average of 9.2% of household income per child on extracurricular education (Kim et al., 2024). China presents a similarly intense landscape, shaped by a long-standing "education fever" that imposes mounting stress on both children and parents (Chen et al., 2021; Guo and Qu, 2022). Urban families devote approximately 11.2% of their income to extracurricular education, and 24.4% of primary school students participate in private tutoring (Wei, 2024). Moreover, students' average daily study time approaches ten hours,[3] placing substantial and sustained strain on their

[1] Source: `https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health`

[2] OECD (2017). *PISA 2015 Results (Volume III): Students' Well-Being*. OECD Publishing.

[3] Calculated from CFPS sample.

physical and mental health.

In response to the mounting academic pressure and youth mental health crises, China launched a large-scale education reform to reduce student burden. In 2021, the government introduced the Double Reduction Policy (DRP), one of its most significant education policy initiatives in recent years. The policy banned private tutoring institutions from offering compulsory education subjects and restricted excessive homework and examination-oriented practices. This reform provides a rare and valuable natural experiment to examine how reducing academic pressure can improve children's mental health, with implications far beyond China.

To examine this, we draw on data from the China Family Panel Studies (CFPS), a nationally representative survey that provides rich information on students' mental health, time use, and educational activities. We adopt a difference-in-differences (DID) design by exploiting two sources of variation: temporal variation driven by the 2021 policy implementation, which defines the post-reform period; and cross-stage variation based on student grade levels. Because the Double Reduction Policy exclusively targets students in compulsory education (primary and junior secondary school), senior secondary school students were not directly exposed to the policy and therefore serve as a credible control group.

Results show that the reform leads to a significant improvement in student mental health. Depressive symptom scores decline by 0.079 standard deviations, and the likelihood of reaching the diagnostic threshold for mild depression falls by 2.2 percentage points—a 14.8% reduction relative to the sample mean. The mental health benefits also extend to the higher-risk groups: the probabilities of meeting the criteria for moderate and severe depression decline by 2.1 and 1.3 percentage points, respectively. These results are robust to alternative mental health measures and various sample restrictions. Furthermore, event-study analysis confirms the absence of significant pre-trends, lending confidence to the causal interpretation of our findings.

Heterogeneity analysis indicates that mental health improvements are substantially larger

for students from families with higher pre-reform educational investment and those from lower-income households. These are exactly the groups for whom the policy delivered the steepest reduction in academic pressure. Likewise, students in regions with a higher density of pre-reform private tutoring institutions experienced greater relief from peer competition, leading to more pronounced psychological gains. In addition, the policy's beneficial effects are broadly similar across gender and parental education levels, suggesting its universal relevance.

To explore the mechanisms, we examine several channels through which the DRP may influence children's psychological well-being. Most directly, the reform substantially alleviates academic burden: Participation in private tutoring drops, with average weekly tutoring time decreasing by an hour. Total study time on weekdays also declines by 0.2 hours, providing meaningful relief from the long study hours students endured in the pre-reform period. Household spending on tutoring and overall education expenditure also decrease substantially.

At the same time, reduced academic pressure does not weaken learning engagement; instead, it strengthens it. At school, students show significantly lower absenteeism and better classroom discipline. Outside school, they check homework more regularly and are more likely to finish assignments before leisure activities. These efforts translate into stronger academic self-efficacy: students report higher self-evaluations of their academic performance and longer expected educational attainment. Overall, these patterns confirm that the policy did not reduce learning effort, but redirected it toward more effective and intrinsically motivated learning.

The social and emotional environment also improves. Students report higher levels of satisfaction with their relationships with teachers, peers, and family members, indicating stronger and more supportive socioemotional bonds. Parental mental health, by contrast, displays a more nuanced and heterogeneous pattern. On average, the DRP had no significant effect on parental well-being. Beneath this null average, parents with higher levels of educa-

tion tend to experience worsened mental health, consistent with widespread concerns that restricted tutoring access could undermine their children's competitive advantage. Meanwhile, parents living in areas with greater pre-reform academic competition benefited substantially from reduced pressure, with noticeable improvements in their mental well-being.

Beyond academic-related outcomes, the DRP also fosters healthier lifestyles. Students report increased physical activity and lower rates of smoking and drinking. These positive lifestyle changes serve not only as a channel through which reduced academic pressure promotes mental health, but also as valuable outcomes in their own right as physical and mental health mutually reinforce each other to support long-term adolescent development.

In addition to unpacking these mechanisms, we further compare and discuss the similarities and differences between China's DRP and burden-reduction policies implemented in other countries, shedding light on the institutional and design factors that contribute to the relative effectiveness of this reform.

This study contributes to and extends the growing literature on adolescent mental health determinants. Existing research has explored a wide spectrum of influencing factors, including macro-level shocks such as economic downturns and public health crises (Fontes et al., 2024; Golberstein et al., 2019; Brodeur et al., 2021; Björkegren et al., 2024; Wang et al., 2026); family-level conditions including socioeconomic background, parental income, and parental health (Persson and Rossin-Slater, 2018; Baird et al., 2013; Jones et al., 2024; Johnston et al., 2013; Aizer et al., 2016); as well as exposure to social media (Nikolaou, 2017; Braghieri et al., 2022) and traumatic events (Cabral et al., 2026; Rossin-Slater et al., 2020). Regarding school-related influences, prior studies have connected adolescent mental disorders and suicidal behaviors to school schedules, highlighting the key roles of academic stress and bullying (Chandler et al., 2022; Chen et al., 2024; Hansen and Lang, 2011; Hansen et al., 2024). High-stakes testing has also been found to trigger significant psychological distress (Bütikofer et al., 2023; Beck et al., 2024; Linder et al., 2023). Building on this literature, we exploit a natural experiment that directly reduces the intensity of students' daily aca-

demic burden and examine its mental health impact. Our design provides sharper, more direct causal evidence on how persistent, routine academic stress shapes the psychological well-being of adolescents.

This study also enriches and advances the broader literature on education systems and reform. Promoting educational expansion and quality improvement has long been a central objective for researchers and policymakers, especially in developing economies (e.g., Glewwe and Muralidharan, 2016). Considerable resources and efforts have been invested in building effective education systems to strengthen human capital accumulation (e.g., Angrist et al., 2023). Yet serious concerns arise when academic pressure becomes excessive. The global expansion of shadow education has imposed a growing financial strain on households. Importantly, much of this educational investment is motivated by competition for relative academic position rather than genuine learning or skill development, leading to substantial social inefficiencies (Tansel and Bircan, 2006; Guo and Qu, 2022; Kim et al., 2024). Beyond financial costs, excessive academic pressure seriously undermines student mental health. As documented earlier, such mental health costs are persistent and far-reaching, and may erode the long-term human capital returns that education is intended to deliver.

Reducing excessive academic burdens has become a critical global policy priority, yet achieving effective burden reduction remains a persistent challenge in practice. Many countries have attempted to ease student academic stress, but such policies often suffer from weak enforcement, market substitution, or rebound effects. In South Korea, for instance, policies designed to alleviate academic pressure frequently triggered a rebound effect, as demand simply shifted toward unregulated segments of the shadow education market (Choi and Choi, 2016). Against this international backdrop, China's Double Reduction Policy stands out as one of the most comprehensive, large-scale, and system-level reforms targeting academic overburden in recent decades. While related research has explored the DRP's impacts on private tutoring industry dynamics (Huang et al., 2025b) and household fertility intentions (Meng et al., 2025), its direct causal effect on student mental health, which is an ultimate

goal of burden reduction policies, has rarely been rigorously identified. This study fills this gap by providing causal evidence that the DRP successfully reduced academic pressure and translated it into substantial, robust improvements in psychological well-being. Our findings demonstrate that coordinated, system-wide adjustments to homework loads, off-campus training, and assessment systems can be an effective policy lever. Importantly, reducing excessive pressure does not erode students' learning motivation or effort; instead, it supports more focused, engaged, and sustainable learning behavior.

More broadly, it underscores the importance of institutionalizing mental health as a core objective in education policy design and evaluation, rather than treating it as a secondary or incidental outcome. This lesson is highly generalizable beyond China and carries significant policy implications for any country facing hyper-competitive education systems, rampant shadow education, and rising youth mental health crises. The DRP experience shows that systemic, consistent, cross-sectoral regulation can mitigate market failures in shadow education, relieve chronic stress, and protect adolescent well-being without compromising human capital accumulation. It is worth noting that due to data limitations, this study only evaluates the short-run impacts of the DRP within the first year after implementation; the stability and longer-term consequences of such mental health gains remain to be examined with extended data and longer windows in future research.

The remainder of the paper is organized as follows. Section 2 provides background information. Section 3 outlines the data and empirical strategy. Section 4 presents the main empirical findings. Section 5 explores the potential mechanisms and other related outcomes. Section 6 discusses the institutional comparison and related discussion, and Section 7 concludes the paper.

2 Background

2.1 China's education system

China's education system can be broadly divided into three stages: compulsory education, senior secondary education, and higher education. Compulsory education covers nine years, including six years of primary school and three years of junior secondary school (or middle school), and is universally accessible under the Compulsory Education Law. Progression beyond this stage, however, is highly selective. Admission to senior secondary schools (or high schools) and universities is determined by competitive, high-stakes entrance examinations, most notably the High School Entrance Examination (*Zhongkao*) and the College Entrance Examination (*Gaokao*).

Each year, millions of students across China take the *Gaokao*, competing for admission to colleges and universities. Although over 60% of students have been admitted to some form of higher education since 2000,[4] admission to top-tier universities remains extremely selective. For example, elite universities under China's Project 985 collectively enroll only about 3.4 percent of applicants (Huang et al., 2025a).[5] The resulting steep hierarchy in educational attainment, combined with high private and social returns to education (e.g., Zhang et al., 2005; Li et al., 2012; Wang et al., 2014; Jia and Li, 2021), makes admission to prestigious schools and universities especially valuable.

The pressure associated with this competitive system extends well beyond the university level and permeates the entire schooling process. Since admission to elite senior secondary schools substantially raises the likelihood of entry into top universities (Hoekstra et al., 2018), competition already intensifies at the compulsory education level. Moreover, recent policy reforms have strengthened academic–vocational tracking immediately following the *Zhongkao*, further increasing the stakes of academic performance at younger ages. As a

[4]Source: National Bureau of Statistics of China.

[5]China's Project 985, launched in 1998, marked a major effort to elevate a group of leading universities to world-class status. With concentrated resources devoted to strengthening their research and teaching capacity, these institutions are widely perceived as gateways to strong academic and labor-market prospects.

result, students in China face strong academic pressure early in their educational trajectories, contributing to widespread concerns about excessive workload, competition, and stress throughout the school years.

In pursuit of entry into better schools and universities, parents devote substantial financial resources and personal efforts to supplementary tutoring, extracurricular training, and other educational expenditures (Chi and Qian, 2016; Li and Xie, 2020). According to Guo and Qu (2022), around 57.3 million primary and secondary school students in China participated in shadow education, representing a penetration rate of 33.9%. Households spent on average over 10% of their income per child on extracurricular education activities (Wei, 2024). These characteristics of China's education system have driven the rapid expansion of the private tutoring sector, which by 2020 had grown into a 120 billion USD industry—accounting for 0.8% of China's GDP (Meng et al., 2025).

2.2 Double reduction policy

The DRP represents a major educational reform initiative in China aimed at alleviating the excessive academic burden on students in compulsory education. Formally entitled the "Opinions on Further Reducing the Homework Burden and Off-Campus Training Burden of Students in Compulsory Education", the policy was jointly issued by the General Office of the Chinese Communist Party and the State Council on 24 July 2021.[6] Its objectives include reducing the volume of homework and after-school tutoring for primary school and junior secondary school students (grades 1 to 9), lowering households' financial expenditures on private tutoring, and promoting a more equitable and healthier learning environment.

A core element of the policy is the effective prohibition of for-profit after-school tutoring through a set of stringent regulations. Firstly, existing providers are required to convert to nonprofit entities, and no new licenses are issued. Secondly, capital-raising activities are also curtailed, as firms in this sector are barred from public listing and related forms of

[6]Source: `https://www.gov.cn/zhengce/2021-07/24/content_5627132.htm`

financing. Thirdly, tutoring for compulsory-education students may not cover core academic subjects or operate on weekends and public holidays. Weekday online tutoring sessions must not continue past 21:00. These regulations led to a sharp industry contraction: tutoring institutions fell by 83.8% by the end of the first semester after the policy,[7] online job postings in tutoring-related firms declined nearly 90%, and new firm entries in the sector dropped by 50% within four months (Huang et al., 2025b).

In addition, the DRP introduces a set of concrete measures aimed at reducing students' academic burden. For example, the policy strictly limits written homework, prohibiting it for grades one and two, while capping the average time at 60 minutes for grades three to six and 90 minutes for grades seven to nine. Students are encouraged to complete this work on campus under teacher guidance, and teachers are forbidden from requiring students to mark or correct their own assignments. The policy further requires schools to adhere closely to curriculum standards and to prevent arbitrary acceleration of teaching pace or excessive difficulty beyond prescribed content, thereby curbing excessive academic competition. In parallel, the policy calls for reductions in exam frequency and the use of exam scores and rankings, in order to move away from a purely score-oriented evaluation system. To ensure effective implementation, the DRP mandates that local governments prohibit the use of enrollment rates as performance targets for schools and teachers, aligning institutional incentives with the goal of reducing academic pressure.

Overall, the DRP is widely regarded as one of the most consequential education reforms in China in recent decades. Beyond the sharp reduction in private tutoring, emerging evidence suggests that student insomnia declined slightly following the reform (Zhang et al., 2024). The policy has also been linked to increased fertility intentions, plausibly driven by lower educational costs and reduced education-related anxiety (Meng et al., 2025). At the same time, however, the reform has raised concerns among some parents. In particular, families who previously relied heavily on private tutoring may worry about losing access to supplementary instruction or facing higher costs for one-on-one alternatives. Working parents,

[7]Source: `http://english.scio.gov.cn/in-depth/2021-12/30/content_77960470.htm`

especially mothers, may also experience increased stress related to childcare arrangements when school days end earlier, and after-school options are limited.

3 Data and Empirical Strategy

3.1 Data

This study uses data from the China Family Panel Studies (CFPS), covering the years 2010 to 2022. The CFPS is a nationally representative longitudinal survey conducted biennially by the Institute of Social Science Survey at Peking University. The baseline survey in 2010 covers 25 provinces, 124 counties, and more than 95% of the Chinese population with stratified multistage probability sampling (Xie and Hu, 2014). The survey includes four questionnaires (community, family, child, and adult), capturing extensive information on demographics, education, family structure, psychological well-being, health status, and time use, making it a rich data source for evaluating the impacts of DRP policy and the underlying mechanisms.

To identify the effect of the DRP, implemented in July 2021, we use four survey waves from 2016 to 2022. The sample is restricted to school-aged children who were enrolled in either junior or senior secondary school at the time of the survey. Junior secondary school students (grades 7-9), who were directly targeted by the policy, serve as the treatment group, while senior secondary students (grades 10-12), who were not covered by the DRP, serve as the control group. We exclude adult learners and in-service education participants to ensure sample consistency. After these restrictions, the analytical sample consists of approximately 5,270 student-year observations across four waves.

Table 1 reports summary statistics for the treatment and control groups. By construction, senior secondary school students and their parents are older. These students are also more likely to be female, only children, and residents of urban areas, reflecting potential selection into high school. Interestingly, the likelihood that parents hold a college degree does not

differ much across groups, although the share of parents with a high school degree is slightly higher among senior secondary school students. Household income is also higher in families of senior secondary school students. Overall, the two groups are not identical in levels, which is expected since it is not compulsory to attend senior secondary school. However, such level differences do not threaten identification as long as the two groups follow parallel trends before and after the reform, an assumption we examine carefully in the next section. All of these family characteristics are also included as controls in the regression analysis.

[Table 1]

Our primary outcome is students' mental health status, measured using the Center for Epidemiologic Studies Depression (CES-D) scale. Although the number of CES-D items administered varies across survey waves, the 8-item CES-D (CES-D8) is consistently included in all waves.[8] To ensure comparability over time, we use the CES-D8 score in the main analysis. Each item is scored from 0 to 3, yielding a total score ranging from 0 to 24, with higher values indicating more severe depressive symptoms. The distribution of the CES-D8 score is shown in Figure 1. We standardize this measure and use it as the outcome variable in the baseline regressions.

The survey data also allow the CES-D8 score to be mapped onto the full 20-item CES-D (CES-D20) scale based on the distribution observed in the survey population. Using this mapping, we classify depressive symptoms following established thresholds in the literature: CES-D20 scores of 16 for mild depression, 23 for moderate depression, and 30 for severe depression (Radloff, 1977; Hsu and Marshall, 1988). Table 1 further reports the prevalence of depressive symptoms by school stage. Among senior secondary school students, 16.8% meet the threshold for mild depression, while 3.9% and 0.6% exhibit moderate and severe depression, respectively. Junior secondary school students show a slightly lower overall prevalence, with 14.9% meeting the threshold for mild depression. However, the shares meeting the thresholds for moderate and severe depression remain non-negligible at 4.4% and 1.0%, re-

[8] Table A1 lists the detailed items and survey waves in which they are included.

spectively. These numbers are roughly consistent with the national report (Guo et al., 2022) and underscore the concerning prevalence of depressive symptoms.

[Figure 1]

The survey also provides rich information on students' academic burden, including time spent studying on weekdays and weekends, participation in tutoring, and educational expenditures. Students also report study behaviors such as absenteeism, homework completion, and compliance with classroom rules, which capture their academic effort and engagement. In addition, both students and parents are asked to evaluate academic and overall performance, as well as expected educational attainment. The survey further includes information on students' physical health and interpersonal relationships. Together, these measures allow us to explore potential mechanisms through which the DRP affects mental health, as well as a broader set of related outcomes.

3.2 Empirical strategy

To identify the causal effect of the DRP on student outcomes, we adopt a DID strategy that exploits variation in policy exposure across both time and school stage. The key idea is that junior secondary school students (grades 7–9) were directly exposed to the DRP, while senior secondary school students (grades 10–12) were not. Thus, by comparing the changes in outcomes before and after the policy across these two groups, we can isolate the average treatment effect of the DRP. Specifically, we estimate the following regression:

$$Y_{ist} = \alpha + \beta \cdot Treat_s \times Post_t + X'_{ist}\gamma + \lambda_s + \theta_t + \delta_c + \phi_{pc} + \rho_{pt} + \varepsilon_{ist}, \tag{1}$$

where Y_{ist} denotes the outcome of interest for student i in school stage s at year t. $Treat_s$ is a binary indicator equal to 1 if the student is in junior secondary school, and 0 if the student is in senior secondary school. $Post_t$ is an indicator for the post-policy period. The coefficient of interest, β, captures the average treatment effect of the DRP on treated students. X_{ist}

denotes a vector of baseline controls, including gender, age, hukou status, urban residence, only-child status, household size, average parental age, and parental education levels. In addition, all regressions control for survey-year fixed effects (θ_t), school-stage fixed effects (λ_s), and birth cohort fixed effects (δ_c). We also include province-by-cohort fixed effects (ϕ_{pc}) to account for regional differences in education systems, mental health infrastructure, economic development, and DRP enforcement that may vary systematically across birth cohorts. Furthermore, province-by-year fixed effects (ρ_{pt}) are included to control for time-varying differences across provinces. Specifically, the DRP was implemented during the COVID-19 pandemic, which may raise concerns that pandemic-related shocks could confound our estimates. The province-by-year fixed effects, therefore, enable us to net out unobserved province-level factors such as varying lockdown policies, local public-health responses, and pandemic-induced economic fluctuations. Standard errors are clustered at the school stage by survey year level to account for possible intra-group correlation.

The identification strategy relies on the parallel trends assumption: in the absence of the policy, the treatment and control groups would have followed similar trends in the outcomes of interest. To examine the validity of the parallel trends assumption and explore the dynamics of policy effects, we estimate an event study model:

$$Y_{ist} = \alpha + \sum_{k \neq -1} \beta_k \cdot Treat_s \times Period_{t=k} + X'_{ist}\gamma + \lambda_s + \theta_t + \delta_c + \phi_{pc} + \rho_{pt} + \varepsilon_{ist}, \quad (2)$$

where β_k captures the differential outcomes for treated students in year k before and after the policy, relative to the base year $k = -1$. This allows us to assess any pre-trend divergence and identify the treatment effects after the policy.

4 The impact of DRP on students' mental health

4.1 Baseline estimates

Table 2 reports the baseline DID estimates of the impact of the DRP on student mental health, comparing junior secondary school students (the treatment group) with senior secondary school students (the control group) before and after the DRP.

Across all mental health outcomes, including the CES-D8 score and binary indicators for above mild, moderate, and severe depression thresholds, the introduction of the DRP is associated with statistically significant reductions in depression risk. For each outcome, the first column presents estimates from a specification that includes year FEs, school stage FEs, and birth cohort FEs, while the second column further includes province-by-cohort and province-by-year fixed effects to account for unobserved geographic heterogeneity across cohorts and over time. Under this more stringent specification, the estimated effect implies a 0.079 standard deviation reduction in the CES-D8 score. Moreover, the probability of exceeding the threshold for mild depression declines by 2.2 percentage points, corresponding to a 14.8% reduction relative to the sample mean. This decline is largely driven by reductions in more severe symptoms, as the probabilities of exceeding the moderate and severe thresholds fall by 2.1 and 1.3 percentage points, respectively.

[Table 2]

We further estimate an event study model as specified in Equation (2) and plot the estimated coefficients in Figure 2. This analysis primarily serves to assess the validity of the parallel trends assumption, for which we find supportive evidence. In the pre-reform period (survey waves 2016–2020), the estimated coefficients are small in magnitude and statistically indistinguishable from zero across all mental health outcomes, indicating no differential pre-trends between the treatment and control groups. This pattern suggests that, in the absence of the DRP, mental health trajectories for the two groups would have

evolved similarly. Following the implementation of the policy in 2021, we observe sharp and statistically significant declines in the CES-D8 score as well as in all depression severity indicators for the treatment group in the 2022 wave. The magnitudes of these effects closely mirror the corresponding DID estimates reported in Table 2, reinforcing the interpretation of a robust negative impact of the DRP on depression risk.

[Figure 2]

This effect size is economically meaningful given that the DRP was implemented as a nationwide, structural policy reform targeting the entire compulsory education system. Previous studies suggest that policy-induced effects in the range of 0.01 to 0.15 standard deviations are considered practically relevant in the context of adolescent mental health interventions, such as school-based mental health services (Golberstein et al., 2024) and life skills programming (Shah et al., 2024). Moreover, the magnitude of our estimate aligns with findings from related education-policy contexts. For example, Björkegren et al. (2024) find that a shift to remote instruction during the COVID-19 pandemic in Sweden led to a 4.4% reduction in psychological distress among high school students, largely due to reduced academic intensity and improved learning environments.

4.2 Robustness checks

Alternative outcome definitions. Appendix Table A2 reports the effects of DRP using other mental health and wellbeing measurements. Consistent with the baseline results, the CES-D20 score declines by 0.090 standard deviations, an effect size very similar to that obtained using the CES-D8. Individual CES-D items, such as reports of feeling depressed, also exhibit corresponding and statistically significant reductions. At the same time, self-reported happiness increases by 0.161 points, equivalent to a 2.0% rise relative to the sample mean, indicating improvements in overall subjective well-being.

Sample restrictions. Appendix Table A3 reports additional robustness checks based on alternative sample restrictions. Panel A excludes students in graduating cohorts (9th and 12th grades), who face elevated stress due to high-stakes entrance examinations and may therefore exhibit weaker responses to the DRP. Under this restriction, the estimated effects remain statistically significant and increase in magnitude; for example, the CES-D8 score declines by 0.095 standard deviations, compared to 0.079 in the baseline specification. Panel B excludes students aged 18 or above, who may be less comparable to school-aged adolescents in terms of school environment and living arrangements. Restricting the sample to school-aged students also yields larger estimated effects. Overall, these findings indicate that the main results are not driven by specific cohort definitions and are robust across alternative sample constructions.

In addition, we examine school-level supply. Appendix Figure A1 shows a steady increase in enrollment for both junior and senior secondary schools from 2016 to 2022. Panel (b) reports student–teacher ratios, which remain essentially flat—at about 2,300 and 2,200 teachers per 10,000 students for junior and senior secondary schools, respectively. Despite rising enrollment, the stability of these ratios suggests that instructional resources expanded in line with demand, indicating that public educational provision remained stable over the sample period.

4.3 Heterogeneous analysis

To further examine for whom the DRP generates larger impacts, we analyze treatment effect heterogeneity across gender, parental education, and pre-policy academic burden. We do so by interacting the DRP treatment indicator with subgroup indicators in the baseline specification. Table 3 reports the estimates using the CES-D8 score as the outcome variable, while Appendix Table A4 to Appendix Table A6 present corresponding results using indicators of depression levels.

Gender. Column (1) shows no substantial heterogeneity by gender. This contrasts with prior evidence suggesting that female students' mental health is more responsive to school-related stress (Högberg et al., 2020; Linder et al., 2023). However, note that in these contexts girls typically exhibit higher baseline levels of depression, whereas in our sample the average CES-D8 score is 4.13 for boys and 4.42 for girls (on a scale of 0–24), indicating only modest gender differences. This suggests that, in the Chinese context, students of both genders may face comparable levels of psychological distress from school and therefore benefit similarly from reductions in academic pressure induced by the DRP.

Parental education. Prior literature documents that higher parental education, particularly maternal education, is associated with improvements in children's physical health (e.g., Currie and Moretti, 2003; Chen and Li, 2009) as well as cognitive and noncognitive skill formation (Carneiro et al., 2013; Lundborg et al., 2014). Using earlier waves of the same dataset and the compulsory schooling reform in China, Cui et al. (2019) show that maternal education has a positive effect on children's mental health. Motivated by the above evidence, Columns (2)–(3) examine heterogeneity in the effects of the DRP by parental education. We find no significant heterogeneity in terms of either maternal or paternal education. This suggests that the DRP's impact on mental health is broad-based, providing comparable benefits to students regardless of their socioeconomic background, as proxied by parental education.

Family economic status. Existing research shows that high-income households tend to allocate more to education activities, whereas their lower-income counterparts may reduce their educational investment (Zhou et al., 2023; Zhang and Wang, 2022), potentially leading to divergent impacts on children's mental health. Building on these, we further examine heterogeneity by family economic status, proxied by household income. Specifically, we define an indicator equal to one if household income is above the median. As reported in Column (4), students from lower-income families experience larger improvements, with CES-D8 scores declining by 0.124 standard deviations, compared to a 0.054 reduction among their

higher-income counterparts. A plausible explanation is that lower-income students were less likely to participate in tutoring programs after the reform and therefore benefited more from the reduction in academic pressure.

[Table 3]

Pre-policy academic burden. We further examine heterogeneity by pre-policy academic burden using four proxies. First, we use household educational expenditures, measured by an indicator for whether a student's education-related spending exceeded the 75th percentile prior to 2021. Second, we exploit cross-provincial variation in exposure to the DRP by constructing a province-level measure of policy intensity based on the pre-policy density of tutoring institutions. This measure captures the share of newly registered tutoring institutions among all new firms in each province during 2016–2020 and is standardized to have a mean of zero and unit variance. Third, based on the second measure, we construct a binary indicator for provinces with above-median values of the tutoring firm share. These proxies are intended to capture differences in baseline academic pressure and the severity of the policy shock across students and regions.

Columns (5)–(7) of Table 3 report the coefficients for the DRP treatment and its interaction with the three proxies for pre-policy academic burden described above. Overall, students facing higher academic pressure prior to the reform exhibit larger mental health responses. For example, as shown in Column (5), while students from households with lower pre-policy educational expenditures experience a 0.072 standard deviation reduction in the CES-D8 score, those from households with education spending above the 75th percentile exhibit an additional reduction of 0.209 standard deviations, indicating a fourfold larger impact. These students were more likely to have participated in tutoring programs prior to the reform and therefore appear to benefit more from the reduction in academic pressure. At the provincial level, students residing in provinces with a one–standard deviation higher pre-policy tutoring

firm share experience an additional 0.044 standard deviation improvement in mental health. Column (7) further shows that the effects are largely concentrated in provinces with above-median tutoring firm density. In places with lower pre-policy educational competition, the policy does not have a significant impact on students' mental health. Taken together, these results indicate that mental health improvements are larger among students who were exposed to greater academic burden prior to the reform, further supporting the interpretation that the effects stem from the relief of education-related stress induced by the policy.

5 Mechanisms and Other Related Outcomes

5.1 Reduced academic burden

The most direct objective of the DRP is to alleviate students' academic workload. Previous studies document that the DRP led to significant reductions in the number of tutoring firms (Huang et al., 2025b) and household education expenditure (Meng et al., 2025). We complement these findings by examining direct changes in students' actual participation in tutoring activities and overall study time. As shown in Columns (1)–(2) of Table 4, although the likelihood of taking any tutoring class declines by only an imprecisely estimated 2.2 percentage points, average weekly tutoring time decreases by almost one hour following the implementation of the DRP. Such an effect is highly statistically significant and corresponds to 67.2% relative to the mean, indicating a substantial reduction in tutoring intensity.

Consistent with these patterns, total study time declines by 0.2 hours on weekdays. Given that students already spend substantial time studying on school days (averaging 9.8 hours per weekday in the sample), reductions in after-school tutoring and related study time are likely to be particularly important for ensuring adequate rest and physical activities. Further analysis by tutoring type reveals a clear compositional shift: participation in school-based tutoring increases, while engagement in private tutoring declines (see Appendix Table A7). This pattern suggests that the overall reduction in study time is primarily driven by

a contraction in private, off-campus supplementary education, partly offset by an expansion of school-provided academic support.

[Table 4]

The reduction in tutoring participation is also reflected in the decrease in educational expenditures. Annual household spending on tutoring falls by 835 RMB. This corresponds to an approximately 40.0% reduction relative to the mean, a relative effect size that is comparable to that reported by Meng et al. (2025). Moreover, parents do not appear to substitute reduced tutoring expenditures toward other forms of educational investment: total annual education spending declines by an even larger amount. Appendix Table A8 further examines whether these savings are reallocated to other types of household consumption, but finds no meaningful evidence of such substitution. Instead, parents appear to retain the unspent education budget as savings earmarked for their children.

5.2 Improved learning effort and self-efficacy

One might worry that reductions in study time and educational investment could adversely affect learning outcomes, which may in turn negatively impact students' mental health. However, adequate rest is also beneficial for maintaining both mental well-being and learning productivity. Moreover, the pre-reform environment may reflect an equilibrium in which households overinvest in education primarily to gain relative standing, leading to significant social inefficiencies (Guo and Qu, 2022; Kim et al., 2024). In such settings, the DRP may reduce efficiency losses by curbing private tutoring at the population level without necessarily reducing absolute learning gains. The resulting reduction in competitive pressure and peer comparison may further enhance students' self-efficacy and intrinsic motivation, potentially translating into improved learning experiences and better mental health.

Following this intuition, we examine changes in students' academic effort and engagement. Results in Table 5 show a significant decline in the likelihood of absenteeism, alongside

increased effort in learning, more frequent homework checking and completion before leisure, improved concentration during tasks, and greater compliance with classroom rules. This indicates that reduced academic pressure does not appear to diminish academic engagement. Instead, it is associated with greater attentiveness and self-regulation. This may be because the decline in stress shifts students' motivation away from externally imposed pressure toward more sustainable, self-directed learning behaviors.

[Table 5]

Table 6 further reports the effects of the DRP on students' self-reported academic performance and educational expectations. On average, students' self-evaluations increase by 0.044 on a five-point scale. The share of students reporting that they ranked among the top 10% (50%) of their class in the most recent examination rises by 2.6 (4.2) percentage points after the reform. Given the inherently relative nature of class rankings and the fact that our measure is self-reported, these increases are best interpreted as improvements in students' perceived academic standing rather than purely objective achievement. Appendix Table A9 reports parents' assessments of their children's academic performance following the DRP. On average, mothers are more likely to rate their children as doing well in maths, while no significant changes are observed in their evaluations of Chinese. No comparable changes are found among fathers.

[Table 6]

Table 6 Column (4) shows that students also report higher expected educational attainment following the reform, whereas parents' expectations for their children remain largely unchanged (see Appendix Table A9). Note that students' self-expected attainment is, on average, lower than that of their parents. This could constitute a source of parent–child tension when parents hold high expectations and impose strict academic requirements. The evidence presented above suggests that, with reduced academic pressure, the DRP enhances

students' self-confidence and intrinsic motivation toward long-term educational goals. This shift may help narrow expectation gaps between parents and children, potentially alleviating family conflict and contributing to improvements in children's mental health.

Heterogeneity by household income reveals a clear difference in students' self-evaluations. As shown in Appendix Table A10, students from higher-income households exhibit significantly higher evaluations. This gradient likely reflects persistent disparities in access to educational resources. Even in the presence of the reform, students from higher-income families, who are better positioned to substitute toward alternative forms of academic support (Zhou et al., 2023), maintain stronger academic confidence and higher expectations. Notably, although students from lower-income households experience larger improvements in health outcomes, their confidence in future educational attainment remains comparatively weaker.

5.3 Better interpersonal relationships

Table 7 further reports improvements across several dimensions of interpersonal relationships. Students exposed to the DRP report higher satisfaction with schools, teachers, and better peer relationships, suggesting a more supportive and harmonious school climate. Treated students are also more likely to share their worries with parents, indicating stronger family communication. These relational improvements likely contribute to gains in mental health, as they provide important emotional support and buffering against negative feelings.

[Table 7]

5.4 Healthier lifestyles and physical health

Reduced academic workload may also allow students to reallocate time toward rest and physical activity. Such adjustments could have a positive effect on both physical and mental

health, which may in turn reinforce each other. Table 8 provides evidence consistent with this hypothesis. Although the DRP does not significantly increase sleep time, it significantly increases exercise time and exercise frequency by 0.71 hours and 0.58 times per week, respectively. The likelihood of smoking and drinking also declines significantly, possibly as a result of lower stress. These changes in health-related behaviors are reflected in improvements in self-rated health. While the average effect on self-reported improved health is positive but imprecise, the probability of having been sick in the past month declines by 4.3 percentage points.

[Table 8]

5.5 Parental mental health

The DRP may also affect parents' mental health, although the direction of the effect is ex ante ambiguous. On the one hand, parents may benefit from improvements in their children's mental health, reduced parent–child tension over schooling, and less perceived competition from peer parents. On the other hand, restrictions on private tutoring may heighten anxiety among parents who view intensive educational investments as essential for their children's academic achievement and long-term prospects. Moreover, parental mental health is also important in that it affects daily parent–child interactions and, in turn, affects children's mental well-being (Goodman et al., 2011; Johnston et al., 2013). Therefore, understanding parental responses is important for assessing the broader welfare implications of the policy.

[Table 9]

Following the same DID specification as in Equation (1), we estimate the impact of the DRP on parental mental health. Parents are classified into the treated group if their child(ren) attend junior secondary school, otherwise they are assigned to the control group.

As shown in Table 9, neither mothers nor fathers exhibit a significant average effect. However, the average effect masks substantial heterogeneity by parental education and pre-policy educational investment. Column (2) shows that both mothers and fathers with a high school degree experience significant deteriorations in mental health. These parents may hold relatively high expectations for their children's academic performance. The abolition of tutoring represents a larger shock to their educational investment strategies, which may heighten their anxiety.

In contrast, mothers from households with higher pre-reform educational investment exhibit improvements in mental health, as do fathers residing in provinces with a higher pre-policy share of tutoring firms. Consistent with the patterns observed for children, these findings may reflect the alleviation of peer-related stress, with mutually reinforcing effects between parents and children.

6 Institutional Comparison and Discussion

In this section, we briefly discuss why the Double Reduction Policy (DRP) has achieved more pronounced effects than earlier education burden-reduction policies in both China and South Korea. From an institutional and regulatory perspective, the DRP exhibits a set of distinctive features in top-level design, cross-departmental enforcement, and comprehensive restrictions on the for-profit tutoring sector. Table A11 summarizes these differences in detail.

The most direct contrast lies in regulatory strictness. Earlier Chinese policies relied mostly on voluntary school-level adjustments without binding force (Xue and Li, 2023). Meanwhile, South Korea's experience is equally instructive. Despite imposing a strict ban on most forms of private tutoring in 1980 (Choi and Choi, 2016), restrictions were progressively relaxed under persistent demand, and the number of *hagwons* (private academies) surged back from 281 in 1980 to 14,043 in 2000 (Kim and Lee, 2010). Subsequent operating-hour curfews fared no better, as students simply shifted to alternative arrangements (Choi

and Choi, 2016; Choi and Cho, 2016). South Korea eventually abandoned elimination as a goal, shifting toward moderate oversight of a tutoring sector it had implicitly accepted as permanent (Kim et al., 2024). The DRP, by contrast, imposed hard bans on for-profit tutoring backed by severe penalties including license revocation, producing a rapid contraction and exit of major tutoring firms that earlier interventions had failed to achieve (Huang et al., 2025b; Xue and Li, 2023).

Beyond strictness, the DRP's top-level design enabled comprehensive cross-departmental coordination. Instead of targeting a single dimension of the tutoring market, simultaneous restrictions were placed on pricing, curriculum, and hours, enforced through unified cross-agency mechanisms.[9] South Korea's more decentralized and fragmented enforcement, by contrast, left regulatory gaps that allowed demand to shift across unregulated channels. Coordination thus extended the reach of strict regulation, preventing the substitution and evasion that had repeatedly undermined earlier policies. Equally important, the DRP's top-level coordination ensured that the abolition of private tutoring was paired with the expansion of alternative after-school programs through public schools. Rather than leaving families without viable outlets, this channeled educational investment toward healthier, school- and family-based activities, sustaining students' educational engagement while relieving competitive pressure, and thus preserving rather than undermining the policy's broader educational purpose.

Overall, the DRP's centralized, top-down governance aligns well with China's long-standing state-led regulatory logic in key social and educational fields. Regardless, the strategies and mechanisms observed may offer valuable lessons for other countries and regions facing similar academic competition pressures. This cross-country comparison remains suggestive rather than conclusive, and further institutional and political-economy research is needed for definitive causal interpretations.

[9]Source: `http://www.moe.gov.cn/jyb_xwfb/gzdt_gzdt/s5987/202202/t20220225_602315.html`

7 Conclusion and Policy Implications

Education is a primary engine of human capital accumulation. Yet, when academic pressure becomes excessive, education systems can generate individual harm and social inefficiency. Education systems and policymakers must therefore navigate a careful balance fostering the effective acquisition of knowledge and skills while preserving the conditions necessary for healthy psychological development.

The DRP reform represents a policy correction from the high-pressure educational paradigm long thought to be excessive for Chinese students. Leveraging variation in exposure across school stages following the reform, this paper examines its impact on student mental health. Results show that the policy reduces depressive symptoms by 0.079 standard deviations and lowers the probability of meeting diagnostic thresholds for depression by 2.2 percentage points. The effects are more pronounced among students from households with higher pre-policy educational investment, lower household income, and in regions with greater policy intensity.

Further analysis suggests that the policy improved children's mental health through multiple pathways. It reduced academic pressure, i.e., lowering tutoring participation, study time, and household education spending. At the same time, the alleviation of pressure appears to have strengthened students' self-efficacy and aspirations. They report greater effort in daily study, higher satisfaction with their academic performance, and more optimistic educational expectations. Students also reported improved relationships with teachers, peers, and family members. Finally, the policy is associated with increased physical activity and a lower likelihood of illness, suggesting improvements in physical health that may mutually reinforce the gains in mental well-being.

Parental mental health exhibits a more nuanced pattern. While there is no significant effect on average, parents with higher levels of education appear to experience greater anxiety, whereas those who had faced heavier academic pressure prior to the reform tend to benefit. Given the potential for parental mental health to spill over to children over the longer term, it

remains important to continue monitoring parental responses and to complement the policy with effective public communication in order to fully realize its intended benefits.

The DRP's notable success stems from its systemic design and stringent enforcement: top-down coordination and cross-agency law enforcement curbed the expansion of shadow education supply, while simultaneous improvements in in-school quality and universal after-school programs reduced family reliance on private tutoring—addressing both symptoms and root causes. This differs fundamentally from burden-reduction policies in South Korea and earlier rounds of similar policies in China, which often remained superficial bans lacking supporting measures and consistent enforcement (Kim and Lee, 2010; Choi and Cho, 2016; Choi and Choi, 2016).

Due to data limitations, this study only examines the short-term effects within one year of policy implementation. Its long-term sustainability, broader impacts (such as academic trajectories and labor market outcomes), potential unintended negative effects, and cost-benefit implications, for instance, employment impacts from the closure of tutoring institutions, still require further investigation and long-term tracking. An optimal policy should reduce academic pressure without undermining educational attainment. Our finding that students' educational aspirations improved suggests these goals can be mutually reinforcing. Given that childhood mental health predicts long-term adult outcomes, the reform holds considerable promise for sustained benefits. Continuing to track these long-run dynamics will be critical to building evidence for the future design of education policy.

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Figures

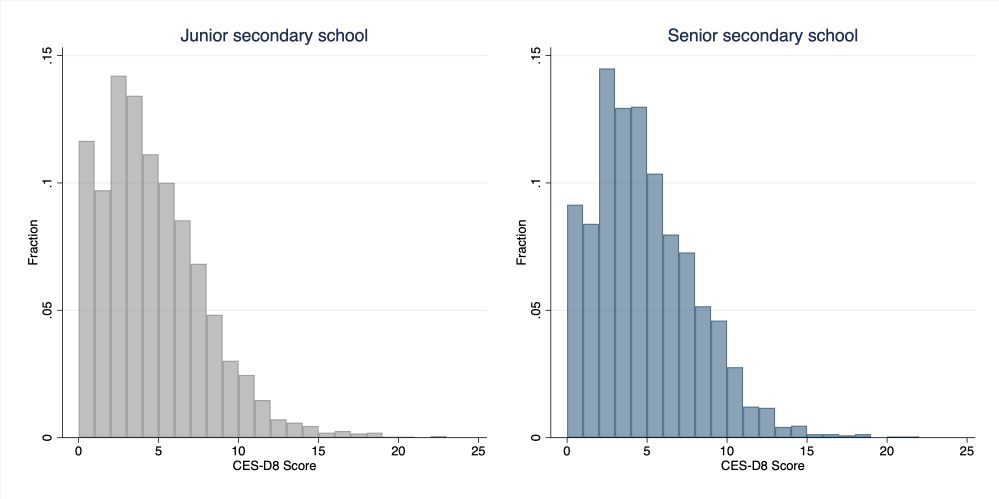


Figure 1: Distribution of mental health for junior and senior secondary school students

Notes: These figures present the distribution of CES-D8 score for junior and senior secondary school students. The detailed CES-D8 items are shown in Appendix Table A1.

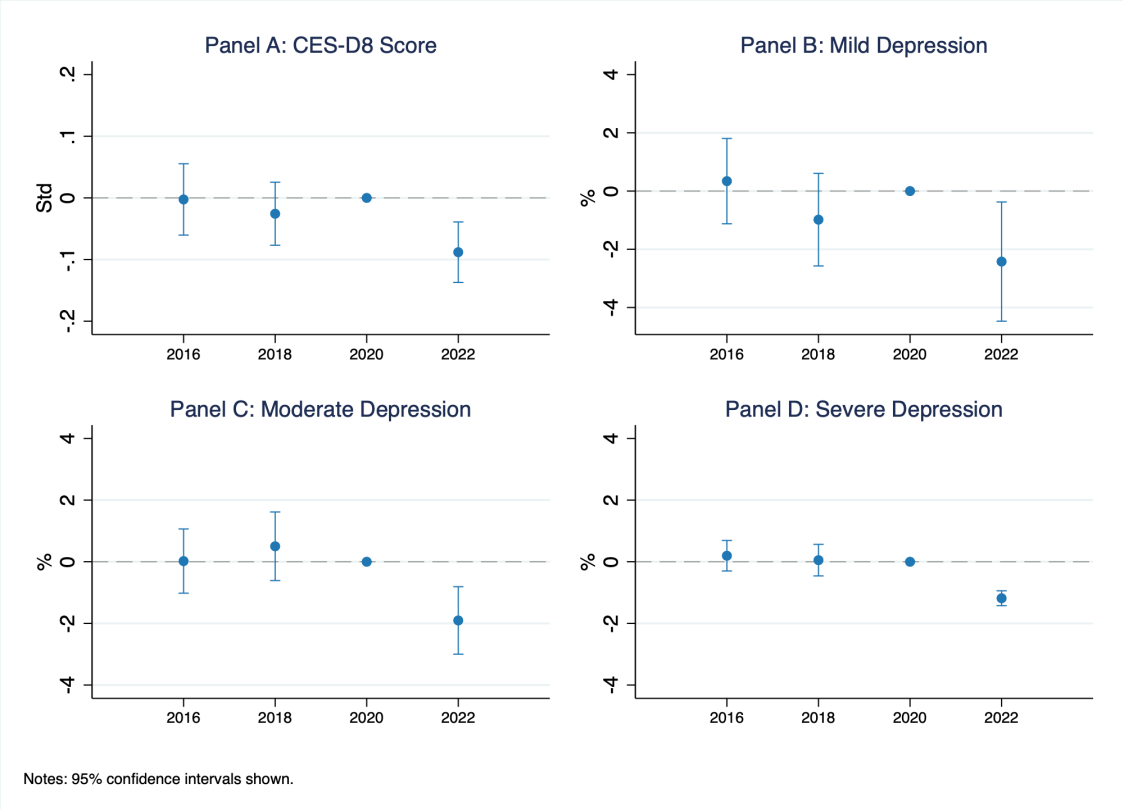


Figure 2: Event study: The impact of DRP on students' mental health

Note: This figure presents event-study estimates based on Equation 2. The dependent variables are standardized CES-D8 scores, the probabilities of exhibiting mild, moderate, and severe depressive symptoms, respectively. Controls include gender, family size, urban residence, only-child status, parents' average age, parents' education, and household income. Year, school-stage, birth cohorts, province-by-cohort, and province-by-year fixed effects are included. Standard errors are clustered at the school-stage–by-year level.

Tables

Table 1: Summary Statistics

	Junior Secondary (N=3047)		Senior Secondary (N = 2132)	
	Mean	SD	Mean	SD
Age	14.352	1.229	17.443	1.294
Male (Yes=1)	0.541	0.498	0.508	0.500
Household size	5.019	1.792	4.580	1.549
Only child (Yes=1)	0.527	0.499	0.595	0.491
Parental age (mean)	41.944	4.859	44.513	4.604
Parental college attendance (Yes=1)	0.104	0.306	0.102	0.303
Parental high school attendance (Yes=1)	0.272	0.445	0.296	0.457
Household income (RMB)	88,347	139,261	89,396	185,469
Urban residence (Yes=1)	0.408	0.492	0.470	0.499
CES-D8 (standardized)	0.024	1.013	0.091	0.983
CES-D20 (standardized)	0.024	1.009	0.085	0.980
Mild depression (CES-D20>16)	14.933	35.647	16.839	37.430
Moderate depression (CES-D20>22)	4.365	20.435	3.940	19.459
Severe depression (CES-D20>30)	0.985	9.875	0.610	7.787

Notes: This table reports summary statistics for students in the treatment and control groups. The treatment group consists of junior secondary school students, while the control group consists of senior secondary school students. Mild, moderate, and severe depression are indicator variables based on CES-D20 cutoffs (greater than 16, 22, and 30, respectively) and are reported as percentages. Parental high school attendance and parental college attendance are coded as one if at least one parent has completed high school or college education, respectively.

Table 2: The impact of DRP on students' mental health

	CES-D8 score standardized		Depressive symptom levels					
			Mild CES-D20>16		Moderate CES-D20>22		Severe CES-D20>30	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × Post	-0.119***	-0.079***	-2.585***	-2.245**	-1.810***	-2.072***	-1.404***	-1.278***
	(0.013)	(0.022)	(0.330)	(0.808)	(0.108)	(0.439)	(0.080)	(0.217)
Year FEs	Y	Y	Y	Y	Y	Y	Y	Y
School Stage FEs	Y	Y	Y	Y	Y	Y	Y	Y
Birth Cohort FEs	Y	Y	Y	Y	Y	Y	Y	Y
Province cohort FEs		Y		Y		Y		Y
Province year FEs		Y		Y		Y		Y
N	5179	5158	5179	5158	5179	5158	5179	5158

Notes: The regression results in this table are based on the CFPS data, with students' mental health as the outcome variables. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, and household income. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Heterogeneous analysis

	CES-D8 score standardized						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat × Post	-0.072*	-0.059**	-0.099***	-0.124***	-0.072**	-0.079**	-0.035
	(0.031)	(0.017)	(0.020)	(0.023)	(0.018)	(0.023)	(0.023)
Treat × Post × Gender	-0.012						
	(0.036)						
Treat × Post × Mom w/ high school degree		-0.094					
		(0.061)					
Treat × Post × Dad w/ high school degree			0.085				
			(0.065)				
Treat × Post × Higher household income				0.070*			
				(0.036)			
Treat × Post × Higher education cost					-0.209**		
					(0.078)		
Treat × Post × Tutoring firm share						-0.044**	
						(0.017)	
Treat × Post × Higher tutoring firm share							-0.131**
							(0.041)
Controls	Y	Y	Y	Y	Y	Y	Y
N	5158	5158	5158	5158	5158	5158	5158

Notes: The regression results in this table are based on the CFPS data, with students' mental health as the outcome variable. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Higher household income is an indicator equal to one if a household's income exceeds the median. Higher education cost is an indicator equal to one if a household's education expenditure prior to the policy exceeds the 75th percentile. Tutoring firm share measures the share of newly registered tutoring firms in the province over the five years prior to the policy, and higher tutoring firm share is an indicator equal to one if this share exceeds the provincial median. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects are included. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 4: The impact on students' academic stress and burden

	Any tutoring	Tutor time	Weekday study time	Weekend study time	Tutor expense	Total education expense	Education savings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat × Post	-0.022	-0.994***	-0.201**	0.044	-835***	-1957***	5443
	(0.012)	(0.223)	(0.077)	(0.114)	(181)	(95)	(3517)
Controls	Y	Y	Y	Y	Y	Y	Y
N	5158	5158	5158	5158	3417	5158	2651
Mean of Dep.var	0.121	1.479	9.757	4.533	2085	6712	2618

Notes: The regression results in this table are based on the CFPS data, with students' academic stress and burdens as the outcome variables. The outcome in Column 1 is a dummy variable, which equals 1 if the student participates in tutoring and 0 otherwise. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: The impact of DRP on students' academic engagement

	Absence from school	Study effort	Homework check	Play after homework	Study focus	Rule compliance
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × Post	-0.015**	0.256***	0.133***	0.197***	0.233***	0.105**
	(0.005)	(0.028)	(0.024)	(0.017)	(0.021)	(0.039)
Controls	Y	Y	Y	Y	Y	Y
N	5074	2904	2895	2903	2906	2906
Mean of Dep.var	0.167	3.413	3.435	3.563	3.668	4.198

Notes: The regression results in this table are based on the CFPS data, with children's academic motivation and engagement as the outcome variables. The outcome in Column 1 is an indicator variable for school absence, taking the value of 1 if the student was absent and 0 otherwise. Outcomes in Columns 2–6 are students' self-reported indicators of academic engagement, measured on a scale of 1 to 5. Higher scores represent greater levels of engagement. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 6: The impact of DRP on students' academic performance and expectations

	Top 10% in class	Top 50% in class	Self evaluation	Self-expected edu. attainment
	(1)	(2)	(3)	(4)
Treat × Post	0.026***	0.042*	0.044***	0.109***
	(0.007)	(0.019)	(0.009)	(0.029)
Controls	Y	Y	Y	Y
N	5158	5158	5157	5149
Mean of Dep.var	0.204	0.722	3.246	15.070

Notes: The regression results in this table are based on the CFPS data, with children's academic performance as the outcome variables. Outcomes in Columns 1–2 are binary indicators for students ranked in the top 10% and top 50% in recent exams, respectively. Columns 3–4 present self-reported satisfaction of academic performance (1–5 scale) and expected total years of schooling. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 7: The impact of DRP on students' interpersonal relationships

	Satisfaction with school	Satisfaction with teacher	Peer relations	Share worries with parents
	(1)	(2)	(3)	(4)
Treat × Post	0.150***	0.129***	0.081***	0.158**
	(0.031)	(0.032)	(0.023)	(0.047)
Controls	Y	Y	Y	Y
N	5158	5076	3711	2650
Mean of Dep.var	3.858	4.145	7.068	0.279

Notes: The regression results in this table are based on the CFPS data, with students' interpersonal relationship indicators as the outcome variables. Outcomes in Columns 1–3 measure self-reported satisfaction with school, teachers (both 1–5 scale), and peer relations (1–10 scale). Column 4 is a dummy variable for sharing worries with parents. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 8: The impact of DRP on students' health and behaviors

	Sleep time	Exercise freq.	Exercise time	Smoking	Drinking	Better health	Sickness	Sickness freq.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × Post	0.138	0.582***	0.713***	-0.018**	-0.024***	0.770	-0.043***	-0.061**
	(0.162)	(0.059)	(0.117)	(0.007)	(0.004)	(1.402)	(0.012)	(0.026)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
N	4425	4426	4382	4428	4428	4427	2666	2666
Mean of Dep.var	55.782	3.054	3.388	0.030	0.017	35.080	0.167	0.224

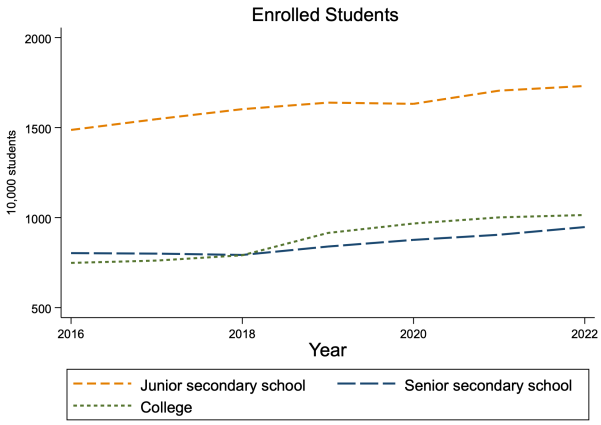
Notes: The regression results in this table are based on the CFPS data, with children's health and related behaviors as the outcome variables. Smoking, drinking, and sickness are binary indicators, taking the value of one if the child reports smoking, consuming alcohol, or experiencing illness, respectively. Better health is self-reported and coded as 100 for improved health status and 0 otherwise (unchanged or worsened). The sample size for sickness and its frequency is reduced due to missing data for children over age 16. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Impact of DRP on Parental Mental Health

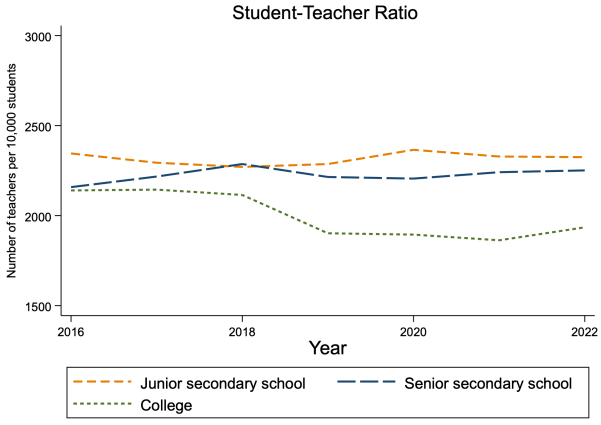
	CES-D8 (Standardized)					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: The impacts on Mothers						
Treat × Post	0.023	-0.010	0.051	-0.005	0.023	0.001
	(0.029)	(0.033)	(0.030)	(0.033)	(0.028)	(0.049)
Treat × Post × High school (Mom)		0.142***				
		(0.034)				
Treat × Post × Education investment			-0.259***			
			(0.037)			
Treat × Post × Higher household income				0.033		
				(0.038)		
Treat × Post × Tutoring firm share					0.027	
					(0.032)	
Treat × Post × High tutoring share						0.066
						(0.068)
Controls	Y	Y	Y	Y	Y	Y
N	4145	4145	4145	4145	4145	4145
Panel B: The impacts on Fathers						
Treat × Post	0.036	-0.038*	0.027	0.067	0.036	0.079***
	(0.023)	(0.018)	(0.023)	(0.043)	(0.023)	(0.013)
Treat × Post × High school (Dad)		0.276***				
		(0.032)				
Treat × Post × Education investment			0.074			
			(0.049)			
Treat × Post × Higher household income				-0.047		
				(0.047)		
Treat × Post × Tutoring firm share					-0.041	
					(0.023)	
Treat × Post × High tutoring share						-0.128***
						(0.034)
Controls	Y	Y	Y	Y	Y	Y
N	3929	3929	3929	3929	3929	3929

Notes: The regression results in this table are based on the CFPS data, with parents' mental health as the outcome variable. Parents of children in junior secondary school serve as the treatment group, and those in senior secondary school as the control group. Controls include age, education indicators, family size, number of children, personal income, household income per capita, and an urban indicator. All specifications include school-stage, year, province, province-by-year, and province-by-school-stage fixed effects. Standard errors are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Appendix



(a)



(b)

Figure A1: Trends in student-teacher ratios and student enrollment over time

Note: This figure shows national trends in student-teacher ratios and student enrollment from 2016 to 2022. The student-teacher ratio is defined as the number of teachers per 10,000 students. Data are from the China Statistical Yearbook.

Table A1: CES-D Questions from CFPS

Item	Question	Scale	Notes
Prompt: How often did you experience the following in the past week?			
Q1	I am annoyed by some trifles.		
Q2	I don't want to eat and have a poor appetite.		
Q3	I feel depressed even though I receive help from my family and friends.		
Q4	I feel that I'm better than someone else.		Reverse-coded
Q5	I find it hard to focus on what I am doing.		
Q6	**I feel depressed.**	**CES-D8**	
Q7	**I find it difficult to do anything.**	**CES-D8**	
Q8	I am hopeful about the future.		Reverse-coded
Q9	I feel that I have been a loser all the time.		
Q10	I feel scared.		
Q11	**I have poor sleep.**	**CES-D8**	
Q12	**I am happy.**	**CES-D8**	Reverse-coded
Q13	I talk less than usual.		
Q14	**I feel lonely.**	**CES-D8**	
Q15	I find people are unfriendly to me.		
Q16	**I have a happy life.**	**CES-D8**	Reverse-coded
Q17	I have cried or want to cry.		
Q18	**I feel sad.**	**CES-D8**	
Q19	I find others dislike me.		
Q20	**I feel that I am unable to keep on with my life.**	**CES-D8**	

Notes: CES-D8 was collected across all waves of the CFPS (2016, 2018, 2020, and 2022). The full 20-item version (CES-D20) was administered only in 2016 using a split-sample design: a random 20% of respondents completed the CES-D20, while the remaining 80% answered the CES-D8. To ensure longitudinal comparability, CFPS used equipercentile equating to construct CES-D20 comparable scores from the CES-D8 for all respondents. All items are coded on a 0–3 scale (0 = almost never [less than one day], 1 = sometimes [1–2 days], 2 = often [3–4 days], 3 = most of the time [5–7 days]). Notably, positive affect items (Q4, Q8, Q12, and Q16) were reverse-coded prior to the equating process.

Table A2: Robustness checks: alternative outcome definitions

	Self-reported happiness	CES-D20	Feel Depressed	Feel happy (reverse coded)	Happy life (reverse coded)
	(1)	(2)	(3)	(4)	(5)
Treat × Post	0.161**	-0.090***	-0.066**	-0.161***	-0.112***
	(0.049)	(0.023)	(0.023)	(0.011)	(0.019)
Controls	Y	Y	Y	Y	Y
N	3712	5158	5158	5158	5158
Mean of Dep.var	7.976	0.049	0.019	0.044	0.043

Notes: The regression results in this table are based on the CFPS data, with students' mental health indicators as the outcome variables. Column (1) uses self-reported happiness as the outcome variable, measured on a scale from 1 to 10, with higher values indicating better mental health. Column (2) uses the standardized CES-D20 score. Columns (3)–(5) report individual CES-D items: "I feel depressed," "I am happy" (reverse coded), and "I have a happy life" (reverse coded), with higher values indicating more severe depressive symptoms. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A3: Robustness checks: Sample restrictions

	Standardized score		Depressive symptom levels		
	CES-D8	CES-D20	Mild	Moderate	Severe
	(1)	(2)	(3)	(4)	(5)
Panel A: excludes students in graduating cohorts					
Treat × Post	-0.095**	-0.108***	-4.898***	-2.865***	-1.406***
	(0.032)	(0.030)	(0.741)	(0.724)	(0.190)
Controls	Y	Y	Y	Y	Y
N	3426	3426	3426	3426	3426
Panel B: excludes students aged 18 or above					
Treat × Post	-0.119***	-0.134***	-3.800***	-3.902***	-1.709***
	(0.017)	(0.019)	(0.691)	(0.478)	(0.205)
Controls	Y	Y	Y	Y	Y
N	4106	4106	4106	4106	4106

Notes: The regression results in this table are based on the CFPS data, with students' mental health indicators as the outcome variables. Panel A excludes students in graduating cohorts, and Panel B excludes students aged 18 or above. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A4: Robustness for heterogeneous analysis

	Mild depression						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat × Post	-3.324**	-0.635	-2.153**	-2.050***	-2.047**	-2.255**	0.349
	(1.088)	(0.750)	(0.697)	(0.577)	(0.831)	(0.833)	(0.918)
Treat × Post × Gender	1.988						
	(1.385)						
Treat × Post × Mom w/ high school degree		-7.685**					
		(2.340)					
Treat × Post × Dad w/ high school degree			-0.416				
			(2.199)				
Treat × Post × Higher household income				-0.298			
				(1.468)			
Treat × Post × Higher education cost					-4.915**		
					(1.744)		
Treat × Post × Tutoring firm share						-2.888**	
						(0.907)	
Treat × Post × Higher tutoring firm share							-7.810***
							(2.100)
Controls	Y	Y	Y	Y	Y	Y	Y
N	5158	5158	5158	5158	5158	5158	5158

Notes: The regression results in this table are based on the CFPS data, with students' mental health as the outcome variable. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Mom (Dad) with higher education is an indicator equal to one if the mother (father) has completed senior secondary school education or above. Higher household income is an indicator equal to one if a household's income exceeds the median. Higher education cost is an indicator equal to one if a household's education expenditure prior to the policy exceeds the 75th percentile. Tutoring firm share measures the share of newly registered tutoring firms in the province over the five years prior to the policy, and higher tutoring firm share is an indicator equal to one if this share exceeds the provincial median. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects are included. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Robustness for heterogeneous analysis

	Moderate depression						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat × Post	-0.348	-2.029***	-2.405***	-3.374***	-1.961***	-2.075***	-1.510*
	(0.597)	(0.332)	(0.419)	(0.507)	(0.438)	(0.456)	(0.647)
Treat × Post × Gender	-3.176***						
	(0.473)						
Treat × Post × Mom w/ high school degree		-0.204					
		(0.736)					
Treat × Post × Dad w/ high school degree			1.221				
			(1.182)				
Treat × Post × Higher household income				1.979**			
				(0.599)			
Treat × Post × Higher education cost					-2.863***		
					(0.781)		
Treat × Post × Tutoring firm share						-0.852	
						(0.887)	
Treat × Post × Higher tutoring firm share							-1.692
							(1.343)
Controls	Y	Y	Y	Y	Y	Y	Y
N	5158	5158	5158	5158	5158	5158	5158

Notes: The regression results in this table are based on the CFPS data, with students' mental health as the outcome variable. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Mom (Dad) with higher education is an indicator equal to one if the mother (father) has completed senior secondary school education or above. Higher household income is an indicator equal to one if a household's income exceeds the median. Higher education cost is an indicator equal to one if a household's education expenditure prior to the policy exceeds the 75th percentile. Tutoring firm share measures the share of newly registered tutoring firms in the province over the five years prior to the policy, and higher tutoring firm share is an indicator equal to one if this share exceeds the provincial median. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects are included. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A6: Robustness for heterogeneous analysis

	Severe depression						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat × Post	-1.460***	-1.349***	-1.059***	-1.687***	-1.279***	-1.276***	-1.188***
	(0.340)	(0.214)	(0.256)	(0.151)	(0.213)	(0.201)	(0.203)
Treat × Post × Gender	0.335						
	(0.364)						
Treat × Post × Mom w/ high school degree		0.339					
		(0.230)					
Treat × Post × Dad w/ high school degree			-0.838*				
			(0.393)				
Treat × Post × Higher household income				0.623**			
				(0.263)			
Treat × Post × Higher education cost					-0.086		
					(0.434)		
Treat × Post × Tutoring firm share						0.640***	
						(0.160)	
Treat × Post × Higher tutoring firm share							-0.270
							(0.545)
Controls	Y	Y	Y	Y	Y	Y	Y
N	5158	5158	5158	5158	5158	5158	5158

Notes: The regression results in this table are based on the CFPS data, with students' mental health as the outcome variable. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Mom (Dad) with higher education is an indicator equal to one if the mother (father) has completed senior secondary school education or above. Higher household income is an indicator equal to one if a household's income exceeds the median. Higher education cost is an indicator equal to one if a household's education expenditure prior to the policy exceeds the 75th percentile. Tutoring firm share measures the share of newly registered tutoring firms in the province over the five years prior to the policy, and higher tutoring firm share is an indicator equal to one if this share exceeds the provincial median. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects are included. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A7: The impact of DRP on students' school-based and private tutoring

	School-based	Private tutoring		
	Academic	Contest	Enrichment	Other
	(1)	(2)	(3)	(4)
Treat × Post	0.038**	0.003	0.001	-0.056***
	(0.010)	(0.004)	(0.001)	(0.010)
Controls	Y	Y	Y	Y
N	3547	3547	3547	3547
Mean of Dep.var	0.234	0.010	0.003	0.066

Notes: The regression results in this table are based on the CFPS data, with indicators for participation in school-based and different types of private tutoring as the outcome variables. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A8: The impact of DRP on household expenditure

	Total Expenditure	Expenditure Category			
		Consumption	Mortgage	Medical	Transfer
	(1)	(2)	(3)	(4)	(5)
Treat × Post	-1602	1405	-719	391	-10
	(1651)	(1851)	(518)	(419)	(185)
Controls	Y	Y	Y	Y	Y
N	5145	4870	5126	5119	5067
Mean of Dep.var	82501	69586	3293	5136	7049

Notes: The regression results in this table are based on the CFPS data, with household expenditures as the outcome variables. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A9: The impact of DRP on parents' evaluation and expectations

	Mothers			Fathers		
	Chinese	Math	Education expectation	Chinese	Math	Education expectation
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × Post	0.036	0.126***	0.015	-0.020	0.110	-1.216
	(0.072)	(0.019)	(0.176)	(0.071)	(0.075)	(0.680)
Controls	Y	Y	Y	Y	Y	Y
N	1458	1459	1464	622	621	622
Mean of Dep.var	0.213	0.232	15.964	0.185	0.185	15.637

Notes: The regression results in this table are based on the CFPS data, with parents' evaluation of children's academic performance and their education expectations as the outcome variables. Math and Chinese are dummy variables equal to 1 if the parent reports the child's performance as "excellent", and 0 otherwise. Education expectation denotes the parent's expected years of schooling for the child. Parents of children in junior secondary school serve as the treatment group, and those in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects are included. Standard errors (in parentheses) are clustered at the school-stage-by-year level.

Table A10: Heterogeneous impacts of DRP on students' academic performance and expectations by household income

	Top 10% in class	Top 50% in class	Self evaluation	Self-expected edu. attainment
	(1)	(2)	(3)	(4)
Treat × Post	0.008	0.008	0.019	0.274**
	(0.010)	(0.007)	(0.032)	(0.105)
Treat × Post × Higher household income	0.021**	0.027***	0.047*	0.346***
	(0.008)	(0.007)	(0.021)	(0.079)
Controls	Y	Y	Y	Y
N	5158	5158	5157	5149

Notes: The regression results in this table are based on the CFPS data, with children's academic performance as the outcome variables. Higher household income is an indicator equal to one if a household's income exceeds the median. Outcomes in Columns 1–2 are binary indicators for students ranked in the top 10% and top 50% in recent exams, respectively. Columns 3–4 present self-reported satisfaction of academic performance (1–5 scale) and expected total years of schooling. Students in junior secondary school serve as the treatment group, and students in senior secondary school as the control group. Controls include gender, family size, urban, whether it is the only child, parents' average age, whether the parents attended high school, whether the parents attended college, household income, year fixed, school stage fixed, birth cohort fixed, province-by-cohort fixed, and province-by-year fixed effects. Standard errors (in parentheses) are clustered at the school-stage-by-year level. *** p<0.01, ** p<0.05, * p<0.1

Table A11: Institutional Comparison of Private Tutoring Regulations: China vs. South Korea

Dimension	**China (Double Reduction Policy)**	**South Korea**
Policy Objective	Reduce academic burden and fundamentally curb the expansion of for-profit tutoring.	Reduce educational inequality and mitigate excessive competition.
Regulatory Approach	Highly centralized, top-down administrative control with nationwide implementation.	Adaptive and evolving approach with cycles of stringent regulation and relaxation.
Policy Trajectory	First comprehensive intervention with simultaneous and large-scale restrictions.	Shift from earlier stringent but ineffective measures to more moderate regulation (e.g., curfews).
Implementation	Strong cross-agency coordination and unified enforcement.	More decentralized and fragmented enforcement with limited inter-agency coordination.
Regulatory Scope	Comprehensive restrictions on pricing, subject offerings, operating hours, and in-school related services.	More targeted restrictions, primarily on operating hours and selected market practices.
Regulatory Intensity	Strict bans on for-profit tutoring and severe penalties, including license revocation.	Moderate restrictions such as night-time curfews and operational limits.
Market Impact	Rapid contraction and exit of major tutoring firms.	Continued expansion and adaptation of *hagwons*.
Policy Effectiveness	Strong short-term suppression of the tutoring sector.	Limited effectiveness due to persistent substitution and evasion.
Key Challenge	Long-term sustainability and potential unintended consequences.	Policy evasion and highly inelastic demand for tutoring.

Notes: This table is synthesized and summarized by the authors based on a comprehensive review of the existing literature.