The Review of Economics and Statistics Fellowship

for NBER Summer Institute

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Summary of Current Research Activity

My research sits at the intersection of development, health, and behavioral economics, with two main axes. First, I study how adverse experiences—such as climate shocks and pandemics—affect mental health, decision-making, and economic behavior, particularly in low-income settings. I also examine the economic consequences of poor sleep, an understudied but pervasive health challenge. Second, I evaluate whether interventions like CBT and CBTi-informed psychotherapy can disrupt the link between these stressors and poverty, thereby improving mental health and enhancing economic resilience. I lead and collaborate on multiple randomized controlled trials in South Asia, Africa, the Pacific, and Latin America. My work has been published in *The Economic Journal*, *Health Economics*, and *Social Science & Medicine*.

Distinctive Perspective and Contribution to the Summer Institute

I would bring both topical and geographic diversity to the NBER Summer Institute. While scholars from Australian institutions are occasionally represented, their participation remains relatively limited. My research also contributes thematic diversity, focusing on the economic impacts of mental health and sleep—topics that are still underrepresented in many applied micro discussions. As a Honduran-born, Indigenous Latina economist, I bring a unique demographic perspective to the field. My work spans several global contexts, and I aim to connect behavioral insights with policy-relevant outcomes in LMICs.

What I Hope to Gain

I hope to engage with researchers whose work complements mine across development, health, and behavioral economics. In particular, I am seeking feedback on two projects: one examining the effects of cognitive behavioral therapy on intimate partner violence in rural Pakistan, and another based on an upcoming RCT studying the economic consequences of poor sleep among low-income workers in Nairobi. The Summer Institute offers an invaluable opportunity to refine these studies, connect with leading scholars in applied microeconomics, and build collaborations that strengthen the policy relevance and rigor of my work.

Sessions of Interest

- Development Economics
- Gender in the Economy
- Economics of Health
- Children and Families

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EMPLOYMENT

2023-	Postdoctoral Research Fellow, Department of Economics, University of Melbourne
2021-2022	Teaching Associate, Monash University
2020-2023	Research Associate, Monash University
2015-2016	Researcher and Consular Assistant, Embassy of the Republic of Korea in Honduras

EDUCATION

2019-2023	Ph.D. in Economics, Monash University
2016-2018	M.A. in Development Studies, University of Passau
2011-2015	B.A. in International Relations, Universidad Tecnológica Centroamericana (*suma cum laude*)

REFEREED PUBLICATIONS

Maselko, J., Collins, A., Baranov, V., Bhalotra, S., Escobar Carías, M., Frost, A., Haight, S., Bibi, A., Sikander, S. (2025) "An examination of multiple illness and social related stressors during the COVID-19 pandemic on maternal and child mental health: findings from a birth cohort in rural Pakistan". ***BMC Public Health***.

Escobar Carías, M., Black, N., Johnston, D., Sweeney, R., Barker., S. F., Rosnaena, Syamsul., D., Waka, T. (2025). "The gender gap in children's educational time investments in informal settlements". **Forthcoming in *Review of Economics of the Household***.

Haight, S. C., Shartle, K., Kachoria, A. G., Hagaman, A., Gupta, S., Escobar Carías, M., Bibi, A., Bates, L. M., Maselko, J. (2025). "Female agency and probable depression in the perinatal period and beyond: Longitudinal findings from rural Pakistan". ***Social Science & Medicine.***

Escobar Carías, M., Johnston, D. W., Knott, R., Sweeney, R. (2024). "Temperature's toll on decision-making". ***Economic Journal.***

Escobar Carías, M., Baranov, V., Maselko, J., Biroli, P., Bhalotra S. (2024). "Maternal Mental Health Responses to COVID-19 Shocks and Uncertainty in Rural Pakistan". ***AEA Papers and Proceedings.***

Frost, A., Collins, A., Chung, E, Escobar Carías, M., Hagaman, A., Gupta, S., Bibi, A., Sikander, S., Maselko, J. (2024). "Trauma exposure among young children in rural Pakistan: Associations with gender, mental health, and cognitive skills". ***BMC Psychology***.

Escobar Carías, M., Johnston, D. W., Knott, R., Sweeney, R. (2022). "Flood disasters and health among the urban poor". ***Health Economics***.

French, M., Barker, S. F., Taruc, R., et al. (2021) "A planetary health model for reducing exposure to faecal contamination in urban informal settlements: Baseline findings from Makassar, Indonesia". ***Environment International***.

WORKING PAPERS

Dodlova M., Escobar Carías, M., Grimm, M. (2023). "The effects of the 2010 Haiti earthquake on children's nutrition and education". IZA DP No. 16195.

WORK IN PROGRESS

Psychological Interventions Provide Resilience to Negative Shocks *(joint work with Victoria Baranov, Sonia Bhalotra, Pietro Biroli and Joanna Maselko).*

Long-term Reductions in Depression and Intimate Partner Violence Over 8 Years: Evidence from a Randomized Controlled Trial *(joint work with Victoria Baranov, Lisa Bates, Sonia Bhalotra, Pietro Biroli and Joanna Maselko).*

Temperature, Health and Livability: Evidence from Informal Settlements *(joint work with Grant Duffy, David Johnston, Rachel Knott, Emma Ramsay and Rohan Sweeney).*

Does prior maternal adversity exacerbate the mental health effects of external shocks? Evidence from mothers and children in rural Pakistan *(joint work with Kaitlin Shartle, Joanna Maselko and Victoria Baranov).*

The impact of Headspace centres on the mental health of Australian adolescents and young adults *(joint work with Nicole Black, Anthony Harris, and David Johnston).*

RESEARCH GRANTS

2024 University of Melbourne, Faculty Research Grant, "The economic consequences of improving sleep through CBTi in LMICs". Total Amount: $12,017 (AUD).

2024 University of Melbourne, Early Career Researcher Grant, "The economic consequences of improving maternal sleep". Total Amount: $25,000 (AUD).

HONOURS AND AWARDS

2024 Mollie Holman Award for Best Doctoral Thesis in the Faculty of Business and Economics, Monash University

2022 Winner of the Monash Faculty of Business and Economics round of the Three Minute Thesis (3MT) Competition.

2021 Best Paper by PhD Student Award at the 16th Australasian Development Economics Workshop

2019-2022 Monash Business School Scholarship

2018 DAAD and Passau University - Matching Funds Scholarship for International Students

2017 DAAD and Passau University - Matching Funds Scholarship for International Students

INVITED PRESENTATIONS

2025 Australian Gender Economics Workshop; Australian Development Economics Association Conference; 16th Annual Workshop on the Economics of Health and Wellbeing (Australia); 2025 Pacific Conference for Development Economics (USC).

2024 ASSA 2024 Annual Meeting; Australian Gender Economics Workshop; 15th Annual Workshop on Economics of Health and Wellbeing; Department Seminar at Deakin University; Mental Health Special Interest Group Seminar Series; Department Seminar at the Royal Melbourne Institute of Technology; 19th Australian Development Economics Workshop; Department Seminar at Arndt-Corden Dept. of Economics Crawford School of Public Policy; Symposium on Economic Experiments in Developing Countries (SEEDEC); Department Seminar at the University Duisburg-Essen; Seminar at the RWI Leibniz Institute for Economic Research; Department Seminar at the University of Gothenburg; Australian Conference of Economists; 45th Annual Australian Health Economics Society Conference; Econometric Society Australasia Meeting.

2023 Seminar at University of Queensland, 36th PhD Conference in Economics and Business.

2022 17th Australasian Development Economics Workshop; 43rd Australian Health Economics Society Conference; Workshop on the Economics of Health; 9th Workshop on Natural Experiments.

2021 Nordic Conference in Development Economics; International Health Economics Congress; UCLA & Luskin Climate Adaptation Research Symposium; CEPR Women in Economics Workshop in Micro- & Applied Microeconomics; 42nd Annual Australian Health Economics Society Conference ; 9th Symposium on Economic Experiments in Developing Countries (SEEDEC); Applied Young Economists Webinar; 34th PhD Conference in Economics and Business; 5th Monash Environmental Economics Workshop; 16th Australasian Development Economics Workshop; KDI School-World Bank DIME Conference on Impact Evaluation in Sustainable and Inclusive Development; Asian and Australasian Society of Labour Economics (AASLE) 2021 Conference.

TEACHING EXPERIENCE

Instructor:	2023-2025	Applied Microeconometric Modelling, University of Melbourne
Teaching Assistant:	2022	Business Statistics, Monash University
	2021-2022	Health Economics

PROFESSIONAL ACTIVITY

Journal Referee: *Journal of Health Economics, Journal of Development Economics, Journal of Development Studies, Journal of Environmental Economics and Management, Economics and Human Biology, Australian Economic Review.*

UNIVERSITY SERVICE

Member of the Executive Committee of the UoM's FBE Gender Lab; Applied Microeconomics Seminar Coordinator (2024); SheCommerce Bootcamp (2023 – 2025) – *workshops to increase representation of female students in economics study programs;* Co-organizer of the Global Health Economics Melbourne Group (2021-2025).

SUPERVISION

TAs: Xinran Hu (PhD Cand.), Renee Zhou (PhD Cand.), Harsh Nathani; *RAs:* Abhirupa Das (PhD Cand.).

Can Psychological Interventions Provide Resilience to Negative Shocks?

Michelle Escobar Carías[1], Victoria Baranov, Sonia Bhalotra, Pietro Biroli and Joanna Maselko*

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Abstract

In this study, we examine whether a maternal mental health intervention, delivered from pregnancy through 3 years postpartum, provided resilience amidst COVID-19 restrictions in rural Pakistan. Our findings indicate that women who received psychotherapy had significantly fewer symptoms of anxiety (22.3%) and depression (18.85%), improved spousal relationships (10.4%), and a lower likelihood of experiencing marital problems (83.9%) during periods of more stringent government restrictions compared to women who did not receive the intervention. Further results suggest that these improvements are likely due to an enhanced ability to manage stress and worry, through increases in locus of control and problem-solving orientation, rather than from differing experiences of economic shocks.

Keywords: COVID-19, mental health, spousal conflict, intimate partner violence, restrictions, Pakistan

JEL Codes: G18, I12, J12, J16

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1. Introduction

The COVID-19 pandemic was a significant health and economic shock that upended people's lives and livelihoods. Its economic effects were particularly devastating in low- and middle-income countries (LMICs) (Josephson et al., 2021). High baseline prevalence of mental illness and intimate partner violence (IPV), poor access to healthcare and basic services as well as weak social safety nets, made residents of LMICs particularly vulnerable during the pandemic (Egger et al., 2021; Gelaye et al., 2016; Ma et al., 2023; Miguel & Mobarak, 2022). In fact, global inequality and poverty increased for the first time in a generation (Mahler et al., 2022). Public health restrictions implemented to slow contagion achieved their purpose (Hsiang et al., 2020), but also exacerbated these effects by further disrupting economic activity, access to basic services and people's time allocation (Bundervoet et al., 2022; Giuntella et al., 2021).

As a result, the pandemic triggered an unprecedented mental health crisis (Quintana-Domeque & Zeng, 2023) and an epidemic of intimate partner violence (UN Women, 2021). While the effects on the former have now been extensively investigated, much less is known about cost-effective strategies aimed at building psychological resilience against these types of shocks. To advance this question, we leverage a unique psychological intervention that randomly assigned perinatally depressed women in rural Pakistan to receive cognitive behavioral therapy (CBT) from pregnancy through 3 years postpartum (Maselko et al., 2020). The Thinking Healthy Program, Peer-delivered Plus (THPP+) was delivered to women aged 18 years or older, in their 3rd trimester of pregnancy, who screened positive for depression between October 2014 and February 2016 (Sikander et al., 2019). The sessions were delivered by volunteer peer women from the same community as the mothers.

By the time when the first wave of the COVID-19 pandemic was declared in Pakistan, in March of 2020, the intervention had concluded and our team had collected seven pre-pandemic household survey rounds: baseline, three- and six-months post-

partum, followed by yearly rounds from year one through four after birth. While year five of data collection was suspended due to the pandemic onset, by year six a new round of surveys was rolled out, allowing us to measure multiple indicators of maternal mental health, marital conflict, and exposure to COVID-related economic and health shocks during the three deadliest waves of the pandemic in Pakistan.

We exploit this setup to estimate whether the psychological intervention was effective at building resilience against the deleterious effects of the restrictions on mental health and spousal conflict. To this end, we implement a Difference-in-Differences strategy, where the first difference arises from the randomized assignment to psychotherapy versus a control condition. The second difference arises from the quasi-random temporal variation in COVID-19 restrictions during the year six survey rollout. We show that this assumption holds because the timing of each participant's survey was exogenously determined by the research team to fall within a specific 45-day window —beginning 15 days before and ending 30 days after the 6th birthday of the index child. Consequently, the intensity of the COVID-19 restrictions experienced by each participant at the time of their survey is also exogenous and largely attributed to this predetermined schedule.

Our findings show that women who were randomized into receiving psychotherapy experienced 22.3% and 18.9% lower symptoms of anxiety and depression, respectively, during periods with more stringent government restrictions, compared to women in the control arm. We also show that more stringent restrictions over the two weeks prior to the survey significantly contributed to the breakdown of spousal relationships by decreasing the quality of the relationship between spouses and increasing marital problems. However, results suggest that the intervention was able to fully offset these effects, improving relationship scores by 10.4% and decreasing marital problems by 83.9% compared to the control condition.

Next, we explore a series of potential mechanisms through which the intervention may have moderated the effects of the restrictions on mental health and spousal conflict. While the intervention did not change women's likelihood of experiencing

COVID-related health or economic shocks during high stringency periods, it did improve women's ability to manage stress and worry about their children. Assignment to treatment also increased perceptions of social support, particularly from family members and the spouse. It also led to significant increases in locus of control and problem-solving orientation, while decreasing loss of interest, appetite loss and psychomotor agitation.

Our unique setting allows us to contribute and improve upon several bodies of evidence. First, we contribute to the literature on the effects of the COVID-19 pandemic on mental health. For example, studies have shown that lockdown measures and COVID-related economic shocks significantly lowered mental health among vulnerable populations in both developed (Adams-Prassl et al., 2022; Anderes & Pichler, 2023; Brodeur et al., 2021; Etheridge & Spantig, 2022; Giuntella et al., 2021) and less-developed countries (Aksunger et al., 2023; Altindag et al., 2022; Baranov, Grosjean, et al., 2022; Bau et al., 2022; Dong & Bouey, 2020; W. Li et al., 2020; X. Li et al., 2020; Z. Li et al., 2020; Nichols et al., 2024). While most of these studies focus on the earliest wave of the pandemic in 2020, we focus on the last three waves recorded in Pakistan in 2021 and 2022. This allows us to explore the lasting effects of the pandemic beyond the first few months.

Secondly, we contribute to the literature documenting the effects of the pandemic on spousal relationships. For instance, Agüero (2021) finds that stay-at-home orders at the start of the pandemic in Peru, led to a 48% increase in the incidence rate of calls to domestic violence (DV) hotlines. Others have found that while calls to DV hotlines increased during the initial shutdown period, arrests and crime reports decreased, suggesting that the cost of reporting crimes to authorities or leaving the household may have also increased (Bhalotra et al., 2024; Miller et al., 2021). For recent reviews on this literature refer to McNeil et al. (2023), Piquero et al (2021), Panchal et al. (2021) and Uzoho et al. (2023).

We also expand the emerging literature on the effects of psychological interventions in low- and middle-income countries. Recent studies include Baranov et al. (2020a),

who study an earlier version of the THPP+ intervention among perinatally depressed women in Pakistan; Bhat et al. (2022), who studied two RCTs providing psychotherapy in Goa, India; Angelucci & Bennett (2023), studying a pharmacotherapy intervention in India; McKelway et al. (2023), who studied the impacts of CBT and cash transfers in a factorial design on the elderly, also in India; and Blattman et al. (2023) who study the long-term effectiveness of CBT targeting high-risk men in Liberia and its effectiveness in reducing crime and violence. For a review of these and other interventions treating mental health conditions in LMICs, refer to Lund et al. (2024). Like Baranov et al. (2020a) and Blattman et al. (2023), we are among the few tracking the long-term effectiveness of CBT informed psychotherapy.

Further, we contribute to the literature on interventions aimed at building resilience to shocks and preventing depression and spousal conflict. Most of the previous worked has focused on cash transfers (Aizer et al., 2023; Christian et al., 2019; Hidrobo & Fernald, 2013). However, cash transfers can be costly to implement once one accounts for the value of the transfer. For example, CT programs can cost between 0.2% and 0.4% of a country's GDP (Caldés & Maluccio, 2005). Meanwhile, CBT can cost as little as $10 dollars per person (Baranov et al., 2020a). Closest to ours is a recent study by Vlassopoulos et al. (2024) that evaluates a randomized, over-the-phone counselling intervention consisting of 4, 25-minute telecounseling sessions made every two weeks starting in mid-July 2020 to a selected sample of women in Bangladesh. Following the intervention, the authors report a 20% reduction in the prevalence of moderate and severe stress and a 33% reduction in depression severity in the treatment group.

Lastly, our study speaks to the literature on the stability of socio-emotional skills. Our findings challenge the long-held view in economics that locus of control is fixed and supports instead, a growing body of evidence which demonstrates that skills can evolve and change as a result of life experiences (Akesaka, 2019; Ananyev & Guriev, 2019; Benassi et al., 1988; Clark & Zhu, 2024; Hanaoka et al., 2018; Hovenkamp-Hermelink et al., 2019; Preuss & Hennecke, 2018).

The rest of the paper is organized as follows. Section 2 describes the development of the COVID-19 pandemic in Pakistan. Section 3 provides details of the intervention, the longitudinal dataset and the outcomes, and discusses our measures of COVID-related restrictions. Section 4 outlines the empirical strategy and the assumptions that underline it. Section 5 presents the main results on the protective intervention effects on maternal mental health and on spousal conflict. Section 6 discusses potential mechanisms at play, and Section 7 concludes.

2. Covid-19 in Pakistan

Pakistan recorded its first two COVID-19 cases on February 26th of 2020. The country experienced five distinct COVID-19 waves (Ahmad et al., 2023), as shown in Table 1. Wave one, lasted from March to October 2020. On March 13th, the government pre-emptively closed its borders and imposed a nationwide lockdown. The lockdown included the closing of educational institutions, government offices, markets and business centres as well as the halting of elective health services, a 2-week ban on public gatherings and the cancellation of the Pakistan Day Parade (Imran et al., 2021). After reaching its peak in June 2020, restrictions were gradually eased and smart lockdowns were imposed to prevent a major economic collapse (Rahim et al., 2022). Large gatherings, political and religious, resumed in July of 2020 across the country (Khan, 2020). Shortly after, a second wave was observed from mid-October 2020 to mid-February 2021. During this time, only localities with high positivity rates were placed under smart or partial lockdowns.

The third wave of the pandemic took place between mid-February and mid-June of 2021. Its onset coincided with the start of our year-6 survey rollout. In response, the government ordered the closure of educational institutions in high-risk districts across the provinces of Punjab and Khyber-Pakhtunkhwa, and the national capital, Islamabad, until April 11. More stringent restrictions on public gatherings were also set in place (Gul, 2021).

The first vaccines for adults aged 65 and older were made available on February 15th, 2021 (Emmanuel et al., 2023). While eligibility was expanded reasonably quickly, the initial vaccination process was slow. This, combined with a high positivity rate of 6.8%, and the introduction of the Alpha and Delta variants, explain why the highest average number of daily cases (3,147) were observed during this period (Ahmad et al., 2023). This was also the deadliest wave with a case fatality rate of 2.35% and 9,448 confirmed COVID-19 deaths (Emmanuel et al., 2023).

A fourth wave was declared mid-June 2021 and lasted until September 2021. COVID-19 restrictions were once again expanded across the country, suspending all commercial activities except essential services and with public transport only allowed to operate at 50% capacity. Educational activities in schools were only allowed three days per week, also at 50% capacity (The Times of India, 2021).[2] A fifth, much shorter wave took place between January 2022 and March 2022 (Sayeed, 2022).

3. Study Design and Data

3.1. The Intervention

The Thinking Healthy Program, Peer-delivered Plus (THPP+) was a cluster Randomized Controlled Trial (RCT) addressing perinatal depression in rural Pakistan (Maselko et al., 2020). Kallar Syedan, the rural subdistrict of Rawalpindi, Punjab chosen for the intervention is a socio-economically deprived area with a poverty rate of about 50%, a high prevalence of maternal depression and little access to clinical mental health care (NIPS & ICF, 2013).

Randomization. The trial was randomized across 40 village clusters: 20 clusters were assigned to receive the intervention and 20 to the control arm. The clusters were geographically separate to minimise contamination risk. Eligible participants were women aged 18 years or older, in their 3rd trimester of pregnancy, married and

[2] The restrictions were imposed in the country's two largest cities, Karachi and Lahore, the national capital, Islamabad, and other cities like Rawalpindi, Multan, Faisalabad, Peshawar, Hyderabad, Abbottabad, among others (Manral Karan, 2021).

registered with a village-based health worker (also known as Lady Health Workers [LHWs]) (Sikander et al., 2019).

Between October 2014 and February 2016, eligible women were approached and screened for depression using the Urdu version of Patient Health Questionnaire (PHQ-9). The tool includes questions about the frequency of depressive symptoms in the last two weeks such as ability to concentrate, sleeping or eating problems and suicidal thoughts. It has been extensively used in the study setting and has an acceptable criterion validity and reliability for this population (Gallis et al., 2018). Women who scored 10 or greater on the PHQ-9 tool, screened positive for depression, and were invited to participate in the trial (Sikander et al., 2019).

Out of the 1731 women screened, 572 (33%) were identified as depressed. Among them, 287 mothers were in clusters randomized to the intervention, 283 in the control arm, with only two mothers refusing to participate before the baseline assessment. Of the 1159 pregnant women who were screened as non-depressed, 584 were randomly selected to be part of the non-depressed arm of the study. They would represent a natural reference group to understand the evolution of maternal and child outcomes.

The THPP+ Intervention. The Thinking Healthy Program, Peer-delivered Plus (THPP+) is a low-intensity psychosocial intervention delivered by non-specialist, volunteer peer women from the same community as the mother. Peers were trained in a 5-day classroom-based workshop, followed by a 2-month internship during which they practiced the content of the intervention on non-trial participants. They also received monthly group supervision throughout the trial (Turner et al., 2016).

THPP+ consisted of ten individual and four group sessions delivered from the third trimester of pregnancy until six months after child-birth. From seven months to 36 months postnatal, 18 group-based booster sessions were delivered. The first six were delivered monthly, and the rest every two months. The first 14 sessions focused on identifying unhealthy behaviors and inducing behavioral activation. The boosters focused on self-care and infant development by encouraging mother-infant

interaction and play. The group sessions also provided a safe environment for women to voice their problems, share experiences and support each other.

Perinatally depressed women in the treatment arm received the THPP+ intervention. In addition to this, both intervention and control groups received enhanced usual care (EUC). The latter consisted of informing participants about their depression status, ways to seek help for it during and after pregnancy. Women without prenatal depression were not offered treatment.

Study sample and follow-up. Our sample consists of the experimental groups of depressed mothers in the treatment and control arms, and the group of mothers who were not depressed at baseline. While data collection on the mother-child dyads has taken place nine times since the trial (3rd trimester of pregnancy, 3, 6, 12, 24, 36, 48, 72, 73), our study primarily focuses on year six (72 months) when waves three through five of the pandemic took place in Pakistan.[3] The effectiveness of the intervention on maternal depression and child development at three years postnatal has been evaluated in previous studies (Maselko et al., 2020).

Balance and Attrition. The experimental sample was slightly imbalanced at baseline, as shown in Table 2. For example, women in the treatment arm were approximately 1.1 cms taller, had a smaller waist circumference by 0.7 inches, and lived in households with 0.32 more people. They also suffered from slightly higher, albeit statistically insignificant, depression scores, as well as psychological, sexual and physical IPV. A joint F-test rejects the balance of baseline characteristics (p-value = 0.055). However, by year 6 post intervention we cannot reject balance of baseline characteristics of the women that remained in the sample (p-value = 0.217).

As Figure 1 shows, lost to follow-up in year six was 22.2%. The main reason was the loss of the index child (40% of the attritors), which was balanced across study arms. Attritors at 72 months were statistically different in terms of nuclear family structure,

[3] The year 5 (60 months post birth) survey rollout did not take place due to the COVID-19 pandemic.

lower presence of the grandmother and whether the index child was her first. They also had higher PHQ-9 scores, greater WHODAS (disability) scores and a lower likelihood of experienced psychological and sexual IPV, though none of these differences were statistically significant (Appendix Table 1). Jointly testing for the difference in attritor characteristics by treatment arms yields balance (p-value = 0.114).

3.2. Outcomes

Mental health. To measure maternal mental health, we use the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder 7-item scale (GAD-7). The PHQ-9 is a 9-item scale used to assess severity of depression symptoms in the last two weeks and it ranges from 0-27 (Kroenke et al., 2001). The GAD-7 scale is used to assess the severity of generalized anxiety disorder over the past two weeks, and it produces a score ranging from 0-21 (Spitzer et al., 2006). For both, response options include "not at all", "several days", "more than half the days" and "nearly every day". In all measures, a higher score is indicative of greater mental health problems. Additionally, we measured nine items from the Structured Clinical Interview for DSM-IV disorders (SCID) (Gorman et al., 2004).

Spousal Conflict. We measure various dimensions of spousal conflict. First, we employ the 6-item Relationship with Father/Husband (RFH) questionnaire which asks respondents: how often (i) does her husband looks after her basic needs, (ii) does she get pocket money for her personal needs, (iii) does she feel that her husband understands her feelings, (iv) does her husband support her in difficult situations, (v) is she happy with her husband's behavior towards her, and (vi) how would she describe her relationship with her husband. These are then aggregated to construct the RFH score. Next, to measure marital unrest we ask women whether or not her marital relations with her spouse have had problems in the last year.

Stress, Social Support and Life Events. To assess some of the potential mechanisms through which the intervention could moderate the effects of restrictions on mental health and spousal conflict, we also study maternal stress, worry about contracting

the virus, perceived social support, loneliness, the experience of traumatic life events, locus of control and generalized self-efficacy.[4] We measure stress through the short Stress Overload Scale (SOS). The SOS is a 10-item questionnaire in which respondents use a 5-point Likert scale to indicate subjective feelings and thoughts experienced over the prior week (e.g., feeling like nothing was going right; there was no escape, etc.) (Amirkhan, 2018). The scale ranges from 10-50 points, with a higher score indicating higher levels of stress overload.

We also apply the Multidimensional Scale of Perceived Social Support (MSPSS), a 12-item instrument designed to measure an individual's perceived adequacy of support from 3 sources: family, friends, and their significant other (Zimet et al., 1990). Each sub-scale ranges from 1-7. Next, we asked respondents about stressful events experienced in the past year using a combination of a modified version of the Life Events and Difficulties Schedule and a list of household economic shocks (Brown & Harris, 1989; Rahman et al., 2003).

Lastly, measure locus of control and generalized self-efficacy. To assess the former, we ask respondents to report on a scale of 1 to 10, to what extent do they feel that (1) everything is determined by fate or, (10) people shape their fate. We also implement the 10-item generalized self-efficacy scale and perform principal components analysis to construct three latent measures: confidence, solution orientation and tenacity.

Self-reported COVID-related shocks. Lastly, we asked respondents about their experience of economic stressors due to the COVID pandemic and about their family's economic prospects for the following year. We use these to assess the relationship between the restrictions and economic difficulties and to estimate any protective effects of the intervention against these shocks.

[4] Histograms plotting the distributions of all outcomes can be found in Appendix Figures 1 and 2.

3.3. Data on COVID-19 Restrictions

Our data on COVID-19 restrictions in Pakistan comes from the Oxford COVID-19 Government Response Tracker (OxCGRT). The OxCGRT dataset captures eight containment and closure government policies from over 180 countries, including Pakistan. They include school closures, workplace closures, cancelling public events, restrictions on gathering size, closure of public transport, stay-at-home requirements, restrictions on internal movements and on international travel (Hale et al., 2021). These are reported in ordinal scales ranging from 0-2, 0-3 or 0-4, with a higher value indicating a more stringent policy, and zero indicating a complete lack of restrictions.

In Pakistan, these measures are available daily, at the national level, from the 1st of January 2020 until December of 2022. However, national policies were not always representative of the restrictions implemented in the villages that took part of the THPP+ intervention. Therefore, we focus on the three restrictions which were most relevant to our setting: workplace closures, stay-at-home restrictions and restrictions on gathering size. Appendix Figure 3 shows their distribution. Based on these three types of restrictions, we create two composite measures of pandemic restrictions: i) the average number of mandatory restrictions that were in place during the 12 days prior to (and including) the date of the survey[5], and ii) the average stringency level over the 12 days before the survey. The first measure employs the sum of the dichotomized variables creating a measure ranging from 0 – 3 (restrictions), and the second measure uses the sum of the ordinal variables creating a measure ranging from 0 – 10. For simplicity, we will employ the former in all main results and the latter for robustness checks. The variation of these measures with respect to the survey rollout is presented in Figure 2, and their overall distribution is depicted in Figure 3.

[5] First, we dichotomize each of the three variables, to take a value of one if the daily stringency level was above two (indicating that the restriction was mandatory for at least a segment of the population), and zero otherwise (no restrictions). The three binary variables were then summed up to measure the number of mandatory restrictions in each of the 12 days prior to and including the day of the survey. Lastly, we averaged all 12 days to match our measure with the reference period of the outcomes.

At the start of the year-six survey rollout, households were under the most stringent level of restrictions, as it coincided with the onset of the third and deadliest pandemic wave in Pakistan. As Figure 2 shows, as the rollout progressed, infections decreased, and restrictions were relaxed only to be ramped up several months later for the fourth and fifth pandemic waves.

4. Empirical Strategy

4.1. Empirical Specification

Our main identification strategy combines the randomized assignment of psychotherapy with the temporal variation in COVID-19 restrictions to isolate the protective effects of CBT on mental health and spousal conflict. Specifically, we implement a *Difference-in-Differences* strategy, where we compare women assigned to psychotherapy versus enhanced usual care (EUC), the control condition, during days with mandatory restrictions ranging from zero to three. To this effect, we estimate the following empirical specification:

$$Y_{ict} = \beta_0 + \beta_1 Treat_c + \beta_2 Restrictions_t + \beta_3 (Treat_c * Restrictions_t) + \mathbf{\Gamma'X}_{ict} + \varepsilon_{ict} \quad (1),$$

where Y_{ict} corresponds to the outcome of interest for woman i living in cluster c, at time t. The variable $Treat_c$ is a dummy that takes a value of one if the mother was assigned to the treatment arm, which varies at the cluster level c, and zero if the mother was assigned to EUC. The variable $Restrictions_t$ measures the average number of mandatory restrictions that were in place during the 2 weeks prior to survey. Since the three policy restrictions[6] that were used to construct this measure were set at the national level, restrictions only vary over time. Our main parameter of interest is β_3, the interaction of the treatment dummy and the number of mandatory restrictions during the 2 weeks prior to survey.

The term $\mathbf{X}_{ict}$ is a vector of characteristics, all of which are demeaned and interacted with the treatment indicator. This is meant to account for the fact that the baseline and

[6] Workplace closures, stay-at-home orders and limits on the number of people allowed in gatherings.

the six-year follow-up samples were not perfectly balanced along all observable characteristics. The interaction with treatment allows for differing impacts of these characteristics on outcomes (Baranov et al., 2020a). Specifically, the set of controls includes enumerator fixed effects, union council fixed effects,[7] mother's height and waist circumference, an indicator for joint/extended families, the number of adults in the household, the number of people per room, a standardized wealth index, the mothers' education, the fathers' education, the mother's experience of sexual IPV in the past 12 months, and the mother's PHQ-9, WHODAS (disability) and PSS (perceived stress) scores.[8] We follow the same procedure for characteristics measured at year 6, which include: enumerator fixed effects, month of survey and its square. We report standard errors clustered at the unit of randomization.

4.2. Identifying Assumptions

To causally interpret β_2, one must assume that the number of COVID-19 restrictions that were in place at the time of the survey is quasi-random (i.e., as good as randomly assigned conditional on controls). In our study, the exposure to COVID-19 restrictions varies only over time and is intrinsically linked to the survey's rollout methodology. Specifically, each participant's survey was scheduled by the research team to fall within a specific 45-day window—beginning 15 days before and ending 30 days after the sixth birthday of the child with whom the participant was pregnant at baseline. This means that as long as the timing of the survey is systematically defined by the research protocol, any variation in exposure to COVID-19 restrictions across participants can be attributed to this predetermined schedule and therefore considered exogenous.

We can show that this assumption holds true in several ways. First, in Appendix Table 2, we show that of the original 570 women enrolled at baseline, 456 were

[7] The subdistrict where the intervention took place was administratively subdivided into 11 union councils. Within these, we identified an even number of village clusters to receive either the intervention or control conditions.

[8] Missing values at baseline are recoded as zeros and indicators for missingness are created for each variable with recoded values.

approached in year six and 114 were lost to follow-up at earlier waves. Of these 456 women, 70% were successfully assessed within the 45-day window based on the child's birthday. Approximately 24% of women were surveyed outside this window and 6% were not successfully surveyed regardless of when they were approached.[9] Next, in columns (1) and (2) of Appendix Table 4, we show that non-compliance with the schedule is independent of mothers' baseline mental health status and exposure to domestic violence. The only characteristic that significantly predicts survey dates outside schedule is the number of COVID-19 restrictions during the weeks prior to the survey and in the opposite direction to what one might expect. That is, restrictions, positively predict compliance, potentially because participants were forced to be at home when they were scheduled to be surveyed. Due to detailed fieldworker notes, we can then examine which maternal characteristics predict non-compliance due to illness in columns (3) and (4) and find no systematic correlation between mothers' observable traits and the outcome of interest.

Lastly, in column (1) of Appendix Table 5, we regress the average number of mandatory restrictions in the two weeks prior to survey on baseline maternal characteristics and find that only family structure and maternal education are significantly and negatively correlated with restrictions. We control for both of them in our primary specification.[10] Altogether, these results show that a) the majority of the women in our sample were surveyed within a scheduled predetermined by the study protocol, b) being surveyed outside schedule is independent of maternal characteristics and as a result, so too is the number of mandatory restrictions at the time of the survey.

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[9] In Appendix Table 3, columns (3) and (4) we show that the majority of these women were not successfully surveyed because a) the moved [n = 18], b) there was illness or death in the family [n = 2], c) the husband did not give permission [n = 2]. These categories for missingness were created based on fieldworkers' notes taking during the survey rollout.

[10] In Appendix Table 6, we also show that none of the measures of restrictions are significantly different between treatment and control.

Having established that β_1 and β_2, can be considered as exogenous, the key identifying assumption for β_3 is that the timing and intensity of restrictions is uncorrelated with other determinants of mental health and spousal conflict that vary by treatment. In Appendix Table 7, we show that baseline characteristics that predict mental health and spousal conflict are balanced across treatment arms at each level of restrictions, supporting this assumption. However, by controlling for the interaction of these baseline characteristics with treatment in our main specification the identification assumption no longer requires that the timing of the restrictions is independent of time-invariant observable maternal characteristics. Instead, it requires the weaker assumption that the timing and intensity of the restrictions is independent of underlying trends in maternal characteristics. In Section 5.3, we discuss placebo tests that allow us to show that is assumption is also satisfied.

5. Results

In what follows, we first report and discuss estimates of the protective effects of the intervention during periods with more stringent COVID-19 restrictions on maternal mental health and spousal conflict. Then, we discuss the robustness of our findings to alternative measures of restrictions, placebo lockdowns during pre-COVID waves, and sensitivity to additional controls.

5.1. Maternal Mental Health

In columns (1) and (2) of Table 4, we examine the protective effects of the THPP+ intervention on maternal mental health and spousal conflict amidst the COVID-19 restrictions. Panel A shows the estimates for the main effects of the intervention and COVID restrictions, and Panel B introduces the interaction term.

Our estimates show that more stringent COVID restrictions are associated with significantly worse maternal mental health. Specifically, women in the control arm who were surveyed during weeks with one additional number of mandated restrictions, experienced a 1.186 (22%) and 0.774 (10%) unit increase in GAD-7 and PHQ-9 scores, respectively. Although the latter is imprecisely estimated. On the other

hand, estimates in Panel A show that on average, assignment to treatment led to a significant reduction in PHQ-9 scores by 0.955 units or 12% relative to the baseline mean measured six years earlier.

Importantly, women who were randomized into receiving the THPP+ intervention, also experienced a significant decrease in symptoms of anxiety and depression during periods of more stringent government restrictions, as compared to women in the control arm. Specifically, they reported 22.3% lower GAD-7 scores and 18.9% lower PHQ-9 scores. In Panel A of Appendix Table 8, we further show that not only did the intervention on average significantly decreased depressed mood, loss of interest, appetite loss and psychomotor agitation in the six-year follow-up, but it was also protective against these symptoms as the number of restrictions during the two weeks prior to survey increased. Next, in Appendix Table 9 we provide evidence suggesting that out of all three types of restrictions that make up our aggregate measure, psychotherapy was most protective against the negative mental health effects of workplace closures. The majority of women in our sample were not employed outside the home, which would suggest that it is the effects of restrictions on their spouses' ability to work which were moderated by the intervention.

Overall, the results in columns (1) and (2) of Table 4 suggest that the intervention was able to fully offset the negative effects of COVID-19 restrictions on anxiety and less so on depression, among women in the treatment arm, compared to those in the control group.

5.2. Spousal Conflict

The pandemic had a profound effect on the financial wellbeing of Pakistani households by increasing job loss and depleting income (Baranov, Grosjean, et al., 2022). These types of economic shocks alone have been shown to increase spousal conflict in other settings (Bhalotra et al., 2021; Tur-Prats, 2021). Stay-at-home orders and workplace closures also forced partners to spend more time together in the privacy of their homes during a period of heightened stress for all family members.

As a result, several reports have documented significant increases in violence against women during the early phases of the pandemic (UN Women, 2021).

Intimate partner violence takes a significant toll on maternal mental health with the potential for lasting consequences (Dokkedahl et al., 2022; Lagdon et al., 2014; Mechanic et al., 2008; Soares, 2006). At the same time, poor maternal mental health is a well-known risk factor for intimate partner violence (Du Mont & Forte, 2014). Research shows that psychotherapy can cause lasting and significant improvements in female empowerment (Baranov et al., 2020a). Furthermore, by decreasing depression (Maselko et al., 2020), the intervention could have also improved women's ability to advocate for themselves, thus increasing their bargaining power and shielding them from violence. This could consequently reduce the toll of the restrictions on women mental health and risk of experiencing spousal conflict.

While we cannot ascertain which was affected first, mental health or spousal conflict, we do find evidence indicating that the pandemic restrictions increased conflict between spouses in our sample. In columns (3) and (4) of Table 4, we show that just as maternal mental health deteriorated when multiple mandatory restrictions were in place, so too did spousal relationships. Specifically, we find that every additional mandatory COVID restriction during the two weeks preceding the survey, is associated with a significant decrease in the quality of spousal relationships, with relationship scores dropping by 1.296 points (5.5% relative to the mean) and the probability of reporting marital problems increasing by 9.4 percentage points (40.87%).

Our estimates in Panel B, also show that women who received the intervention were fully protected against the deleterious effects of more stringent restrictions. For example, we find that treated women reported higher relationship scores by 2.44 points (10.4%) and a lower likelihood of spousal conflict by 19.3 percentage points (83.91%) compared to the control group. The results in Appendix Table 9 suggest that the intervention was particularly protective against the effects of workplace closures

and stay-at-home orders, as demonstrated by the offsetting effect in the interaction term when compared against the main effect of each restriction.

Next, In Appendix Table 10, we decompose the items contributing towards the relationship with father/husband score from Table 4. The estimates suggest that with every additional restriction, women in the treatment arm more frequently felt that their husband looked after their needs (7.3%), understood their feelings (12.4%), and supported them in difficult situations (13.1%), reporting greater satisfaction with their husband's behavior towards them (11.4%), and overall indicated having better relationships with their partner (7.4%). Appendix Table 11, we also show that the protective effects of psychotherapy were restricted to acts committed by the women's partner and not by other members of the family.

5.3. Dose Response

All the results discussed so far, employ the binary randomized assignment of participants to either the treatment or control arms of the intervention. An alternative approach is to focus on the number of sessions attended by participants. Women were invited to attend a total of 32 sessions, the first 14 focused on the behavioral component of the intervention which was delivered from the third trimester of pregnancy until six months after child-birth. The last 18 booster sessions focused on selfcare and child development and lasted from seven months to 36 months postnatal. Figure 4 plots the distribution of attendance for components A and B, and for the sum of both. The graphs indicate that session attendance was highest for the behavioral component, with women attending an average of 10.3 out of 14 sessions. Only 5.6% of women assigned to the treatment arm at baseline attended zero sessions. In contrast, women attended an average of 9.34 out of 18 booster sessions. When summed up, the average woman attended a total of 19.6 sessions between her third trimester of pregnancy and 36 months post birth of her child.

While assignment to treatment is exogenous, the number of sessions attended is not. Therefore, in order to estimate the dose response from session attendance and the effect of its interaction with COVID restrictions, we now employ an *Instrumental*

Variables estimation approach. We use two instruments: i) assignment to treatment as an instrument for the number of sessions attended, and ii) the interaction of treatment with the number of COVID restrictions as an instrument for the dynamic effect of restrictions as a function of attended sessions. We define the first-stage equation as:

$$V_{ict} = \alpha + \gamma_1 Z_1 + \gamma_1 Z_2 + \Gamma' \mathrm{X}_{ict} + \varepsilon_{ict} \quad (2),$$

where V_{ict} stands for the endogenous regressors: a) the number of sessions attended by woman i and b) the interaction of sessions attended and average number of COVID-19 restrictions in the two weeks preceding the survey. Z_1, our first instrument, is a binary measure for assignment to treatment. Z_2, our second instrument, is the interaction of treatment assignment and number of COVID-19 restrictions. X_{ict} includes all the covariates in equation (1). Finally, the second-stage equation is defined as:

$$Y_{ict} = \alpha + \delta' \hat{V} + \Gamma' \mathrm{W}_{ict} + \varepsilon_{ict} \quad (3),$$

where Y_{ict} is one of four primary outcomes: GAD-7 score, PHQ-9 score, relationship with father/husband score or marital conflict. $\hat{V}$ are the fitted values from the first stage, and W_{ict} is a vector of controls now including the instruments from equation (2).

In Appendix Table 12, we display the estimates corresponding to the first and second stage, as well as the corresponding OLS estimates. First, we demonstrate that the relevance assumption is met with Z_1 and Z_2 being strong predictors for session attendance and the interaction of sessions and restrictions, respectively. In the second stage results, we show that as one would expect, the more sessions attended by a participant, the more protective becomes the intervention as COVID-19 restrictions ramped up.

5.4. Robustness Checks and Placebo Tests

In this section we test the robustness of our main results to alternative measures of pandemic exposure, alternative sets of controls, and perform placebo tests using pre-COVID survey rounds.

In Appendix Table 13, we study five alternative ways of defining pandemic exposure: a) the average number of mandatory restrictions [our benchmark], b) the average stringency or intensity of restrictions [based on ordinal measures of the three main restrictions, c) the stringency index defined by the Oxford team based on a suite of nine restrictions, d) the number of new confirmed COVID-19 cases and e) the number of confirmed COVID-related deaths.[11] All five measures use the 2 weeks preceding the survey as reference and are standardized with a mean of zero and standard deviation of one, to facilitate interpretation across panels. Panels A and B, employing the aggregate measures based on the three most relevant restrictions for our setting are highly consistent. They suggest that treatment was more protective during periods with more restrictions. The estimates in panel C have the same sign as those in panels A and B but are half as large, highlighting the importance of adapting markers of pandemic exposure to the local setting. Similarly, the interaction terms using new cases and new COVID-related deaths suggest that the protective effects of the intervention are much more limited when the prospect of death and serious illness are more salient.

Next, in Appendix Table 14, we test the robustness of our primary estimates to controlling for weather and its interaction with treatment arm. The concern being that the quasi-randomness assumption for β_3 could be violated if time variant factors such as temperature and rain affect the treatment and control groups differently and co-vary with the number of COVID-19 restrictions that were in place at the time of the surveys.[12] We find that while adding these new controls reduces the precision of our estimates, our primary conclusions remain qualitatively unchanged. In Appendix Figure 4, we expand these analyses to show the robustness of our findings to completely removing all controls or their interaction with treatment. Overall, our

[11] Their variation over time during the year six rollout is plotted in Appendix Figure 5.

[12] Temperature and rain are known to cause changes in affect, sleep patterns, suicide rates and domestic violence (Baylis, 2020; Burke et al., 2018; Carleton, 2017; Díaz & Saldarriaga, 2023; Escobar Carias et al., 2024; Minor et al., 2022; Zhu et al., 2023).

estimates benefit from having fully interacted models and the estimates for spousal conflict are more robust to different sets of controls.

To further test our primary assumption, we create a placebo treatment by imposing the same temporal pattern of restrictions onto follow-up survey waves during years 3 and 4 post birth, which took place before the start of the pandemic. These results are presented in Appendix Table 15. In neither post birth years 3, 4, or the combined sample of these two waves, do we observe statistically significant effects of COVID-19 restrictions on any of our primary outcomes. More importantly, neither do we see significant interaction effects between the intervention indicator and the number of mandated restrictions. This is reassuring as it indicates that results from our primary specifications are not driven by other unobserved time varying factors following a similar pattern as the restrictions which could bias our primary estimates.

6. Mechanisms

In this section, we explore potential mechanisms behind the protective effects of psychotherapy described earlier. First, we investigate whether the containment measures imposed by the national government affected household's financial wellbeing and whether the intervention attenuated these potential economic effects during our survey period. Next, we explore whether stress, uncertainty and loss of social support associated with COVID-19 restrictions might be additional potential mechanisms behind the deleterious mental health effects and the protective intervention effects found earlier. Lastly, we study whether changes in individual locus of control and generalized self-efficacy attributed to the intervention could be at play.[13]

[13] Appendix Table 16 shows the pairwise correlations between these potential mechanisms and our primary outcomes (anxiety, depression, relationship scores and marital problems).

6.1. Economic Impacts of the COVID-19 Restrictions

In Table 5, we show the results of a modified version of equation (1) with various aggregate measures of economic shocks and financial support as outcomes. We find suggestive evidence indicating that when restrictions were more numerous and stringent, respondents were between 3.2 and 6.2 percentage points more likely to report that they did not have enough money to cover their basic needs. However, beyond this outcome, we find not further evidence that the national restrictions increased household financial impacts or economic uncertainty. Given the lack of main effects of restrictions on economic shocks, it is therefore not surprising to find no significant interaction effects between the intervention and restrictions.

How should one interpret this seemingly surprising finding? First, it's important to understand that the year six survey took place during the last three waves of the pandemic in Pakistan. In our surveys, respondents were asked to report whether they had experienced different COVID-related economic stressors since the start of the pandemic. Most of these are likely to have occurred during the first two waves. Our findings therefore show that past economic shocks are not correlated with current restrictions.

6.2. Stress, Uncertainty and Perceived Social Support

By definition, the containment restrictions imposed by the authorities would only achieve their goal if the population followed orders and reduced their interactions with people outside their household. One might therefore expect a potential reduction in perceived social support during periods of increased isolation. Moreover, because heightened restrictions always followed spikes in COVID-19 cases and deaths, one might also expect to observe increased stress and worry about contracting the virus. Indeed, in Table 6, we find that when more mandatory restrictions were in place, stress overload scores increased by approximately 1.85 units or 8.1% among the control group. During these times, worry about the prospect of getting sick from COVID also increased by about 28.4 percentage points and mothers' concerns about problems experienced by their children either at school or in regard to their health also increased

by almost 16 percentage points. Our estimates for the interaction between number of restrictions and treatment, suggest that the intervention helped women better manage this stress and worry, at least partially offsetting the main effects of the restrictions experienced by women in the control group.

Another goal of the intervention was to encourage women to seek support from friends and family when experiencing increased symptoms of anxiety and depression. In Table 7 we examine whether the intervention achieved this objective. We find suggestive evidence that during times with more mandatory restrictions, women scored lower in various scales measuring perceived social support from family, friends and their significant other. However, only social support from friends dropped significantly when restrictions were high. The results also indicate that on average, women assigned to the treatment arm felt more supported by their family members and their significant other by 4.2% and 3.8%, respectively. Furthermore, the estimates in Appendix Table 18 indicate that higher session attendance for both components of the intervention (psychological and child development) is positive and significantly correlated with perceived social support. Notice however, that these effects are not statistically significant for support from friends, which suggests that the group component of the intervention and the increased contact with a peer might not be important drivers of the protective effects of the intervention. We find no evidence that the intervention significantly affected women's perceptions of social support during weeks with more stringent restrictions.

6.3. Locus of Control and Generalized Self-Efficacy

The results presented thus far support recent studies[14] indicating that CBT-informed mental health interventions can lead to lasting improvements in symptoms of depression, which can then translate into increased psychological resilience during stressful events. One potential explanation for this is that CBT goes beyond alleviating current stressors or chemical imbalances and instead, teaches individuals coping skills

[14] Specifically, Baranov et al. (2020b) and Blattman et al. (2023).

which the person can then access at a later point in time to deal with difficult situations. Another hypothesis is that CBT induces neuroplasticity, or changes in the brain structure which then regulates our responses to stress (Månsson et al., 2016).

Were either of these to be the case, one might expect positive treatment effects on participant's locus of control and sense of self-efficacy. The former measures the degree to which people believe that they have control over the outcomes of events in their lives. The latter assesses the strength of an individual's belief in their own ability to respond to novel or difficult situations and deal with the associated obstacles. We test this in Table 8, which shows that in the sixth year of follow-up, assignment to treatment still had detectable improvements in locus of control, which was higher by 0.20 standard deviations compared to the control arm. While general self-efficacy (GSE) was also higher among the treatment arm by 0.05 standard deviations, these effects were not statistically significant under conventional standards. However, when we break down self-efficacy into factors based on a principal components analysis,[15] we find that solution orientation improved by 0.14 standard deviations among women who received psychotherapy. While Panel B does not indicate that these effects were differentially salient during weeks with more stringent COVID restrictions, the results in Panel A provide suggestive evidence in favor of the two overarching mechanisms briefly described above.

7. Discussion

We evaluate the protective effects of a psychosocial intervention against the deleterious effects of COVID-19 restrictions on mental health and spousal in the context of rural Pakistan. The intervention, which has previously been shown to cause lasting reductions in maternal anxiety and depression (Baranov, Frost, et al., 2022; Maselko et al., 2020), provided cognitive behavioral therapy to 283 clinically depressed women and enhanced usual care to 287 women (the control group). The

[15] Factor loadings are shown in Appendix Table 17.

intervention was delivered by volunteer peer women from the same community as the mothers. Five to seven years after the intervention started, we identify large protective effects of treatment on women's mental health, and spousal conflict during periods with a high stringency of pandemic restrictions.

To the best of our knowledge, this is the first evidence that a low cost and scalable CBT-based intervention offers significant protection against common mental disorders and spousal conflict induced by the recent pandemic in a low- and middle-income country. We find suggestive evidence that these effects operate, at least in part, through an improved ability to manage stress and process worry which could be operationalized through treatment effects on increases in locus of control, problem solving orientation and perceived social support.

Overall, our findings suggest that treating maternal depression may provide psychological resilience and reduce spousal conflict when negative shocks strike. Given the persistent levels of poverty and the heightened risk that climate changes poses to many in low- and middle-income countries, and the potential for intergenerational transmission of poor mental health and domestic violence, the results in this paper provide new evidence to motivate greater policy investment in the treatment of maternal depression in LMICs.

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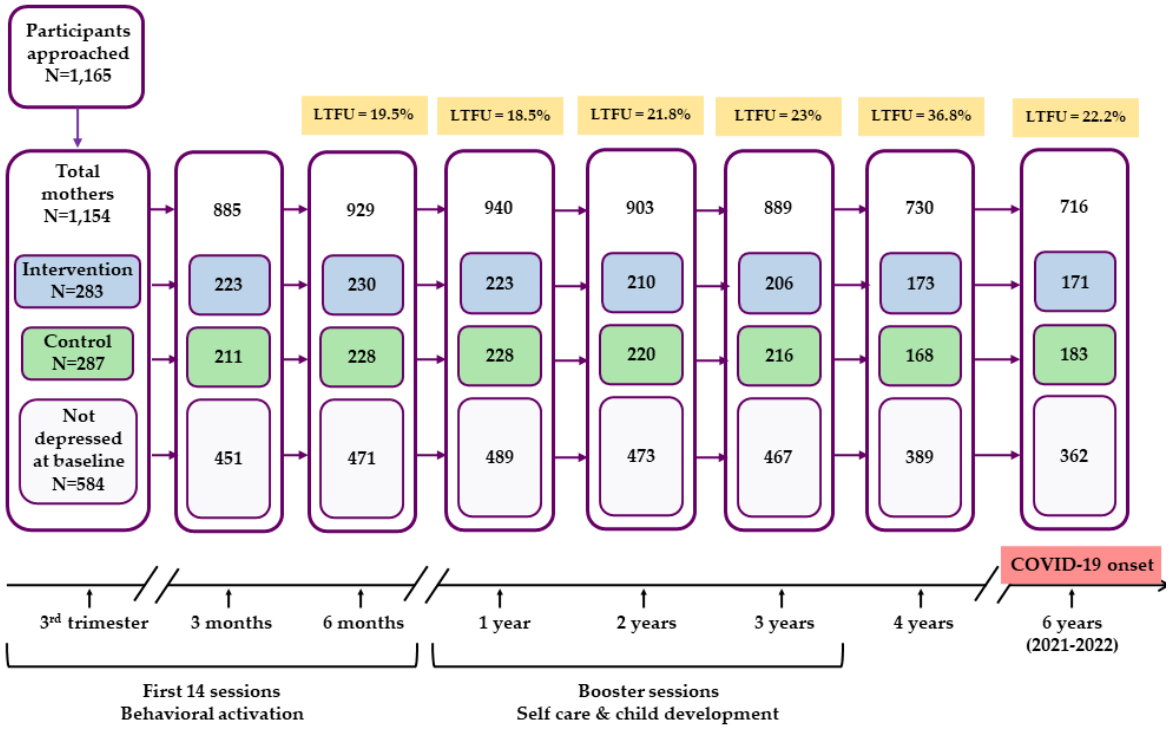
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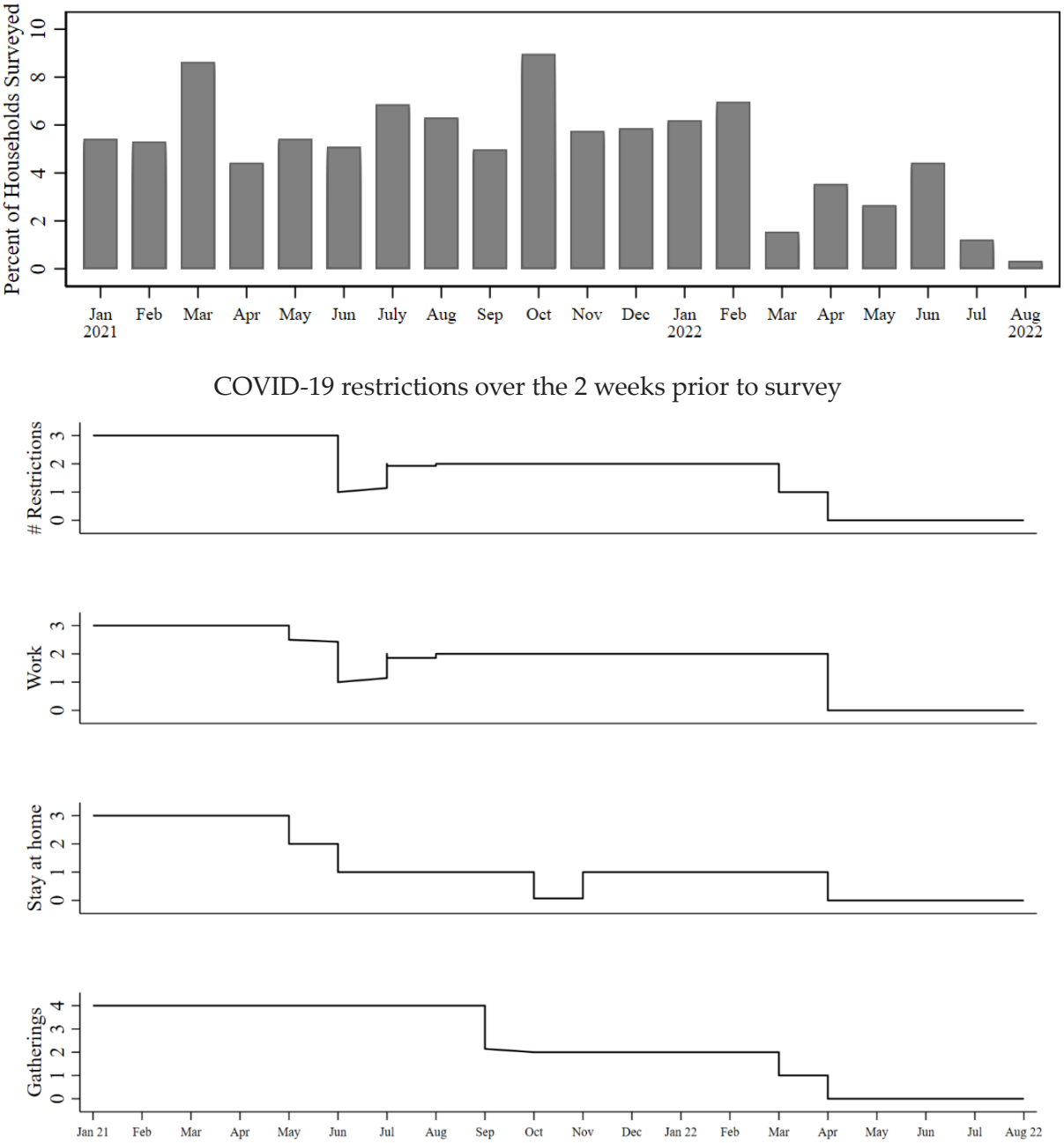
Figures

Figure 1. Timeline of THPP+ Intervention and Follow-ups



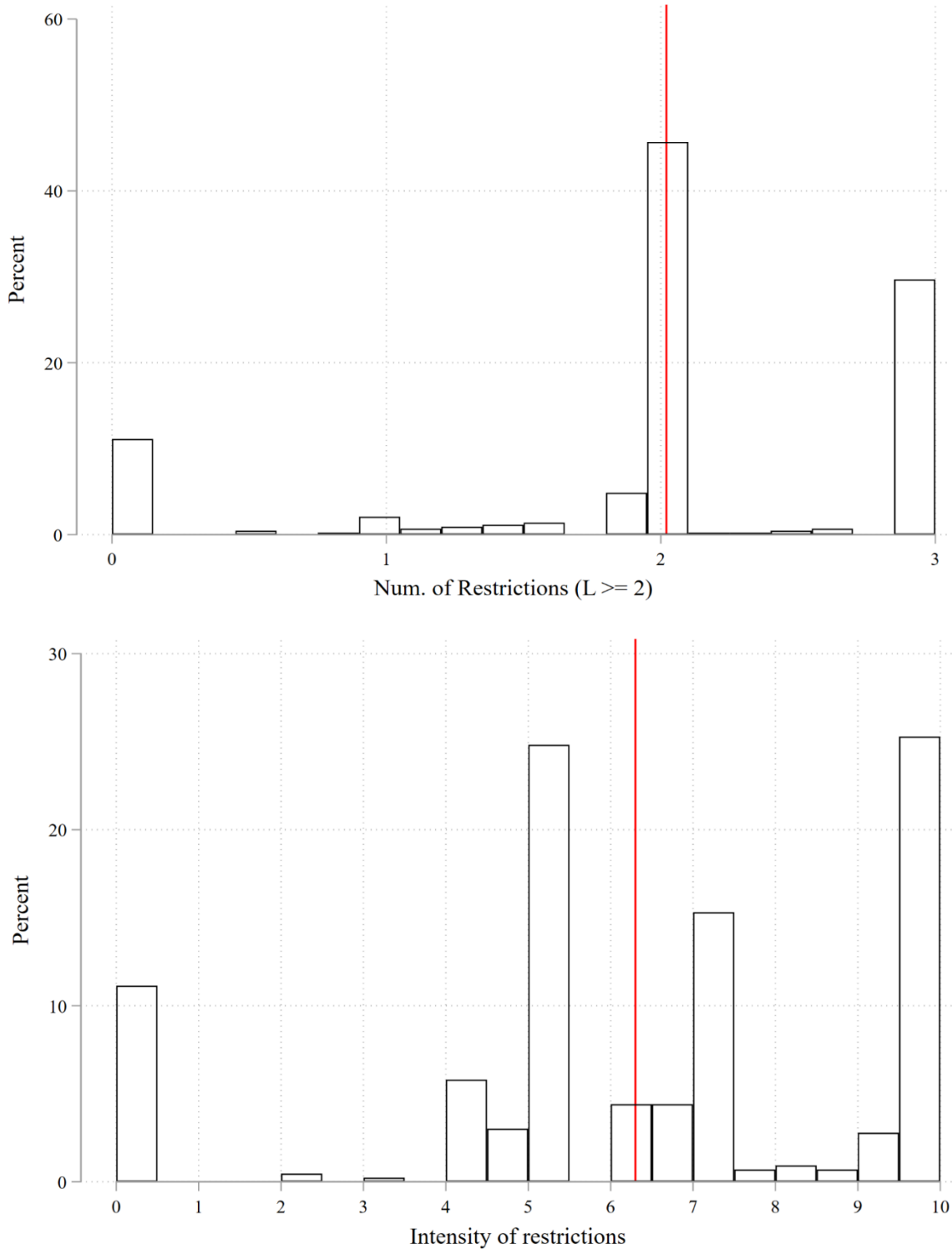
Note: In year 4, surveys were collected using mobile phones, which explains why lost to follow-up increased from 23% in year 3 to 36.8%. However, by year 6, we were able to reach 22.2% of the original sample.

Figure 2. Timeline of the Bachpan Year-6 survey rollout and national restrictions



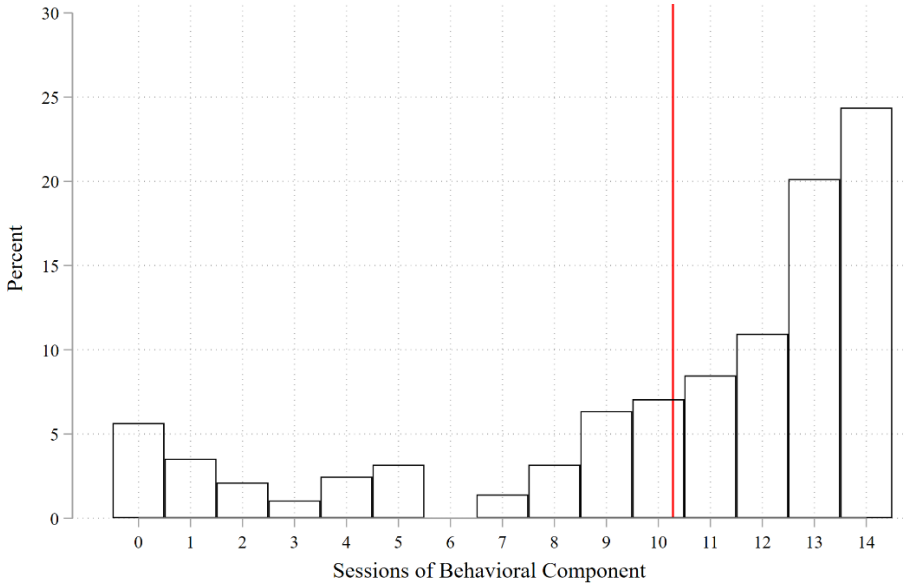
Note: Figure 2a plots the percentage of households surveyed in each month of the year six rollout between January of 2021 and August of 2022. Figure 2b plots i) the average number of mandatory restrictions that were in place during the two weeks prior to the survey, ii) the intensity of workplace closures (0 – no restrictions, 1 – suggested restrictions, 2 – mandated from some segments of the population and 3 – mandated for everyone), iii) the intensity of stay-at-home orders (0 – no restrictions, 1 – suggested restrictions, 2 – mandated from some segments of the population and 3 – mandated for everyone), and iv) the stringency of restrictions on gatherings in terms of number of people allowed in them (0 – no restrictions, 1 – 1000 people at most, 2 – 101 to 1000 people, 3 – 10 to 100 people at most, 4 – 4 to 10 or less people allowed).

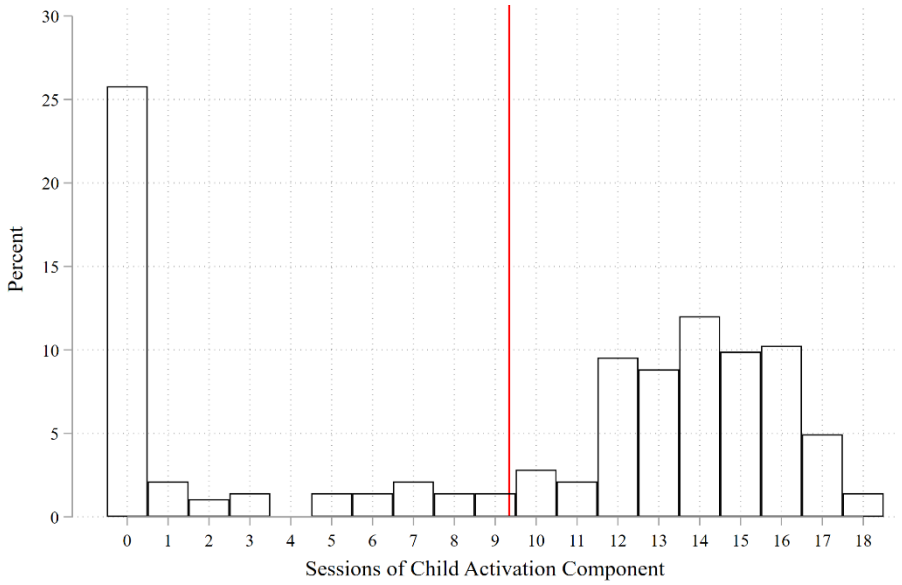
Figure 3. Aggregate restriction measures during year-six of the study

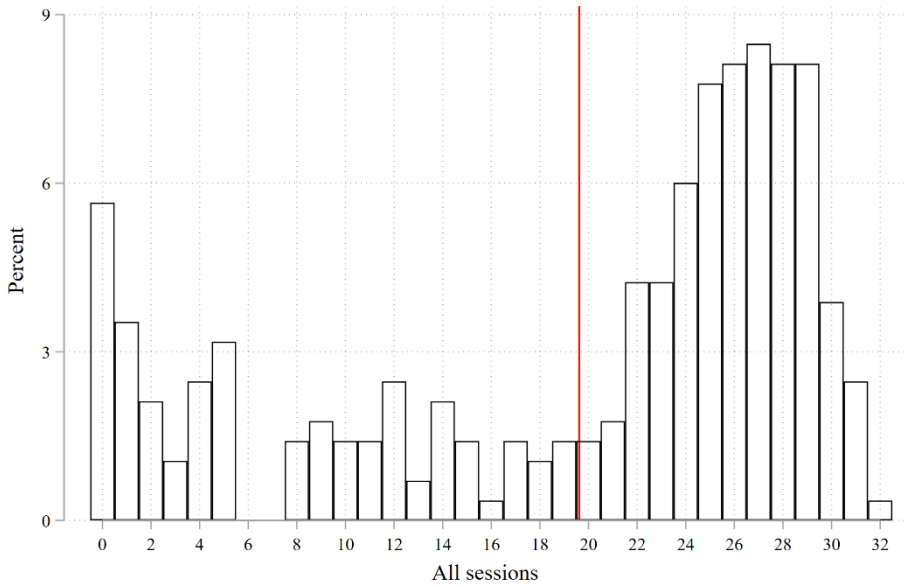


Note: Figure 3a plots the proportion of women surveyed by the average number of mandatory restrictions over the two weeks prior to (and including) the survey. Figure 3b plots the corresponding distribution by intensity of restrictions, which is the sum of the ordinal measures of workplace closures, stay-at-home orders and restrictions on gatherings, averaged over the two weeks preceding the survey date.

Figure 4. Compliance with treatment







Tables

Table 1. Characteristics of COVID-19 waves in Pakistan

COVID-19 Wave	Dates	Confirmed Cases	Deaths	Vaccinations
Wave 1	March 2020 - October 2020	321,877	6,621	-
Wave 2	October 2020 - February 2021	242,200	5,712	-
Wave 3	February 2021 - June 2021	379,988	9,448	3,136,386
Wave 4	June 2021 - September 2021	309,803	6,175	45,291,948
Wave 5	December 2021 - February 2022	221, 825	1,401	45,667,572

Note: Data come from Ahmad et al. (2023) and Emmanuel et al. (2023). COVID-19 vaccines were not being administered during waves 1 and 2. The peaks of each wave were usually reached around the middle of each timeframe: wave 1 – June 2020, wave 2 – December 2020, wave 3 – May 2021, wave 4 – August 2021 and wave 5 – January 2022.

Table 2. Balance in baseline characteristics by treatment arm

	Baseline Sample (N=1,154)								72-months (903)	
	Control		Treatment	Non-depressed	Diff.	p-val	Diff.	p-val	Diff.	p-val
	Mean	SD	Mean	Mean	(ND-D)		(T-C)		(T-C)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mother's age	27.29	4.97	26.80	26.37	-0.67	0.012	-0.49	0.225	-0.49	0.276
Mother's height (cm)	156.33	6.09	157.43	156.84	-0.04	0.932	1.10	0.030	1.17	0.048
Mother's weight (kg)	61.24	12.88	60.17	59.89	-0.82	0.238	-1.07	0.313	-1.43	0.246
Mother's waist circ. (in)	37.56	4.09	36.85	37.07	-0.14	0.600	-0.70	0.045	-0.83	0.037
Mother's blood pressure	71.82	14.10	70.66	71.18	-0.07	0.922	-1.16	0.291	-0.61	0.615
PHQ-9 Score	14.48	3.58	14.89	2.80	-11.89	0.000	0.41	0.181	0.27	0.443
WHODAS Score	16.11	9.12	16.71	5.61	-10.80	0.000	0.60	0.416	0.63	0.459
PSS Score	22.90	7.52	23.84	12.21	-11.15	0.000	0.94	0.138	1.05	0.152
Current major dep. episode	0.73	0.44	0.78	0.02	-0.73	0.000	0.05	0.206	0.05	0.276
Nuclear family	0.25	0.43	0.25	0.20	-0.05	0.056	0.00	0.923	-0.02	0.621
Joint/extended family	0.63	0.48	0.58	0.71	0.10	0.000	-0.06	0.182	-0.04	0.397
Grandmother present	0.67	0.47	0.63	0.72	0.07	0.010	-0.04	0.362	-0.01	0.845
Total adults in the household	5.70	2.99	5.33	5.98	0.47	0.008	-0.37	0.133	-0.08	0.768
First child	0.25	0.43	0.23	0.36	0.12	0.000	-0.02	0.555	0.00	0.968
Number of boys	0.79	0.96	0.86	0.56	-0.26	0.000	0.07	0.405	-0.05	0.569
Number of girls	0.85	1.06	0.96	0.66	-0.24	0.000	0.10	0.256	0.05	0.632
People per room	2.47	1.87	2.79	2.22	-0.42	0.000	0.32	0.051	0.35	0.041
SES asset index	-0.32	1.69	-0.56	0.42	0.86	0.000	-0.24	0.094	-0.08	0.606
Mother's education	6.80	4.55	6.83	8.57	1.75	0.000	0.03	0.945	0.24	0.562
Father's education	8.33	3.29	7.85	9.15	1.06	0.000	-0.48	0.099	-0.61	0.063
Any psychological IPV past 12m	0.49	0.50	0.52	0.20	-0.31	0.000	0.03	0.469	0.00	0.938
Any physical IPV past 12m	0.23	0.42	0.27	0.07	-0.18	0.000	0.03	0.393	0.05	0.284
Any sex-related IPV past 12m	0.37	0.48	0.43	0.22	-0.18	0.000	0.07	0.102	0.10	0.036
Observations	287		283	584						
Joint test (p-value)						0.000		0.055		0.217

Note: This table tests for balance in baseline characteristics. Columns 1, 3 and 4 show the mean in the control, treatment and non-depressed group at baseline.

Table 3. Main study measures used in the analyses

Variable	Description	72-months		
		Control		Treatment
		Mean	SD	Mean
Panel A - Mental Health and Spousal Conflict Outcomes				
GAD-7 Score	Generalized Anxiety Disorder (GAD-7) was measured in years 4 and 6	4.97	5.28	5.82
PHQ-9 Score	Patient Health Questionnaire (PHQ-9) was measured in all but year 1	7.6	5.85	7.88
Relationship with father/husband score	6-item scale measuring the quality of the spousal relationship	23.91	6.41	23.21
Marital problems	Binary indicator of problems with marital relations in the past 12 months	0.21	0.41	0.25
Panel B - COVID-19 Restrictions				
Average number of mandated restrictions over past 2 weeks	Sum of dichotomized restrictions on work, stay-at-home and gatherings above level 2 (mandatory), averaged over the 2 weeks prior to the survey date	2.01	0.88	2.03
Average intensity of restrictions over past 2 weeks	Sum of ordinal measures of 3 restrictions (work and stay-at-home 0-3; gathering 0-4), averaged over the 2 weeks prior to the survey date	6.27	3.00	6.28
Average intensity of workplace closures over past 2 weeks	Indicator = 0 if level: 0 (no measures) or 1 (recommend closing) Indicator = 1 if level: 2 (required closing some sectors), or 3 (required closing for all but essential)	2	0.9	2.01
Average intensity of stay-at-home orders over past 2 weeks	Indicator = 0 if level: 0 (none), 1 (recommend not leaving home) Indicator = 1 if level: 2 (required not leaving with exceptions exercise, shopping), or 3 (required not leaving with minimal exceptions)	1.4	1	1.42
Average intensity of restrictions on gatherings over past 2 weeks	Indicator = 0 if level: 0 (none) or 1 (limit above 1,000 people) Indicator = 1 if level: 2 (limit is 101-1,000 people), 3 (101 to 10 people), or 4 (ten or less people)	2.9	1.4	2.86

Note: All restrictions are measured at the national level so variation in Panel B comes from the timing of the survey rollout.

Table 4. COVID-19 restrictions and maternal mental health

	Mental Health		Spousal Conflict	
	GAD-7 Score	PHQ-9 Score	Relationship w. husband Score	Marital problems (0/1)
	(1)	(2)	(3)	(4)
Panel A				
Intervention	-0.088	-0.955**	-0.205	0.014
	(0.382)	(0.396)	(0.440)	(0.028)
Average # of restrictions over past 2 W	0.602**	0.062	-0.092	-0.001
	(0.296)	(0.397)	(0.499)	(0.036)
R-squared	0.311	0.296	0.285	0.186
	431	431	427	427
Panel B				
Average # of restrictions over past 2 W	1.186***	0.774	-1.296**	0.094*
	(0.407)	(0.470)	(0.555)	(0.048)
Intervention	-0.098	-0.967**	-0.162	0.011
	(0.373)	(0.389)	(0.435)	(0.029)
Intervention x Restrictions over past 2 W	-1.198**	-1.459*	2.443***	-0.193***
	(0.564)	(0.747)	(0.880)	(0.064)
R-squared	0.316	0.302	0.300	0.207
Outcome Mean (Baseline depressed)	5.38	7.74	23.57	0.23
Outcome Mean (Baseline non-depressed)	2.41	4.25	26.35	0.11
Observations	431	431	427	427

Note: Panels A and B differ only in the interaction between assignment to treatment and average number of mandated restrictions over the two weeks prior to the survey. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 5. Restrictions and self-reported COVID-19 shocks

	Covid stressors score	Covid Economic Impact	Covid uncertainty score	Economic support index	Enough money for basic need
	(1)	(2)	(3)	(4)	(5)
Panel A					
Intervention	0.105	0.404**	-0.058	-1.156	0.040
	(0.134)	(0.194)	(0.199)	(1.209)	(0.029)
Average # of restrictions over past 2 W	-0.070	-0.026	0.456*	1.098	-0.032
	(0.127)	(0.131)	(0.247)	(0.918)	(0.030)
R-squared	0.237	0.264	0.301	0.531	0.289
Panel B					
Average # of restrictions over past 2 W	-0.138	-0.080	0.347	0.296	-0.062*
	(0.167)	(0.157)	(0.301)	(1.027)	(0.034)
Intervention	0.106	0.405**	-0.056	-1.141	0.040
	(0.137)	(0.197)	(0.202)	(1.199)	(0.028)
Intervention x Restrictions over past 2 W	0.139	0.111	0.223	1.645	0.062
	(0.253)	(0.261)	(0.497)	(1.827)	(0.061)
R-squared	0.237	0.264	0.301	0.533	0.291
Outcome Mean	2.21	3.46	7.07	68.74	0.79
Observations	431	431	431	431	431

Note: Panels A and B differ only in the interaction between assignment to treatment and average number of mandated restrictions over the two weeks prior to the survey. Outcomes in columns (1) – (3) are composite scales. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 6. COVID-19 restrictions, stress, and loneliness

	Stress Overload Score	Worry about getting sick from COVID	Worry about child problems	Loneliness Score
	(1)	(2)	(3)	(4)
Panel A				
Intervention	-0.448	-0.051	0.070*	-0.074
	(1.077)	(0.063)	(0.041)	(0.489)
Average # of restrictions over past 2 W	0.718	0.210*	0.086**	-0.199
	(0.746)	(0.113)	(0.035)	(0.342)
R-squared	0.277	0.312	0.204	0.316
Panel B				
Average # of restrictions over past 2 W	1.847**	0.284**	0.158***	-0.588
	(0.846)	(0.128)	(0.043)	(0.478)
Intervention	-0.469	-0.052	0.069	-0.067
	(1.068)	(0.063)	(0.041)	(0.487)
Intervention x Restrictions over past 2 W	-2.315	-0.151	-0.148**	0.796
	(1.411)	(0.225)	(0.064)	(0.668)
R-squared	0.280	0.313	0.214	0.318
Outcome mean	22.79	1.85	0.70	21.55
Observations	431	431	431	431

Note: Panels A and B differ only in the interaction between assignment to treatment and average number of mandated restrictions over the two weeks prior to the survey. Outcomes in columns (1) and (4) are composite scales. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 7. COVID-19 restrictions and social support

	Overall Score	Family Score	Friends Score	Significant Other Score
	(1)	(2)	(3)	(4)
Panel A				
Intervention	0.205*	0.247*	0.196	0.231*
	(0.113)	(0.128)	(0.223)	(0.119)
Average # of restrictions over past 2 W	-0.298***	-0.113	-0.855***	-0.110
	(0.107)	(0.111)	(0.222)	(0.111)
R-squared	0.239	0.259	0.242	0.288
Panel B				
Average # of restrictions over past 2 W	-0.192	-0.161	-0.693*	-0.184
	(0.183)	(0.176)	(0.362)	(0.175)
Intervention	0.203*	0.248*	0.193	0.232*
	(0.113)	(0.128)	(0.223)	(0.119)
Intervention x Restrictions over past 2 W	-0.218	0.099	-0.331	0.151
	(0.202)	(0.220)	(0.424)	(0.223)
R-squared	0.242	0.260	0.244	0.289
Outcome mean	4.65	5.93	3.69	6.09
Observations	431	431	431	431

Note: Panels A and B differ only in the interaction between assignment to treatment and average number of mandated restrictions over the two weeks prior to the survey. All outcomes are based on composite scales. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

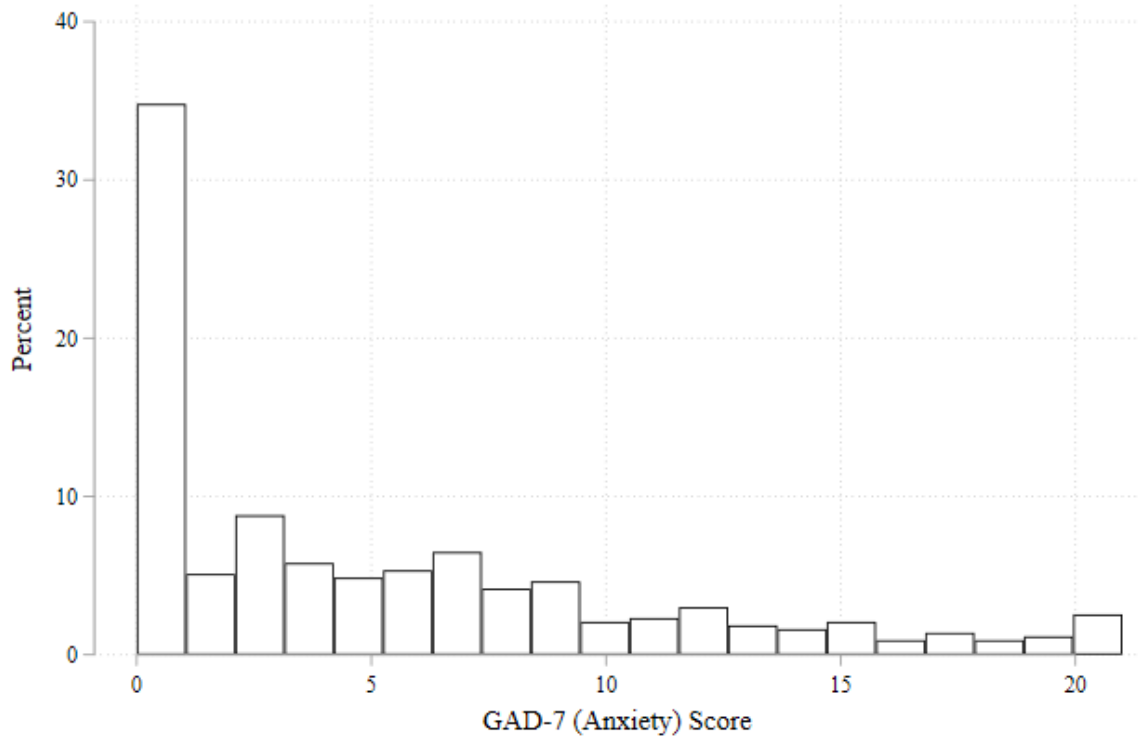
Table 8. COVID-19 restrictions, locus of control and self-efficacy

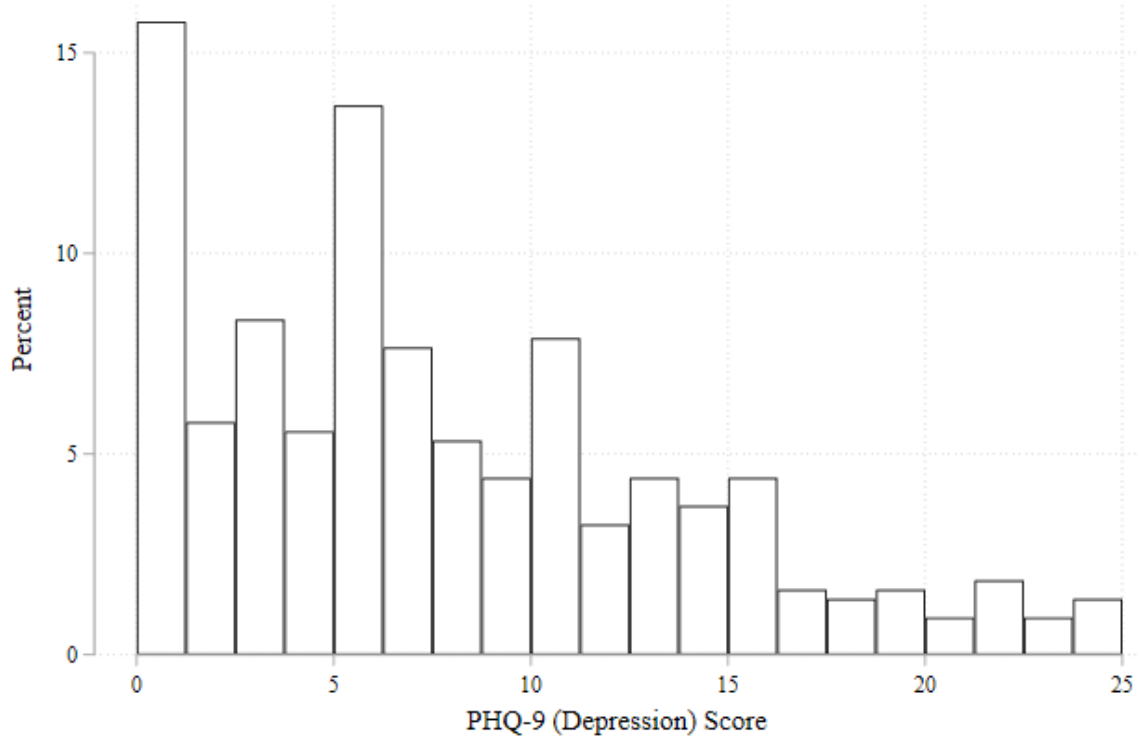
	Locus of control	General Self-efficacy	GSE Factors		
			Confidence	Solution orientation	Tenacity
	(1)	(2)	(3)	(4)	(5)
Panel A					
Intervention	0.197**	0.053	-0.091	0.138**	0.132
	(0.073)	(0.082)	(0.082)	(0.066)	(0.087)
Average # of restrictions over past 2 W	0.008	-0.068	-0.032	-0.090	-0.013
	(0.078)	(0.074)	(0.072)	(0.079)	(0.078)
R-squared	0.243	0.286	0.290	0.234	0.187
Panel B					
Average # of restrictions over past 2 W	-0.059	-0.014	-0.025	0.030	-0.027
	(0.106)	(0.108)	(0.114)	(0.104)	(0.108)
Intervention	0.198**	0.052	-0.091	0.136**	0.132
	(0.076)	(0.083)	(0.082)	(0.066)	(0.087)
Intervention x Restrictions over past 2 W	0.136	-0.111	-0.013	-0.247	0.029
	(0.156)	(0.146)	(0.144)	(0.149)	(0.156)
R-squared	0.245	0.287	0.290	0.239	0.187
Observations	431	431	431	431	431

Note: All outcomes are standardized with a mean of zero and standard deviation of one. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

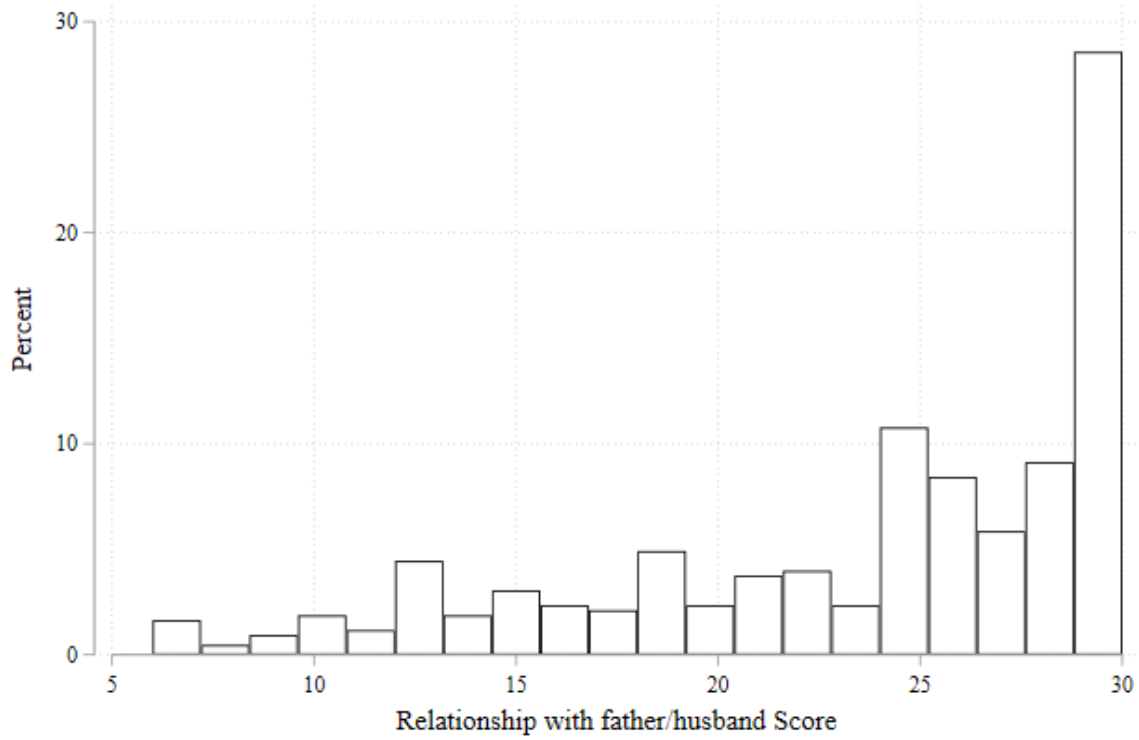
Appendix A – Figures

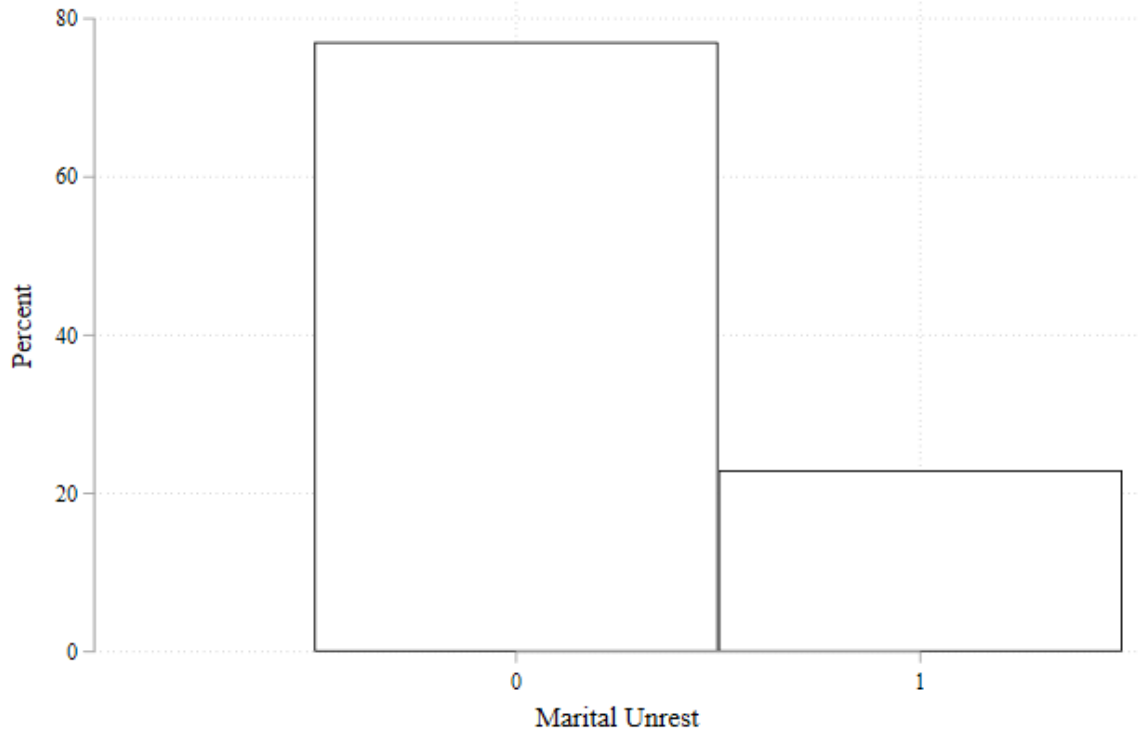
Appendix Figure 1. Distribution of primary outcomes



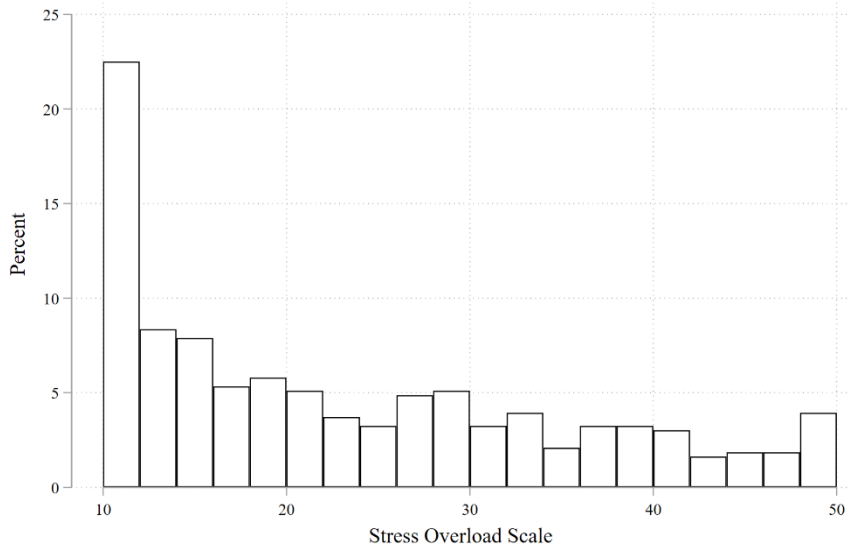


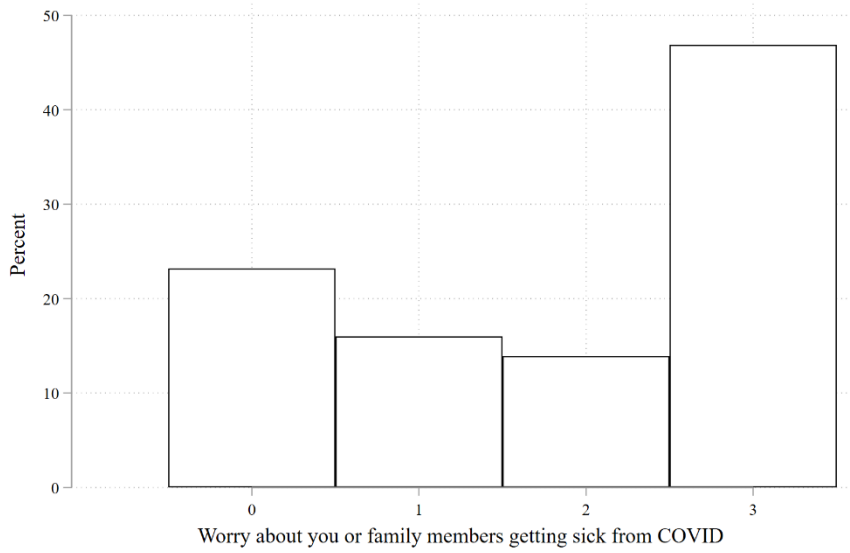
Appendix Figure 1. Distribution of primary outcomes (…continued)

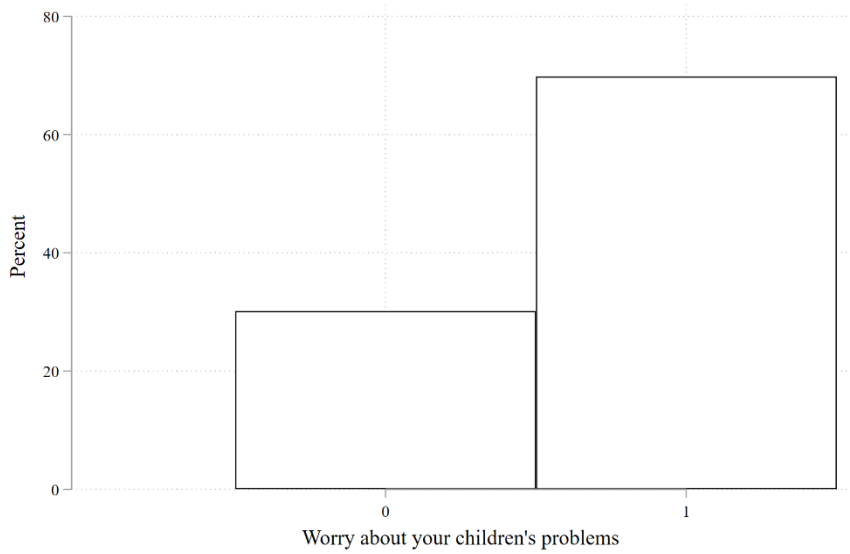




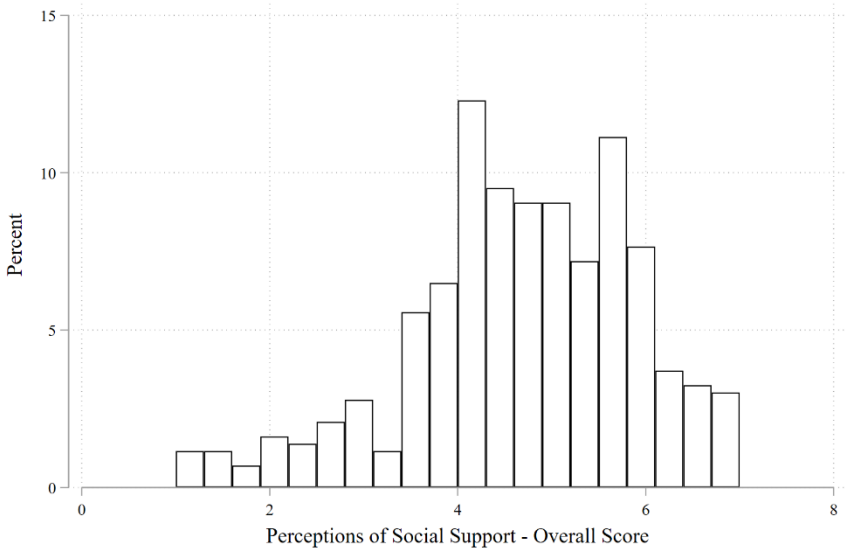
Appendix Figure 2. Distribution of secondary outcomes

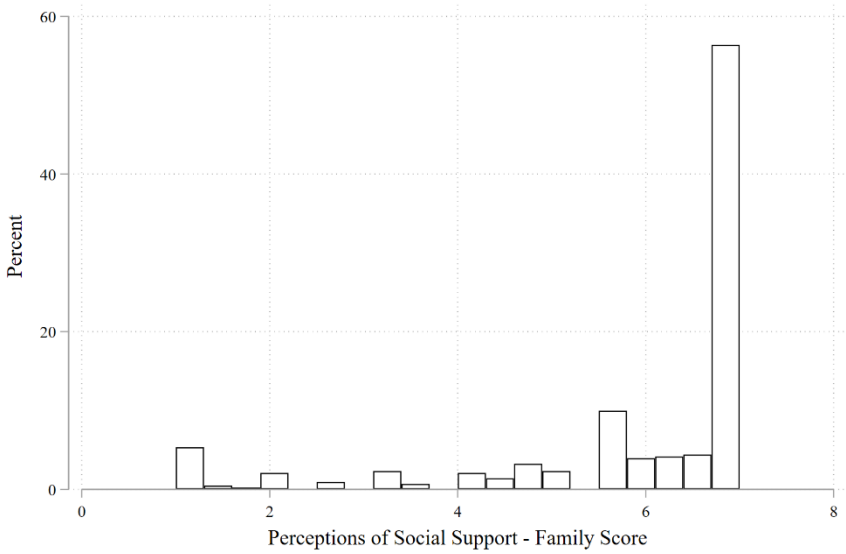


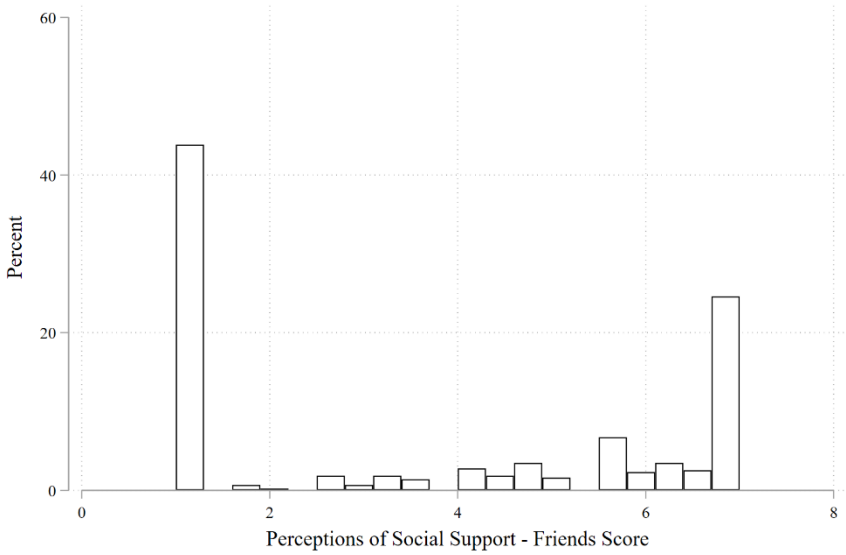




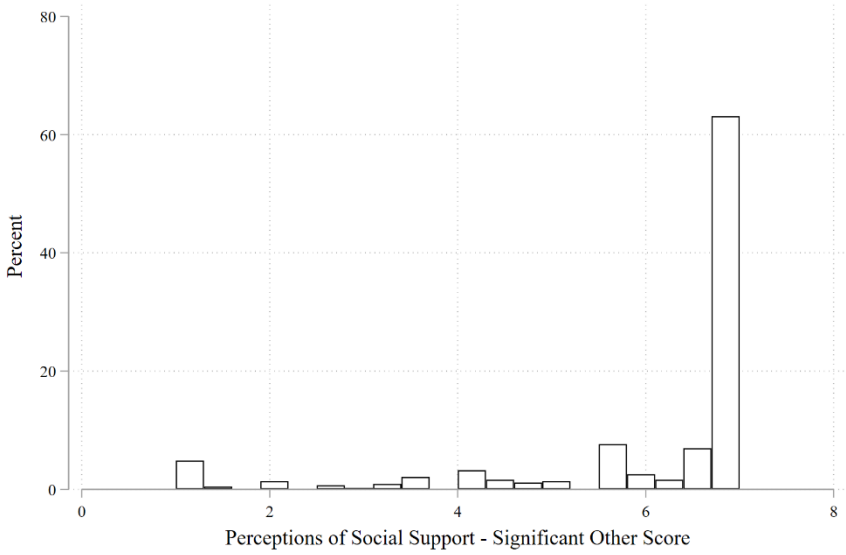
Appendix Figure 2. Distribution of secondary outcomes (…continued)

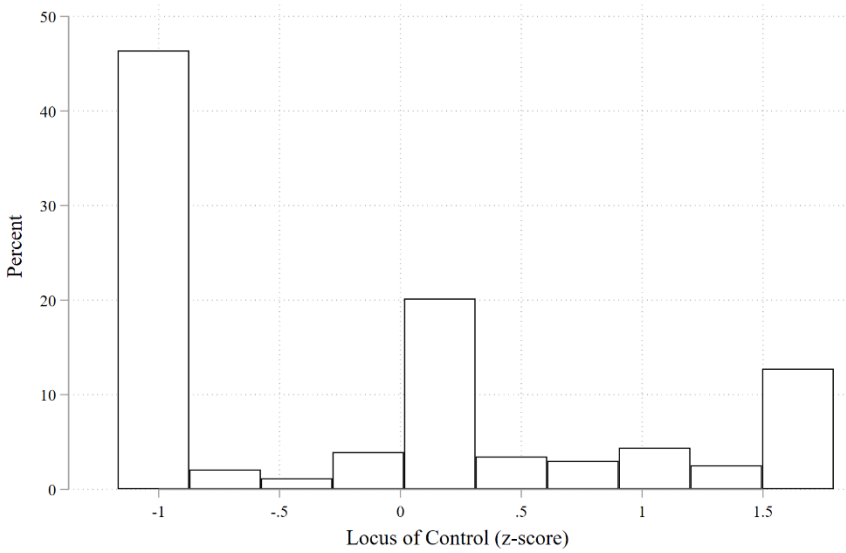

Percent
15
10
5
0
0
2
4
6
8
Perceptions of Social Support - Overall Score

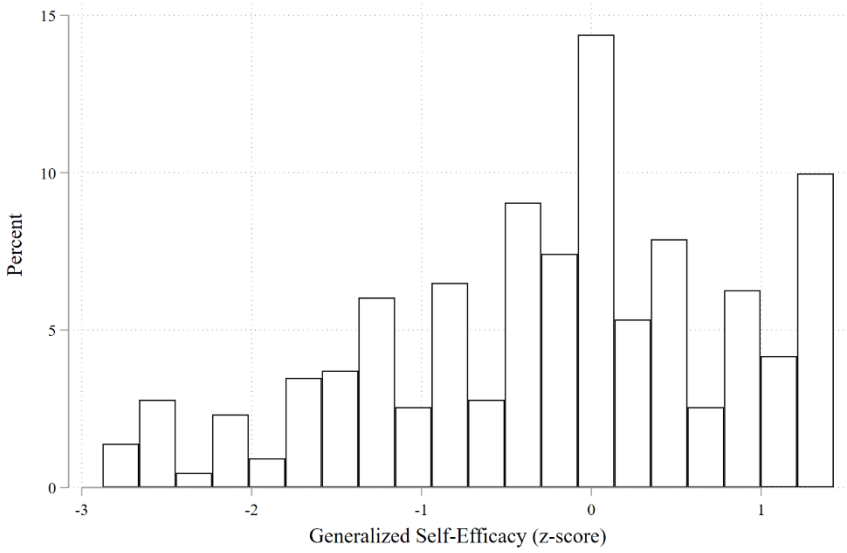

Percent
60
40
20
0
0
2
4
6
8
Perceptions of Social Support - Family Score


Percent
60
40
20
0
0
2
4
6
8
Perceptions of Social Support - Friends Score

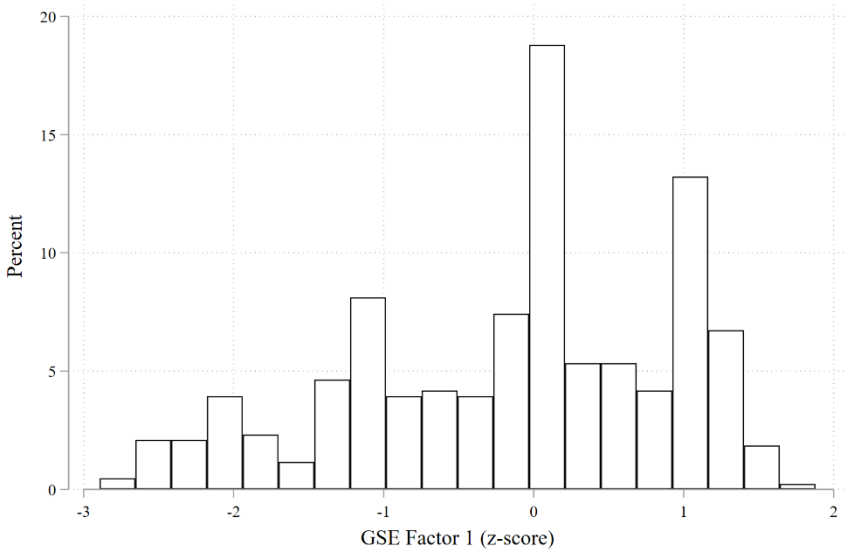
Appendix Figure 2. Distribution of secondary outcomes (…continued)

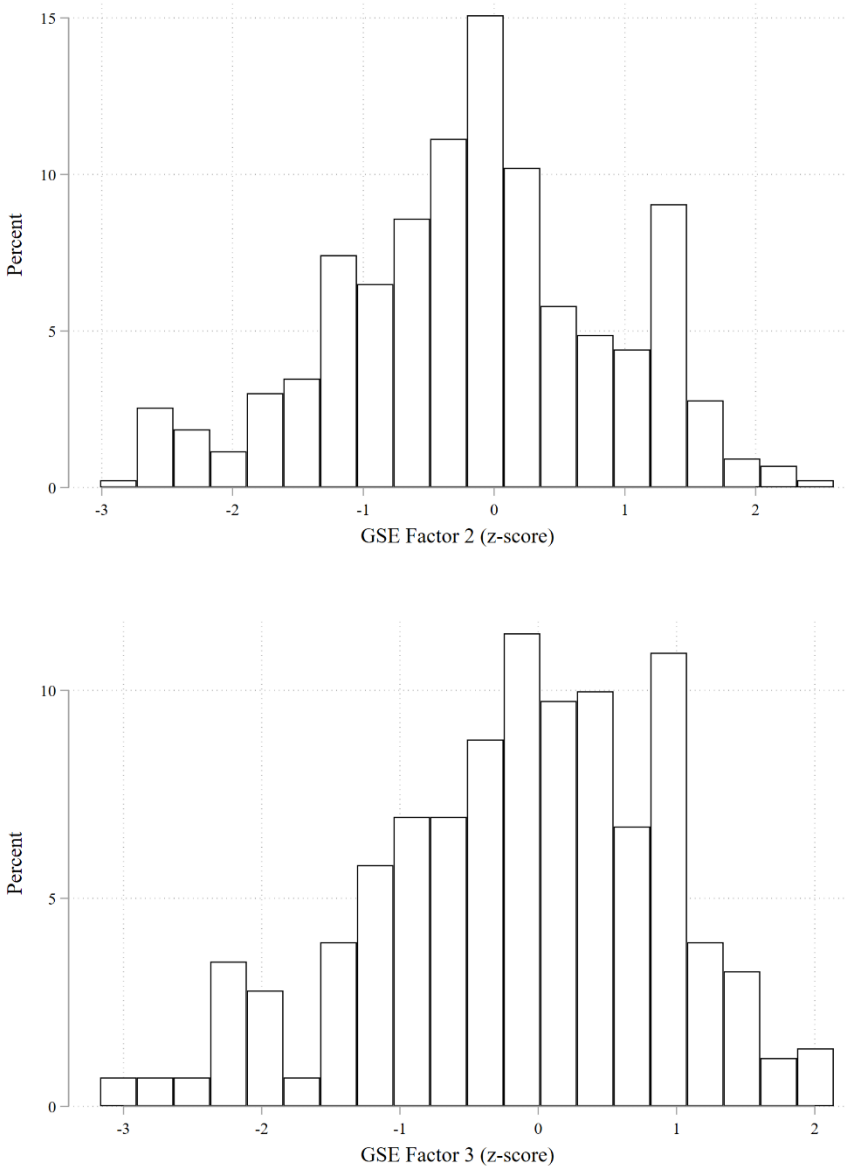




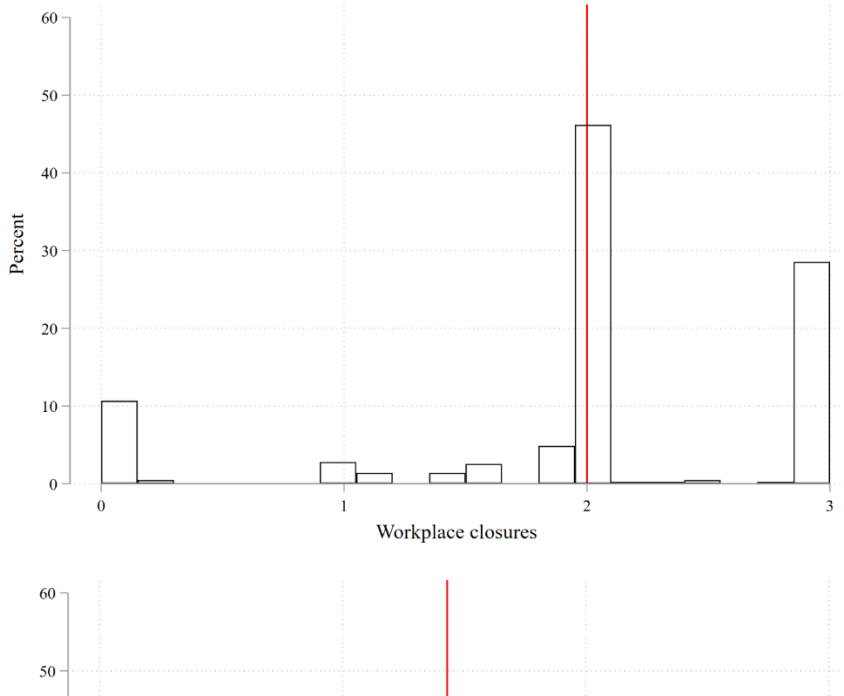


Appendix Figure 2. Distribution of secondary outcomes (…continued)

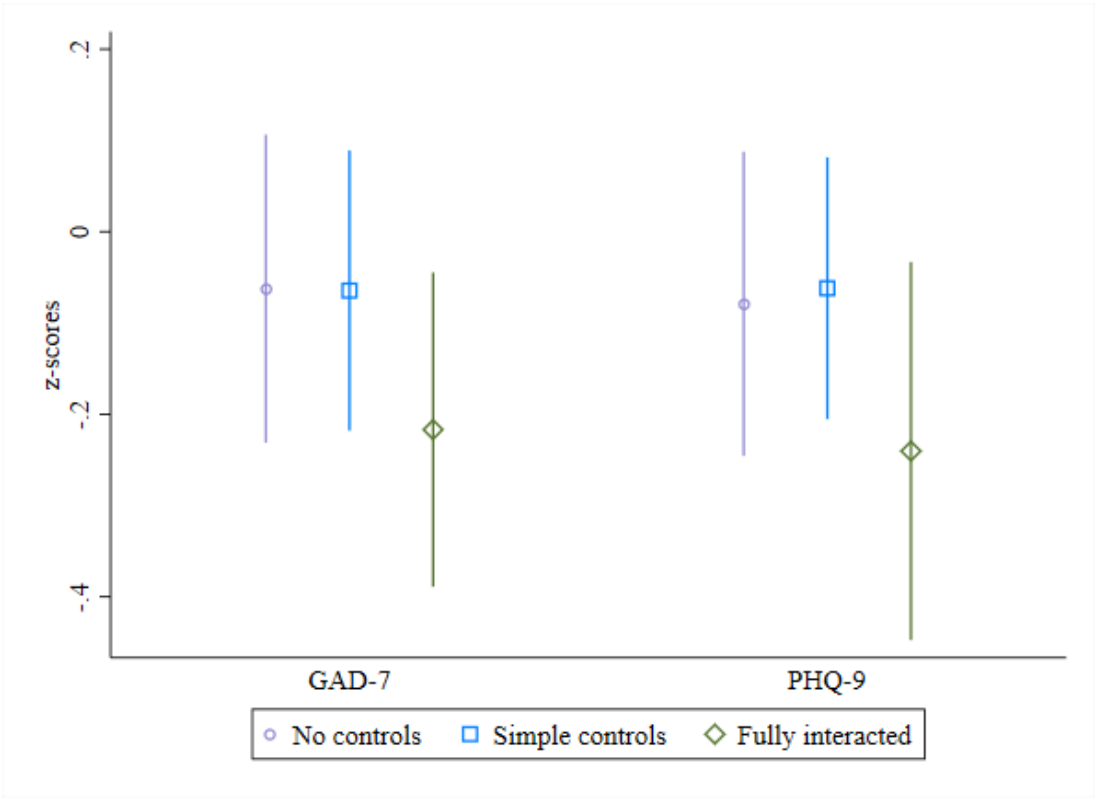


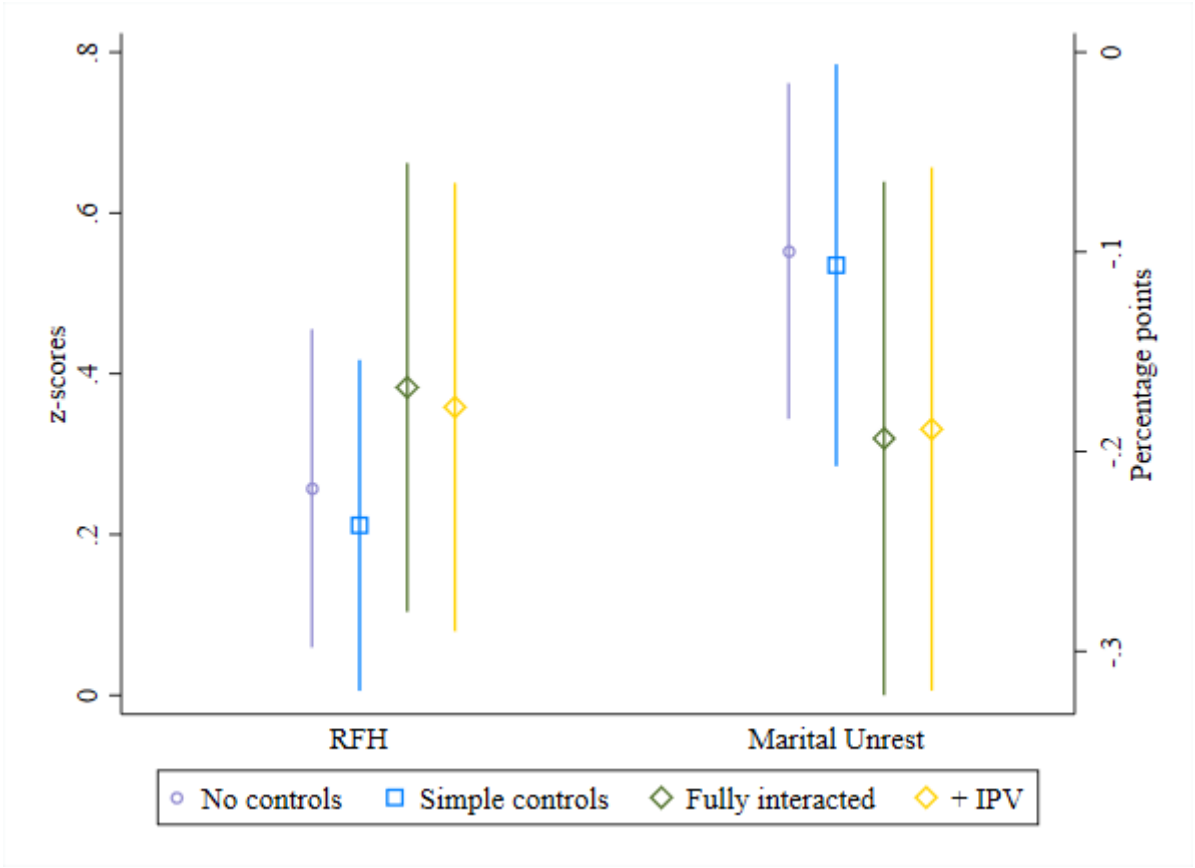


Appendix Figure 3. Individual restrictions during year 6 of the Bachpan study

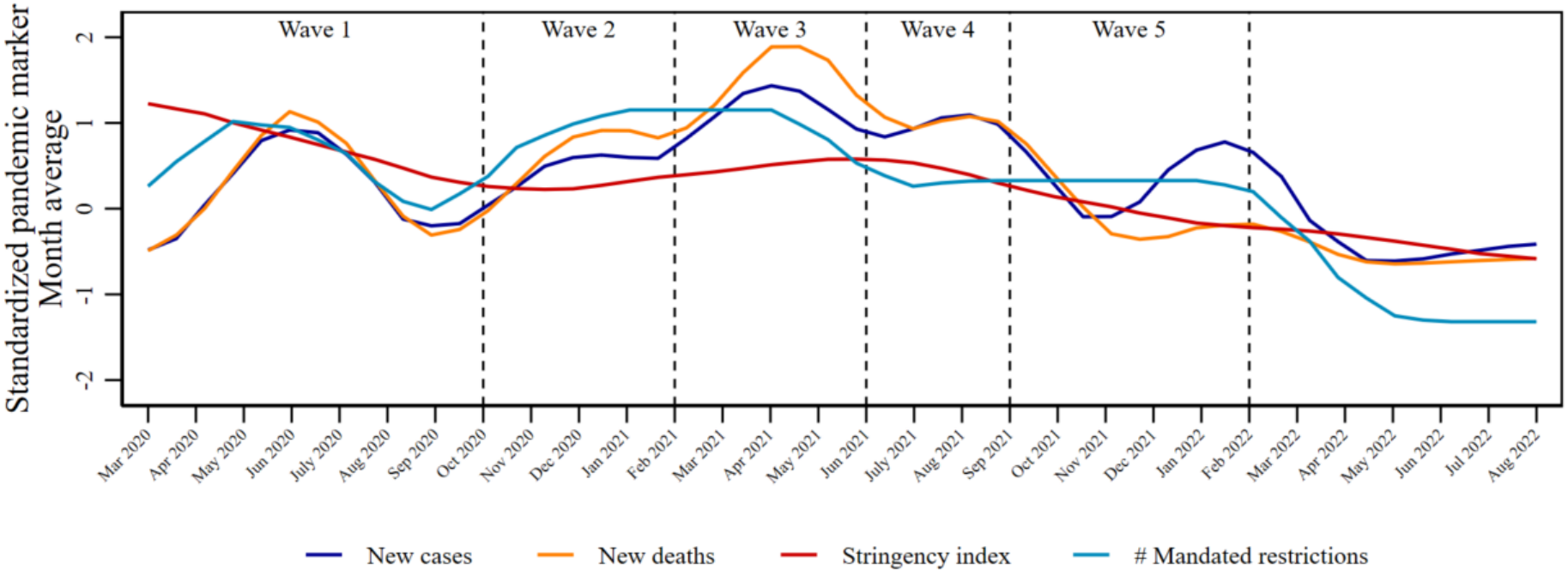


Appendix Figure 4. Sensitivity to controls





Appendix Figure 5. Alternative pandemic markers



Appendix B – Additional Results

Appendix Table 1. Characteristics of Attritors at 6 Years (72 months)

	Attritor characteristics				Attritor characteristics by treatment arm			
	Sample mean (1)	Attritor mean (2)	Diff. (2)-(1) (3)	p-val (4)	Attritor T mean (5)	Attritor C mean (6)	Diff. (T-C) (7)	p-val (8)
Mother's age	27.15	26.72	-0.43	0.355	26.94	26.53	0.41	0.634
Mother's height (cm)	156.96	156.61	-0.35	0.553	156.11	157.06	-0.95	0.347
Mother's weight (kg)	61.09	59.55	-1.53	0.213	59.44	59.66	-0.22	0.916
Mother's waist circ. (in)	37.30	36.91	-0.39	0.340	37.06	36.78	0.28	0.713
Mother's blood pressure	71.40	72.32	0.93	0.430	73.92	70.89	3.03	0.218
PHQ-9 Score	14.60	14.95	0.35	0.329	14.53	15.32	-0.79	0.199
WHODAS Score	16.29	16.78	0.49	0.570	16.53	17.00	-0.47	0.761
PSS Score	23.39	23.30	-0.09	0.905	22.97	23.60	-0.63	0.625
Current major dep. episode	0.74	0.79	0.05	0.224	0.77	0.81	-0.04	0.582
Nuclear family	0.23	0.32	0.10	0.023	0.29	0.35	-0.06	0.426
Joint/extended family	0.62	0.56	-0.07	0.165	0.61	0.51	0.09	0.274
Grandmother present	0.67	0.56	-0.11	0.018	0.62	0.51	0.11	0.202
Total adults in the household	5.55	5.42	-0.13	0.654	6.08	4.84	1.24	0.021
First child	0.22	0.30	0.08	0.057	0.35	0.26	0.09	0.240
Number of boys	0.82	0.84	0.02	0.837	0.61	1.04	-0.43	0.013
Number of girls	0.87	1.00	0.13	0.238	0.86	1.12	-0.26	0.205
People per room	2.57	2.82	0.25	0.182	2.71	2.92	-0.21	0.619
SES asset index	-0.39	-0.59	-0.20	0.231	-0.22	-0.92	0.69	0.019
Mother's education	6.67	7.26	0.59	0.174	7.64	6.92	0.72	0.375
Father's education	8.20	7.76	-0.44	0.193	7.77	7.74	0.03	0.963
Any psychological IPV past 12m	0.51	0.48	-0.03	0.509	0.41	0.55	-0.14	0.103
Any physical IPV past 12m	0.25	0.25	0.00	0.944	0.26	0.25	0.01	0.882
Any sex-related IPV past 12m	0.39	0.37	-0.02	0.685	0.38	0.37	0.01	0.866
Observations	430	140			66	74		
Joint test (p-value)				0.054				0.114

Note: This table tests for balance in baseline characteristics between the full sample and attritors and between attritors in the control and treatment arms.

Appendix Table 2. Success in assessment of respondents within scheduled window by arm

	Treatment		Control		Total	
	N	%	N	%	N	%
	(1)	(2)	(3)	(4)	(5)	(6)
Assessed within the scheduled window	150	53.00	171	59.58	321	56.32
Assessed outside the scheduled window	59	20.85	50	17.42	109	19.12
Reached within window but not surveyed	12	4.24	7	2.44	19	3.33
Reached outside window and not survey	5	1.77	2	0.70	7	1.23
Complete LTFU at earlier timepoint so no DOB or DOI	57	20.14	57	19.86	114	20.00

Note: Table shows total number of people and % within categories of success of assessment within scheduled window by arm. A successful assessment within window would take place if the woman was surveyed with a 45-day period that starts 15 days before and 30 days after the index child's 6th birthday.

Appendix Table 3. Reasons for differences in schedule

	Assessed and DOI in window (1)	Assessed outside window (2)	Reached within window but not surveyed (3)	Reached outside window and not surveyed (4)	Complete earlier LTFU (5)	Total (6)
Illness or death in family	3	1	2	0	0	6
Harvesting or Eid	0	3	0	0	0	3
Husband did not give permission	1	0	1	1	0	3
LHW unavailable	0	4	0	0	0	4
Mother only	0	0	1	0	0	1
Moved	3	0	12	6	0	21
Participant unavailability	0	1	0	0	0	1
Says window passed due to harvest but didn't	1	0	0	0	0	1
Sensitive info	0	0	0	0	1	1
No notes	313	100	3	0	113	529
Total	321	109	19	7	114	570

Note: In some instances, fieldworkers took notes for the reasons why people were reached and/or successfully surveyed outside the scheduled window. This table is a cross tabulation of their notes against categories of success in reaching and surveying participants.

Appendix Table 4. Baseline characteristics that predict DOI outside range

	DOI outside range		**Due to Illness**	
	Beta	SE	Beta	SE
	(1)	(2)	(3)	(4)
Intervention	0.066	(0.041)	0.002	(0.013)
Num. Restrictions over past 2 weeks	-0.105**	(0.047)	-0.008	(0.006)
Intervention x Num. Restrictions	-0.018	(0.062)	0.005	(0.007)
Mother's age	0.005	(0.006)	0.001	(0.001)
Mother's height (cm)	-0.001	(0.003)	-0.000	(0.001)
Mother's weight (kg)	0.004*	(0.002)	0.000	(0.000)
Mother's waist circ. (in)	-0.006	(0.007)	0.002	(0.001)
Mother's blood pressure	0.002	(0.002)	0.000	(0.000)
PHQ-9 Score	0.003	(0.006)	-0.001	(0.002)
WHODAS Score	-0.005*	(0.003)	-0.001	(0.000)
PSS Score	-0.000	(0.003)	0.001	(0.001)
Current major dep. episode	-0.031	(0.053)	0.011	(0.013)
Nuclear family	-0.002	(0.072)	-0.012	(0.019)
Joint/extended family	0.053	(0.057)	0.010	(0.016)
Grandmother present	0.044	(0.054)	0.005	(0.009)
Total adults in the household	-0.010	(0.009)	-0.001	(0.002)
First child	0.007	(0.064)	0.007	(0.012)
Number of boys	-0.007	(0.025)	0.008	(0.007)
Number of girls	-0.036	(0.024)	-0.000	(0.006)
People per room	-0.010	(0.013)	0.003	(0.004)
SES asset index	0.002	(0.016)	0.001	(0.006)
Mother's education	-0.009*	(0.006)	0.002	(0.002)
Father's education	-0.007	(0.007)	-0.000	(0.002)
Any psychological IPV past 12m	0.041	(0.051)	0.022	(0.015)
Any physical IPV past 12m	-0.061	(0.058)	0.000	(0.017)
Any sex-related IPV past 12m	0.062	(0.049)	-0.011	(0.010)
R-squared	0.092		0.039	
Outcome mean	0.26		0.01	
Observations	456		456	

Note: (DOI = Date of interview). A DOI outside range means that the woman was assessed either before or after the 45-day window (15 days before and 30 days after the index child's 6th birthday). Columns (3)-(4) show the characteristics that predict DOI outside range due to illness as identified by the fieldworkers.

Appendix Table 5. Balance in COVID restrictions by baseline characteristics

	Aggregate measures over past 2W		Individual restrictions		
	Average # of restrictions	Intensity of restrictions	Work Restrictions	Stay home restrictions	Restrictions on Gatherings
	(1)	(2)	(3)	(4)	(5)
PHQ-9 Score	-0.003	-0.023	-0.006	-0.001	-0.016
	(0.011)	(0.038)	(0.011)	(0.015)	(0.016)
WHODAS Score	0.005	-0.000	0.005	-0.011	0.005
	(0.007)	(0.023)	(0.006)	(0.007)	(0.011)
PSS Score	0.009	0.042**	0.010*	0.020***	0.012
	(0.006)	(0.020)	(0.006)	(0.007)	(0.009)
Mother's age	0.011	0.027	0.011	0.012	0.005
	(0.011)	(0.037)	(0.010)	(0.013)	(0.019)
Mother's height (cm)	0.009	0.024	0.008	0.006	0.010
	(0.007)	(0.024)	(0.007)	(0.008)	(0.012)
Mother's weight (kg)	-0.001	-0.005**	-0.001	-0.001***	-0.002**
	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)
Mother's waist circ. (in)	-0.013	-0.018	-0.013	-0.003	-0.002
	(0.014)	(0.047)	(0.014)	(0.016)	(0.021)
Mother's blood pressure	-0.005	-0.020*	-0.004	-0.009**	-0.007
	(0.003)	(0.011)	(0.003)	(0.004)	(0.005)
Nuclear family	-0.106	-0.112	-0.049	0.021	-0.094
	(0.112)	(0.379)	(0.111)	(0.142)	(0.158)
Joint/extended family	-0.219**	-0.471	-0.204**	-0.134	-0.133
	(0.087)	(0.292)	(0.090)	(0.104)	(0.138)
Grandmother present	-0.048	-0.151	-0.037	-0.026	-0.101
	(0.113)	(0.352)	(0.115)	(0.134)	(0.130)
Total adults in the household	0.021	0.065	0.024	0.027	0.014
	(0.017)	(0.061)	(0.017)	(0.020)	(0.029)
First child	-0.146	-0.281	-0.151	-0.064	-0.070
	(0.166)	(0.515)	(0.163)	(0.160)	(0.223)
Number of boys	-0.078	-0.196	-0.078	-0.051	-0.068
	(0.060)	(0.192)	(0.057)	(0.077)	(0.078)
Number of girls	0.005	0.182	-0.000	0.052	0.125
	(0.060)	(0.189)	(0.059)	(0.065)	(0.079)
People per room	0.008	0.004	0.006	-0.010	0.006
	(0.024)	(0.083)	(0.023)	(0.030)	(0.038)
SES asset index	-0.035	-0.159	-0.023	-0.059	-0.079
	(0.034)	(0.126)	(0.031)	(0.039)	(0.066)
Mother's education	-0.022**	-0.086**	-0.027***	-0.025**	-0.033*
	(0.009)	(0.036)	(0.009)	(0.012)	(0.018)
Father's education	0.010	0.034	0.005	0.009	0.020
	(0.012)	(0.039)	(0.012)	(0.012)	(0.019)
Any psychological IPV past 12m	-0.121	-0.567	-0.092	-0.150	-0.325*
	(0.114)	(0.372)	(0.107)	(0.108)	(0.183)
Any physical IPV past 12m	0.129	0.557	0.091	0.069	0.395**
	(0.107)	(0.370)	(0.103)	(0.123)	(0.179)
Any sex-related IPV past 12m	-0.154	-0.275	-0.116	0.013	-0.177
	(0.202)	(0.705)	(0.198)	(0.219)	(0.334)
Joint test (p-value)	0.0013	0.0001	0.0007	0.0001	0.0012
Observations	457	457	457	457	457

Note: Table shows the association between baseline characteristics and restrictions during the year-6 survey rollout. The p-values at the bottom come from F-tests that jointly test all coefficients with the null hypothesis of balance among respondents surveyed in times with more restrictions. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 6. Balance in covid restrictions by treatment arm

	(1) Control Mean	(2) Treatment Mean	(3) Non-Dep Mean	(4) Diff. T-C	(5) p-val	(6) Diff. ND-D	(7) p-val
Aggregate measures of restrictions over past 2 weeks							
Average Num. of Restriction	2.01	2.03	2.07	0.02	0.790	0.045	0.447
Intensity of restrictions	6.27	6.29	6.24	0.02	0.956	-0.040	0.841
Individual restrictions over past 2 weeks							
Work Restrictions	1.99	2.01	2.05	0.02	0.823	0.050	0.383
Stay home restrictions	1.43	1.42	1.44	-0.01	0.945	0.017	0.8
Restrictions on Gatherings	2.86	2.86	2.75	0.00	0.999	-0.110	0.228
Observations	222	209	472	431		903	

Note: This table tests for balance in COVID restrictions and our aggregate measures by treatment arm. Columns (1), (2) and (3) show the mean in the control, treatment and non-depressed groups at baseline.

Appendix Table 7. Differences in baseline characteristics between arms by COVID restrictions

	No restrictions		**1 restriction**		**2 restrictions**		**3 restrictions**	
	T-C	p-val	T-C	p-val	T-C	p-val	T-C	p-val
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mother's age	-3.57	0.108	2.40	0.446	-0.36	0.513	-0.33	0.667
Mother's height (cm)	0.83	0.796	0.57	0.917	0.81	0.286	1.46	0.102
Mother's weight (kg)	-2.49	0.610	0.96	0.942	-0.95	0.566	-0.98	0.601
Mother's waist circ. (in)	-0.94	0.613	0.79	0.856	-0.70	0.135	-0.81	0.262
Mother's blood pressure	0.64	0.842	3.80	0.440	-0.40	0.812	-2.35	0.207
PHQ-9 Score	-2.41	0.154	-0.10	0.978	0.44	0.332	0.52	0.347
WHODAS Score	-9.07	0.023*	3.60	0.647	1.05	0.345	1.99	0.107
PSS Score	-4.80	0.141	1.80	0.745	0.95	0.338	1.94	0.072
Current major dep. episode	0.04	0.840	0.15	0.685	0.04	0.517	0.06	0.332
Nuclear family	-0.26	0.165	0.00	-	0.06	0.303	-0.03	0.678
Joint/extended family	0.26	0.165	-0.10	0.798	-0.08	0.186	-0.08	0.295
Grandmother present	0.01	0.943	0.15	0.685	-0.04	0.511	-0.02	0.779
Total adults in the household	0.27	0.817	0.05	0.975	-0.70	0.049*	0.27	0.562
First child	0.33	0.087	0.25	0.292	-0.01	0.876	-0.08	0.266
Number of boys	0.00	1.000	-0.45	0.644	0.06	0.634	-0.05	0.756
Number of girls	-0.07	0.882	1.10	0.216	-0.02	0.877	0.21	0.268
People per room	1.50	0.080	0.31	0.280	0.18	0.421	0.47	0.067
SES asset index	-2.30	0.001*	-0.24	0.832	0.14	0.482	-0.37	0.187
Mother's education	-2.64	0.179	1.00	0.758	0.88	0.101	-0.60	0.373
Father's education	-2.10	0.230	-1.20	0.648	-0.42	0.325	-0.96	0.061
Any psychological IPV past 12m	-0.03	0.895	0.20	0.407	-0.02	0.794	0.02	0.813
Any physical IPV past 12m	-0.09	0.650	0.50	0.089	0.02	0.780	0.04	0.621
Any sex-related IPV past 12m	0.13	0.542	0.35	0.356	0.06	0.287	0.07	0.377
Observations	24		9		263		165	

Note: This table shows the difference in baseline characteristics between treatment and control groups by restrictions. Imbalance at 5% level or lower indicated with a *.

Appendix Table 8. SCID Components

	Depressed mood	Loss of interest	Appetite loss	Sleep disturbance	Psychomotor agitation	Fatigue	Feeling worthless	Trouble concentrating	Suicidal ideation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A									
Intervention	-0.072*	-0.054*	-0.067**	0.006	-0.083***	-0.018	0.028	-0.035	-0.010
	(0.037)	(0.028)	(0.031)	(0.034)	(0.023)	(0.040)	(0.023)	(0.023)	(0.021)
Panel B									
Average #of restrictions over past 2 W	0.036	0.102***	0.070*	-0.007	0.126***	0.008	0.010	0.077**	0.035*
	(0.045)	(0.027)	(0.037)	(0.040)	(0.038)	(0.054)	(0.019)	(0.033)	(0.020)
Intervention	-0.072*	-0.055*	-0.067**	0.006	-0.084***	-0.018	0.028	-0.036	-0.010
	(0.037)	(0.028)	(0.031)	(0.034)	(0.022)	(0.040)	(0.023)	(0.023)	(0.021)
Intervention x Restrictions over past 2 W	-0.081	-0.134**	-0.057	0.063	-0.086	0.039	-0.022	-0.087	-0.038
	(0.059)	(0.050)	(0.056)	(0.064)	(0.061)	(0.072)	(0.036)	(0.052)	(0.029)
R-squared	0.210	0.272	0.205	0.233	0.227	0.341	0.216	0.260	0.210
Outcome Mean	0.31	0.24	0.25	0.21	0.25	0.45	0.11	0.16	0.07
Observations	431	431	431	431	431	431	431	431	430

Note: This table displays the main effects of the intervention on all components of the Structured Clinical Interview for DSM-5 (SCID-5) in Panel A. Panel B shows the coefficients for the average number mandated of restrictions, assignment to treatment and their interactions. Panels A and B only differ in the inclusion of the interaction term. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 9. Individual restrictions, mental health and spousal conflict

	Mental Health		Spousal Conflict	
	GAD-7 Score	PHQ-9 Score	Relationship w. father/husband Score	Marital problems
	(1)	(2)	(3)	(4)
Panel A				
Restrictions on Work	1.202**	0.725	-1.141*	0.095*
	(0.504)	(0.490)	(0.583)	(0.049)
Intervention	-0.108	-0.978**	-0.147	0.009
	(0.378)	(0.392)	(0.437)	(0.029)
Intervention x Work	-1.353*	-1.296	2.440**	-0.189***
	(0.722)	(0.772)	(0.902)	(0.065)
R-squared	0.316	0.301	0.299	0.205
Panel B				
Stay at home restrictions	1.480	-0.139	-3.758***	0.265***
	(1.068)	(1.403)	(1.126)	(0.078)
Intervention	-0.013	-0.935**	-0.236	0.016
	(0.381)	(0.405)	(0.440)	(0.028)
Intervention x Stay home	-1.040	-0.554	2.454***	-0.173***
	(0.687)	(0.888)	(0.814)	(0.054)
R-squared	0.319	0.297	0.302	0.205
Panel C				
Restrictions on gatherings	1.843*	1.487	-5.032***	0.339***
	(1.027)	(1.588)	(1.707)	(0.114)
Intervention	-0.018	-0.889**	-0.326	0.022
	(0.371)	(0.391)	(0.400)	(0.026)
Intervention x Gatherings	-0.664*	-0.847	1.678***	-0.113***
	(0.328)	(0.516)	(0.601)	(0.041)
R-squared	0.312	0.301	0.303	0.204
Outcome Mean	5.38	7.74	23.57	0.23
Observations	431	431	427	427

Note: The restrictions are continuous variables between 0 and 3 (4 for gatherings), denoting whether there were no restrictions (0), whether restrictions were recommended but no mandated (1), whether they were required but only for segments of the population (2), and whether they were required for all except essential workers (3). Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 10. Components of Relationship w. child's father/husband Score

	Husband looks after your needs	Get pocket money for personal needs	Husband understand your feelings	Husband support in diff. situations	Happy with husband's behavior	Relationship w. husband (1 - bad, 5 VG)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Intervention	-0.192***	-0.050	-0.046	0.026	0.011	0.047
	(0.060)	(0.106)	(0.110)	(0.098)	(0.097)	(0.059)
Panel B						
Average # of restrictions over past 2 W	-0.162	-0.076	-0.261*	-0.275**	-0.277**	-0.244**
	(0.108)	(0.133)	(0.133)	(0.117)	(0.128)	(0.091)
Intervention	-0.187***	-0.044	-0.037	0.035	0.019	0.052
	(0.058)	(0.104)	(0.110)	(0.100)	(0.097)	(0.059)
Intervention x Restrictions over past 2 W	0.292*	0.352	0.495**	0.540***	0.462**	0.303**
	(0.172)	(0.232)	(0.207)	(0.178)	(0.176)	(0.125)
R-squared	0.315	0.258	0.256	0.269	0.273	0.300
Outcome Mean	4.01	3.30	4.00	4.11	4.04	4.12
Observations	427	427	427	427	427	427

Note: This table displays the main effects of the intervention on all components of the Relationship with father/husband score (RFH) in Panel A. Panel B shows the coefficients for the average number mandated of restrictions, assignment to treatment and their interactions. Panels A and B only differ in the inclusion of the interaction term. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 11. # of COVID-19 restrictions and other forms of conflict in the house

	Quarrels with family	Worse relationship w/children	Increase in arguments
	(1)	(2)	(3)
Average # of restrictions over past 2 W	0.036	-0.008	-0.047
	(0.052)	(0.038)	(0.049)
Intervention	-0.093**	-0.019	-0.068**
	(0.040)	(0.033)	(0.033)
Intervention x Restrictions over past 2 W	-0.038	0.058	0.006
	(0.066)	(0.059)	(0.065)
R-squared	0.171	0.219	0.232
Outcome Mean	0.29	0.22	0.32
Observations	431	431	431

Note: Robust and clustered standard errors at the cluster level are reported in parentheses.
*p<0.1; **p<0.05; ***p<0.01

Appendix Table 12. Dose response - Number of sessions attended

	Mental Health		Spousal Conflict	
	GAD-7 Score	PHQ-9 Score	RFH Score	Marital Problems
	(1)	(2)	(3)	(4)
Panel A - IV 2nd Stage				
Restrictions x All sessions	-0.055**	-0.068**	0.112***	-0.009***
	(0.023)	(0.030)	(0.037)	(0.003)
Panel B - OLS				
Restrictions x All sessions	-0.003	-0.021**	0.008	-0.000
	(0.007)	(0.008)	(0.010)	(0.001)
Panel C - First Stage	Sessions		Restrictions x Sessions	
	(1)		(2)	
IV 1. Intervention	23.043***		3.472	
	(1.386)		(2.354)	
IV 2. Intervention x Restrictions	-0.226		20.850***	
	(0.349)		(1.233)	
F-stat	28601.21		1478.46	
Observations	431	431	427	427

Note: 14 individual sessions maximum and 18 group sessions maximum. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 13. Alternative COVID pandemic markers

	Mental health		**Spousal Conflict**	
	GAD-7	PHQ-9	Relationship w. father/husband scale	Marital problems
	(1)	(2)	(3)	(4)
Panel A				
Intervention x Number of restrictions	-1.070**	-1.303*	2.182***	-0.173***
	(0.504)	(0.667)	(0.786)	(0.057)
Panel B				
Intervention x Intensity of restrictions	-1.153**	-1.109	2.554***	-0.182***
	(0.535)	(0.734)	(0.852)	(0.056)
Panel C				
Intervention x Stringency index	-0.064	-0.502	1.279	-0.089*
	(0.611)	(0.692)	(0.816)	(0.050)
Panel D				
Intervention x New cases	-0.546	-0.442	0.780	-0.093*
	(0.580)	(0.600)	(0.802)	(0.047)
Panel E				
Intervention x New deaths	-0.498	-0.188	0.651	-0.110**
	(0.578)	(0.696)	(0.856)	(0.053)
Observations	431	431	427	427

Note: All 5 pandemic measures have been standardized (with a mean of zero and s.d. of one) to facilitate comparisons across regressions for each outcome. All markers are averaged over the 12 days prior to (but including) the date of the survey. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01

Appendix Table 14. Controlling for weather (temperature and rain on the day of the survey)

	GAD-7		PHQ-9		Relationship w. husband score		Marital problems	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average # of restrictions over past 2 W	1.208**	0.895	0.499	0.592	-1.298*	-1.883***	0.098*	0.093
	(0.460)	(0.583)	(0.539)	(0.602)	(0.668)	(0.658)	(0.050)	(0.066)
Intervention	-0.111	-0.037	-1.025**	-0.975**	-0.188	-0.076	0.011	0.005
	(0.391)	(0.389)	(0.394)	(0.402)	(0.428)	(0.413)	(0.028)	(0.030)
Intervention x Restrictions over past 2 W	-1.282*	-0.789	-1.045	-0.869	2.628**	2.889***	-0.214***	-0.179**
	(0.638)	(0.720)	(0.811)	(0.789)	(0.991)	(1.058)	(0.065)	(0.082)
R-squared	0.318	0.320	0.315	0.307	0.303	0.305	0.213	0.215
Outcome mean	5.38	5.38	7.74	7.74	23.57	23.57	0.23	0.23
Observations	431	431	431	431	427	427	427	427
Main controls	✓	✓	✓	✓	✓	✓	✓	✓
Maximum temperature and total rain on DOI	✓		✓		✓		✓	
Average max temp and total rain over past 30 days		✓		✓		✓		✓

Notes: DOI (day of the interview). The main controls include: At baseline (PHQ-9, WHODAS, PSS, woman's height, waist circumference, joint household, adults in the house, people in the room, asset score, mother's education, father's education, sexual IPV, Union Council FE, assessor FE), at year 6 (assessor FE, month and month squared). Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 15. Placebo Restrictions and Mental Health

	GAD-7			PHQ-9		
	Combined	Year 3	Year 4	Combined	Year 3	Year 4
	(1)	(2)	(3)	(1)	(2)	(3)
Average # of restrictions over past 2 W	-0.139	-0.437	0.096	0.270	0.309	0.133
	(0.374)	(1.212)	(1.048)	(0.374)	(0.663)	(0.947)
Intervention	-0.411	-0.635	0.799	-0.233	-0.903	0.667
	(1.467)	(2.303)	(0.739)	(0.889)	(1.339)	(0.689)
Intervention x Restrictions over past 2 W	-0.266	-0.128	-1.342	-0.454	-0.192	0.059
	(0.482)	(1.506)	(1.312)	(0.496)	(1.052)	(1.293)
Outcome Mean	4.47	5.1	3.91	5.57	6.17	4.83
Observations	637	299	338	760	422	338

Note: Placebo restrictions are constructed by taking the of average number of restrictions in the 2 weeks prior to the survey from year 6 and imposing them on all observations in years 3 and 4 based on the order of the rollout in each year. In each wave, the rollout started in the month of January and lasted for approximately 20 months. Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 16. Correlation between mechanisms and primary outcomes

	GAD-7	PHQ-9	Relationship Score	Marital Problems
	(1)	(2)	(3)	(4)
SOS Total	0.67***	0.59***	-0.53***	0.37***
Worry about disease risk	0.24***	0.20***	-0.10*	0.02
Worry about child problems	0.34***	0.30***	-0.32***	0.25***
Family Support	-0.27***	-0.28***	0.46***	-0.40***
Friend Support	-0.12*	-0.10*	0.14**	-0.06
Support from Significant Other	-0.28***	-0.32***	0.49***	-0.30***
Locus of Control	-0.04	-0.03	0.12*	-0.05
GSE F1	-0.26***	-0.25***	0.31***	-0.12*
GSE F2	-0.18***	-0.20***	0.31***	-0.07
GSE F3	-0.19***	-0.19***	0.34***	-0.18***
Observations	431	431	427	427

Notes: All values in the table above are pairwise correlations and all mechanism variables are standardized. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 17. Rotated factor loadings - Generalized self-efficacy items

Variable	Factor 1	Factor 2	Factor 3
GSE1. I can always manage to solve difficult problems if I try hard enough	0.3785	0.4598	0.4655
GSE2. If someone opposes me, I can find means and ways to get what I want	0.3324	0.4151	0.4158
GSE3. It is easy for me to stick to my aims and accomplish my goals	0.4016	0.3961	0.4307
GSE4. I am confident that I could deal efficiently with unexpected events	0.7157	0.3229	0.2714
GSE5. Thanks for my resourcefulness, I know how to handle unforeseen situations	0.7377	0.3346	0.1915
GSE6. I can solve most problems if I invest the necessary effort	0.4812	0.484	0.3695
GSE7. I can remain calm when facing difficulties because I can rely on my coping abilities	0.5235	0.5085	0.1503
GSE8. When I am confronted with a problem, I can usually find several solutions	0.3878	0.6398	0.2286
GSE9. If I am in trouble, I can usually think of a solution	0.3745	0.6243	0.2856
GSE10. I can usually handle whatever comes my way	0.4762	0.6313	0.3172

Note: Table shows factor loadings of 10 items from the generalized self-efficacy scale used to construct outcomes in Table 8. In it, factor 1 is categorized as confidence in dealing with unexpected events, factor 2 is coded as solution orientation, and factor 3 as tenacity.

Appendix Table 18. Session attendance and perceptions of social support

	Family			Friends			Significant Other		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sum of all sessions	0.010*			0.011			0.010**		
	(0.006)			(0.011)			(0.005)		
# Sessions Psych Component		0.019			0.026			0.022**	
		(0.012)			(0.021)			(0.010)	
# Sessions Child Dev Component			0.020*			0.016			0.015
			(0.011)			(0.023)			(0.010)
Outcome mean T0	4.20	4.20	4.20	3.33	3.33	3.33	4.28	4.28	4.28
Outcome mean Y6	5.93	5.93	5.93	3.69	3.69	3.69	6.09	6.09	6.09
R-squared	0.258	0.258	0.257	0.200	0.201	0.199	0.287	0.289	0.285
Observations	431	431	431	431	431	431	431	431	431

Notes: Robust and clustered standard errors at the cluster level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.