Analyzing the Impacts of COVID-19 Shelter-in-Place Policies on Depression, Social Isolation, & Loneliness in Older Adults

Amanda Shi

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Jerome Dugan

Lesley Steinman

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Abstract

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Amanda Shi

Chair of the Supervisory Committee:
Jerome Dugan
Department of Health Systems & Population Health

During the start of the COVID-19 pandemic, emergency policies prioritized the prevention of community transmission of the virus without considering the impact on components of depression, social isolation, and loneliness. This study utilized a quantitative analysis of clinical measures of these constructs to determine the impact of initial shelter-in-place policies on the community-dwelling older adult population. The data source was administrative data from PEARLS, an evidence-based program serving community-dwelling older adults (n = 1820; mean age 72 years) in Washington, Maryland, Texas, and Florida (USA) from January 2015 to November 2021. A quantitative panel regression and quasi-experimental approach were applied, whereby causal mechanisms between the shelter-in-place policy in each of these states and related outcomes were analyzed. The difference-in-difference models predicted the change in clinical measures, adjusted for age, race, and insurance status. The quantitative results suggest that there was an increase in (1) clinically significant depression in Washington and Maryland; (2) suicidality in Washington, Maryland, and Florida; (3) social isolation and loneliness in Maryland and Florida; (4) financial hardship to pay for basic needs and provision of uncompensated caregiving in Maryland and Florida. For public health and policy, these results emphasize the importance of social safety nets and engaging in preventative interventions for the community-dwelling older adult population when enacting emergency pandemic policies.

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Introduction

COVID-19 policy discussions have not adequately captured the impacts on mental health and social connectedness for vulnerable older populations. Since the first documented case of COVID-19 in the United States on January 15, 2020, national and state policies have focused on balancing economic considerations with slowing disease transmission and addressing an overwhelmed healthcare system.[1,2] The growing endemics of loneliness, social isolation, and depression have been sidelined despite their pervasive impacts on health. [3, 4, 5] Older adults are at a higher risk of COVID-19 infection, hospitalization, and death than younger adults and are more prone to loneliness and isolation. [6, 7, 8, 9] Specific older adult sociodemographic groups, including those with low socioeconomic status and poor functional status, are more likely to report loneliness.[9] Additionally, older adults with chronic medical conditions are dually at high risk of severe COVID-19 symptoms and depression.[10]

The relationships between depression, social isolation, and loneliness are multidirectional, with each serving as both catalyst and consequence for the others. Loneliness, defined by the CDC as subjective feelings of being alone despite level of social contact, can serve as a precursor to depression in older adults.[11,12] Depression, defined by the NIH as a group of conditions that lower mood and affect the ability to perform daily tasks, contributes to increased mortality, disability, and worse physical outcomes.[13,14] Suicide rates in older adults are higher and have a greater association with depression when compared to younger adults.[15] Early in the COVID-19 pandemic, 29.5% of adults aged ≥ 55 years reported high loneliness; those who also reported depression had a higher prevalence of loneliness.[16] Social isolation, defined by the CDC as an objective lack of social connections, compounds and predicts depression and loneliness, intensifying related health outcomes such as cognitive decline.[11,17,18]

The disproportionate impact of COVID-19 policies on segments of the older adult population intensifies established sociodemographic inequities in the burden of depression, social isolation, and loneliness.[19,20] Shelter-in-place policies from April and May 2020 resulted in greater loneliness and depression among older adults, which could be mediated by social engagement and strong relational connections.[21] However, research based on the National Social Life, Health and Aging Project shows that Black and Hispanic older adults live in neighborhood social contexts with greater perceived danger, lower social cohesion, and fewer social ties, despite higher residential density.[22] This inequitable access to social engagement within the physical and social environment compounds the existing disparities. Conversely, among older adults with chronic conditions, 66.4% reported moderate to severe loneliness, with persons of color reporting the lowest levels of loneliness compared to white adults with chronic conditions.[23]

Current studies on the effects of COVID-19 on older adults largely focus on clinical risk factors and health disparities due to sociodemographic factors, such as age [24], chronic medical conditions[25], racial/ethnic identity [26], and income [26]. Select domestic and international publications examine the effects of COVID-19 shelter-in-place and quarantine policies on depression[27], loneliness[28,29], and isolation[21]. One study reviewed loneliness in early 2020, finding no increase in loneliness among older adults and high resiliency among this population.[30] In the policy context, analyses focus on the impacts on transmission rates[31] , policy implementation[32], and comparisons between jurisdictions[19]. However, existing research has not focused on COVID-19 policy impacts or the longitudinal effects on social isolation, loneliness, and depression.

Examining the connection and tradeoff between emergency policy and unintended health consequences is crucial for understanding disparity impacts in crisis scenarios and engaging in preventative measures to avert the widening of gaps in the future. This quantitative study focuses on the impact of initial COVID-19 shelter-in-place policies on the community-dwelling older adult population, given their high COVID-19 susceptibility and risk for adverse health effects due to depression, social isolation, and loneliness. Specifically:

1. What is the impact of COVID-19 shelter-in-place policies (by state) on depression in community-dwelling older adults?
2. For states with the available data, what is the impact of initial COVID-19 shelter-in-place policies on social isolation and loneliness in community-dwelling older adults?
3. Are there differential impacts of initial COVID-19 shelter-in-place policies on depression, social isolation, and loneliness based on sociodemographic characteristics, namely gender and race, in community-dwelling older adults?
4. Does insurance status influence the impact of initial COVID-19 shelter-in-place policies on depression, social isolation, and loneliness in community-dwelling older adults?

Methods

Study Design

This retrospective event study analysis investigated the association between COVID-19 shelter-in-place policies on depression, social isolation, and loneliness in older adults. The Institutional Review Board of the University of Washington granted the study exempt status under Category 2 because this research represents a secondary analysis of existing de-identified program data from community-based social service organizations (CBOs).

Setting & Participant Sample

The Program to Encourage Active, Rewarding Lives (PEARLS) is an evidence-based intervention for older adults developed in partnership with CBOs that reach underserved older adults and the CDC-funded University of Washington Health Promotion Research Center (HPRC). PEARLS is active in more than 50 sites in 18 states.[33,34] Through the HPRC's AARP Foundation-funded PEARLS Connect Study[35], pre-intervention data from 16 partner programs was received from five states: Florida, Maryland, New York, Texas, and Washington. New York data were excluded as this site only collected post-intervention data, which would confound any findings for pre/post policy analysis. Observations with no available state information were excluded from the analysis (*N=2*). Data points from six Oregon residents were also excluded from the analysis, as these were formerly Washington residents who had moved during the course of the intervention and continued to receive treatment but resided under different policies in Oregon. The final dataset included 1,820 participants, with data collected between January 29, 2015, to November 22, 2021. Eighteen months of baseline PEARLS data was included for pre/post shelter-in-place policies by state to account for seasonal changes and provide data to recognize immediate and longer-term policy impacts. The dataset was tested with date restrictions to be ~12-month pre/post shelter-in-place policy enactment, but we found that this restriction to equal periods greatly decreased the number of observations (*N=1007*). We kept the larger dataset for the power of the analysis after finding that the date-restricted (*N=1007*) and non-date restricted (*N=1820*) datasets had comparable characteristics. The dataset limitations and testing are displayed below in Figure 1.

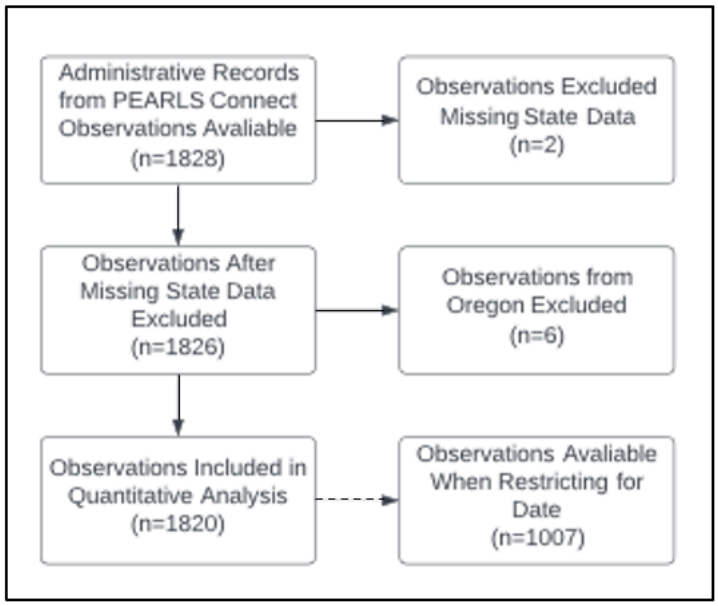

Figure 1: Sample Exclusion Process, where solid arrows represent the final process, while dashed arrows represent the testing process that was not included in creating the final analysis dataset

PEARLS Connect used maximum variation purposive sampling to outreach to CBOs in different geographic areas serving diverse isolated older adults with low socioeconomic and poor functional status. These older adults are enrolled in the PEARLS intervention on a rolling basis.[36] This community-dwelling population included urban and rural settings, but did not include institutionalized older adults, such as those living in nursing homes. Data was collected in person or by phone in real time through trained PEARLS providers. The collection of baseline pre-intervention data included general sociodemographic factors (age, gender, race, ethnicity), insurance information, and self-reported measures for depression, social isolation, and loneliness.

Policy By State

Individual states issued their own shelter-in-place (stay-at-home) orders. To date, no federal shelter-in-place policy has been enacted. To fully understand the variation of shelter-in-place policies by state, we used Boston University's COVID-19 US State Policies (CUSP)

database.[37] We used the following dates, displayed in Table 1, for pre/post analysis: Washington, March 23, 2020; Maryland, March 30, 2020; Texas, April 2, 2020; Florida, April 3, 2020. Namely, Texas was recognized for issuing a shelter-in-place order that "did not specifically restrict movement of the general public" and did not "explicitly order individuals to stay at home."

Table 1: Table of CUSP Shelter-in-Place Policies by State

	Washington	Maryland	Texas	Florida
Shelter-in-Place Date	3/23/20	3/30/20	4/2/20[†]	4/3/20
[†]Did not restrict the movement of the general public				

The length of this first shelter-in-place order varied, with Texas' lasting approximately one month until May 1, 2020, and Florida's lasting slightly longer until May 18, 2020. Maryland's shelter-in-place order ended around the same time, on May 15, 2020, but had begun earlier. Washington's shelter-in-place order lasted the longest, starting the earliest and ending on June 1, 2020, for almost three months.

We triangulated the shelter-in-place dates with information from the following sources from each state: state department of health, press releases from the governor's office, and local news agencies (KIRO 7 Seattle, NBC 6 South Florida, WPLG Local 10 Miami, CBS Baltimore, and FOX 4 Dallas-Fort Worth). We also utilized documented population movement provided through the CDC's Morbidity and Mortality Weekly Report to confirm these dates.[38]

Instrumentation & Outcome Measures

The outcomes of interest were older adults' mental and social health, specifically depression, objective social isolation, and subjective loneliness. All PEARLS programs use the Patient Health Questionnaire-9 (PHQ-9) to measure intervention impacts on depression. For social isolation and loneliness, some PEARLS partner sites collected data using the Duke Social

Support Index-10 (DSSI-10), Patient-Reported Outcomes Measurement Information System – Social Isolation (PROMIS-SI), and UCLA 3-Item Loneliness Scale. The social isolation and loneliness measures, and their pathway to social connectedness, are included in Figure 2 below. Notably, some measures of social connectedness were never collected, as programs did not include these scales in their routine baseline data collection. Further, those states that collected social connectedness measures in their PEARLS programs also asked four-line items measuring health services and utilization and financial hardship (Item 18-21). During COVID-19, limited data collection was especially prominent due to the emergent situation and the prioritized objective of PEARLS to provide intervention and care to the enrolled population.

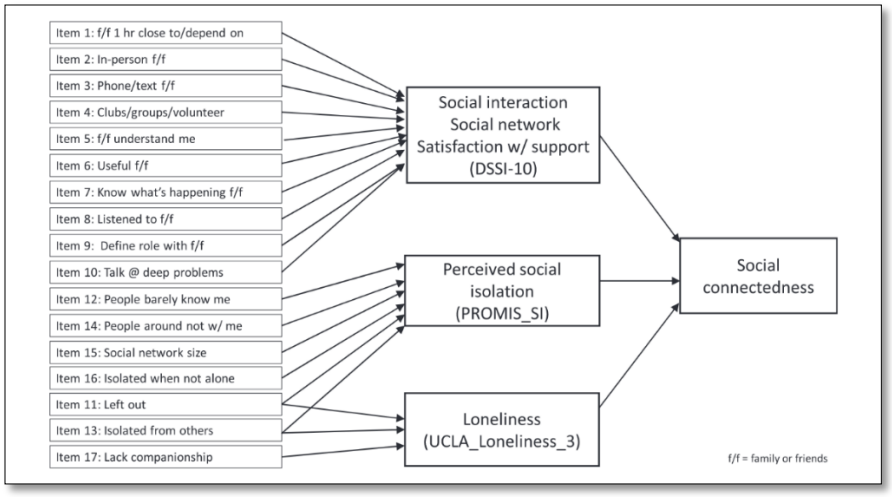

Figure 2: From Steinman, et al.(4a) conceptual framework for loneliness & social isolation instrumentation

Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is the clinical standard to diagnose depression in individuals through nine individual line items that connect to the DSM-IV criteria for depression.[39] PHQ-9 total scores are ranged in buckets, with a score of (5 to 9) indicating mild depression, (10 to 14) indicating moderate depression, (15 to 19) indicating moderately severe depression, and (≥ 20) indicating severe depression. Clinical intervention is traditionally provided for patients with a total score of

≥10.6/7/22 2:31:00 PM Line items on the PHQ-9 are rated on a scale of 0-3, with 0 representing "Not at all", "1" representing "Several days", "2" representing "More than half the days", and "3" indicating "Nearly every day". Cardinal symptoms of depression, known as the PHQ-2, are measured in items one and two, which ask about anhedonia, the inability to feel pleasure, and depressed mood.[40, 41] In our analysis, we defined the Cardinal indicator variable as a score of >1 on either line item one ("Over the last two weeks, how often have you been bothered by little interest or pleasure in doing things?") or line item two ("Over the last two weeks, how often have you been bothered by feeling down, depressed, or hopeless?").[42] A score of ≥1 on item nine ("Over the last two weeks, how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?") is a predictor of suicidality.[43]

Duke Social Support Index-10 (DSSI-10)

Originally, Duke University developed a 35-item scale to measure social support. This longer scale is harder to implement in the field due to its length. The DSSI-10 is a validated shortened model to measure social support for diverse populations of adults.[44] The DSSI-10 takes two subscales to measure objective social network size and social interactions through the first four questions (DSSI-SI) and perceived satisfaction with social support through the last six questions (DSSI-SS). These subscales are more commonly analyzed separately due to their difference in objective and subjective measures. In our analysis, we recoded the DSSI-10 raw scores to match the other indicators'' (PROMIS-SI, UCLA-3) directionality, where higher scores would indicate a higher level of social isolation and loneliness.

Patient-Reported Outcomes Measurement Information System-Social Isolation (PROMIS-SI)

PROMIS provides a variety of scales to measure mental and physical health outcomes, with the goal of standardization of measures across research.[45] For the social isolation scale,

there are six items to measure perceived isolation. PROMIS-SI uses a graded response scale that scores through item-level calibrations, with higher scores indicating higher social isolation among the population.

UCLA 3-Item Loneliness Scale

The original Revised UCLA Loneliness Scale (R-UCLA or UCLA-20), developed in 1978, includes 20 items with four response categories.[46] Other researchers have trimmed the original 20 questions down to a popular three-item loneliness scale with high validity.[47] The PEARLS programs included in this study utilized this three-item scale with recoded scores to align with the PROMIS-SI given two UCLA-3 items overlap with this measure. In our analysis, we kept the directionality of the raw data, with higher scores indicating higher degrees of loneliness.

Health Utilization & Financial Hardship Line Items

Some PEARLS providers collected data measuring the health utilization and financial hardship respondents faced, which we analyzed as secondary outcomes of interest. These four-single-items measured instances of unpaid care, visits to primary care, hospitalizations, and ability to pay for basic & medical needs. The questions asked to respondents are listed below – the first three items are open-ended responses while the last item asked on a 3-point Likert scale (Not hard at all, Somewhat hard, Very had) with higher scores indicating more financial hardship.

- Line Item 18: “In the last 12 months, have you provided unpaid care to an adult relative or friend to help them take care of themselves?”
- Line Item 19: “In the last 6 months, how many times did you visit your primary care provider?”

- Line Item 20: “In the last 6 months, how many times did you stay in the hospital one or more nights?”
- Line Item 21: “How hard is it for you to pay for the very basics like food, housing, heating, medical care, and medications?”

Data Analysis

We utilized a panel regression and a quasi-experimental approach to examine the impact of the COVID-19 shelter-in-place policies on depression, social isolation, and loneliness in older adults. This approach was selected to capture the causal effects of COVID-19 policies to create a more comprehensive policy analysis given the diverse experiences of individuals during the COVID-19 pandemic. We hypothesized and analyzed the following mechanism, outlined in Figure 3, between shelter-in-place policies and various dependent depression, social isolation, and loneliness outcomes.

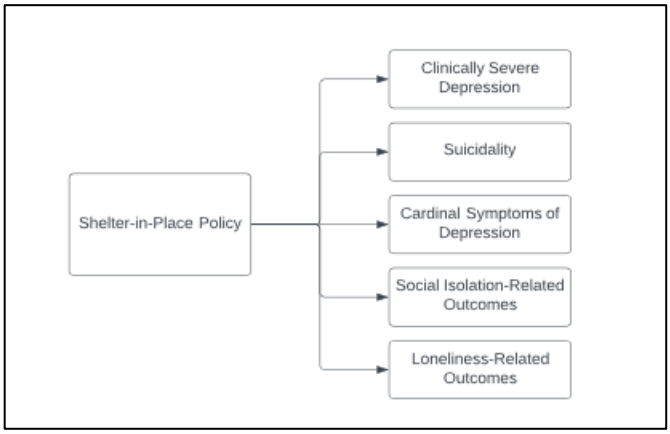

Figure 3: Dependent Variable (Shelter-in-Place Policy) on Independent Variables Related to Depression, Suicidality, Social Isolation, and Loneliness

Utilizing R software, we conducted separate longitudinal pre/post primary analyses by state to assess the correlation between each of the following factors: age (continuous, years), gender (binary, men, or women), race (categorical, self-identified), insurance status (categorical,

Medicare, Medicaid, Private Insurance, Veteran's Insurance, combination) and their association of change with depression (PHQ-9 total score, line item scores, cardinal symptom scores, suicidality score), social isolation (DSSI-10 first four questions referred to as DSSI-SI, PROMIS-SI), and loneliness (DSSI-10 last six questions referred to as DSSI-SS, UCLA 3-Item Loneliness Scale) before and after shelter-in-place policies. Various sociodemographic variables, including age, gender, race, and ethnicity, were included to understand whether certain segments of the older adult population disproportionately experienced impacts on their mental health and social connectedness due to shelter-in-place policies. Insurance status was also identified as a variable to conceptualize whether the type of insurance, public or private, influenced the impact of shelter-in-place policies on depression, social isolation, and loneliness.

Multiple values were missing for the insurance and outcome variables of social isolation and loneliness, as some PEARLS partner sites did not routinely collect this data. As a result, we had up to 65% of data missing for any one variable for social isolation and up to 45% of data missing for insurance information. We computed missing values in the dataset and determined that the available data for each variable was representative of the total dataset.

As a supplementary policy analysis, we utilized difference-in-difference analysis to estimate the causal effect of shelter-in-place policies on depression and social connectedness for the overall sample population. The utilized DID regression equation is presented below in Figure 3. To create the indicator variables X_5, we considered the pre-treatment group to be before the earliest shelter-in-place policy from Washington on March 23, 2020, and the post-treatment group to be after the shelter-in-place policy from Maryland on March 30, 2020. This eliminated 14 data observations between 3/23/20 and 3/30/20. To create the indicator variables X_6, we matched Washington and Maryland as the treatment group, given that these states had policy

language in official documents and anecdotal data that signified a similar intensity for their initial shelter-in-place policy. The control group for the indicator variables X_6 included Texas and Florida, which had shelter-in-place policies that were similarly comparative. From these two indicator variables, X_5 & X_6, we generated an interaction term that captures the shelter-in-place effect. DID models were run for Y_i models for covariates only (X_{1-4}), a parsimonious model with only indicators (X_{5-7}), DID without Florida included in X_6 to test the validity of the groupings in X_6, and the main DID model with X_{1-7}.

Figure 3: Regression Equation

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

Where,
X_1 = Gender
X_2 = Insurance
X_3 = Race
X_4 = Age
X_5 = Pre/Post Shelter-in-Place Policy Indicator
X_6 = State Control/Treatment Group (Treatment Group including WA and MD)
X_7 = Interaction Term Between X_5 & X_6

Where Y_i included DID models for,
Y_1 = PHQ-9 Total Score
Y_{1A} = Suicidality from Line-Item 9 of PHQ-9
Y_{1B} = Cardinal Symptoms of Depression from PHQ-9
Y_{1C} = Clinical Cutoff (>10) from PHQ-9 Total Score
Y_2 = DSSI-10 Indicator Score
Y_{2A} = DSSI-SI, a generated social isolation sub-indicator
Y_{2B} = DSSI-SS, a generated loneliness sub-indicator
Y_3 = PROMIS-SI Indicator Score
Y_4 = UCLA-3 Indicator Score

Results

Sample Characteristics

The 1,820-participant sample was predominately female (77%) and White (57%), with a mean age of 72. Almost half of the sample came from Florida (n = 870; 48%), with the next majority from Maryland (n = 390; 21%), then Washington (n = 300; 16%) and Texas (n = 260; 14%). For the sample, the PHQ-9 total score, which ranges from 0-27, had a mean (SD) score of 12.79,

indicating moderate depression (score range 10-15). The full characteristics of the sample are displayed in Table 1. Comparison subset tables of the analysis sample with (1) a sample restricted on the availability of social isolation and loneliness measures, (2) a matching time frame date restricted sample, and (3) a sample restricted on the availability of insurance information, are available in Appendix Table 1.

Table 1: Characteristics of Sample, *N = 1820*	
CHARACTERISTIC	N (%)
State	
WA (2)	300 (17%)
MD (1)	390 (21%)
TX (3)	260 (14%)
FL (0)	870 (48%)
Age	
Mean (SD)	72 (10.5)
Range	21-103
NA	128
Race	
White (0)	1040 (57%)
Black (1)	394 (22%)
Other (2)	152 (8%)
NA	234 (13%)
Gender	
Female (0)	1399 (77%)
Male (1)	393 (21%)
NA	28 (2%)
Insurance	
Medicare Only (0)	733 (40%)
Medicaid Only (1)	91 (5%)
Dually Enrolled (2)	217 (12%)
Private/Veterans (3)	45 (2%)
None (4)	32 (2%)
Other (5)	7 (<1%)
NA	695 (38%)

PHQ-9 Total Score	
Mean [Range]	12.79 [0-27]
NA	12

NA = Not Available

Impact of COVID-19 Shelter-in-Place Policies on Depression by State

Washington was the only state to show a statistically significant association between shelter-in-place policies and clinically significant (>10) PHQ-9 total scores. Washington also had the largest Chi-Squared value among the states (Table 2). Clinically significant PHQ-9 scores, known as the clinical cutoff, activate medical diagnoses and interventions for depression in clinical settings. This clinical activation or further depression assessment can also be triggered by a high score (>1) on either line item 1 or 2 from the PHQ-9, which relates to anhedonia and depressed mood – cardinal symptoms of depression. Aligned with the increase of clinically significant PHQ-9 scores in Washington is the association found between shelter-in-place policies and an increase in these cardinal symptoms of depression (shown in Table 2). Florida also had an association between their shelter-in-place policy and symptoms of depression.

Despite the lack of statistically significant changes in clinical cutoff (>10) for PHQ-9 Total Scores and cardinal indicators, we found statistically significant changes in the severity of depression from pre-shelter-in-place periods to post-shelter-in-place periods among some states in the analysis. Washington and Maryland showed a significant increase in the number of individuals who had a severe total PHQ-9 score, which indicates individuals falling in the range of 20-27 and qualifying for a diagnosis of Major Depressive Disorder based on PHQ-9 criteria. The data from Washington also showed an association between lockdown policy and moderate depression, defined as a PHQ-9 total score of 10-14, with statistical significance at the 5% level.

A statistically significant association between lockdown policy and mild depression was observed for Washington and Texas, as defined by a PHQ-9 total score of 5-9.

There was a marked increase in suicidality in Washington, Maryland, and Florida during COVID-19 lockdown policies. While the clinical cutoff did not match this association in Maryland and Florida, the statistically significant change in the suicidality-associated line item 9 from the PHQ-9 denotes that clinical activation may not always capture changes in suicidality.

There were also associations observed between lockdown policy and other individual depressive symptoms. We observed a statistically significant association between the lockdown policy and line item 4, "feeling tired or having little energy," for Washington, Florida, and Texas. The Florida analysis showed an association between lockdown policy and line item 5, "poor appetite or overeating," which is significant at the 10% level. Washington and Maryland showed an association between lockdown policy and line item 6, "feeling bad about yourself – or that you are a failure or have let yourself or your family down," which is significant at the 10% level, and an association between lockdown policy and line item 8, "moving or speaking so slowly that other people could have noticed. or the opposite – being so fidgety or restless that you have been moving around a lot more than usual", with Washington having statistical significance at the 10% level and Maryland at the 1% level. Washington also shows an association between lockdown policy and line item 7, "trouble concentrating on things, such as reading the newspaper or watching television," significant at the 5% level.

Impact of COVID-19 Shelter-in-Place Policies on Social Isolation & Loneliness by State

For Maryland and Florida, states with available pre/post DSSI-10, PROMIS-SI, and UCLA-3, we found increases across the board on the full set of indicators, as shown in Table 3. The decrease in number of social interactions and social network size, as measured by the DSSI-

SI (four-item objective social isolation subscale from the DSSI-10), is slightly less dramatic than the change in the satisfaction with social supports, measured by the DSSI-SS (six-item subjective satisfaction with social interaction subscale from the DSSI-10). The PROMIS-SI and UCLA-3 showed similar large decreases across both states, with the value magnitude being greater in Florida than Maryland, as shown in Table 3. At the more granular level, the analysis of individual line items for the DSSI-10, UCLA-3, and PROMIS-SI revealed supporting trends for Maryland and Florida with statistically significant increases in social isolation and loneliness after the shelter-in-place policy (shown in Appendix Table 2). We could not complete a pre/post shelter-in-place analysis for Washington and Texas due to missing post-values and uneven tail sizes, respectively.

We conducted supplemental analysis to ignore baseline differences in the level of social isolation and loneliness that could potentially confound state comparisons (shown in Appendix Table 3). We found that Florida had much lower changes in some of its social isolation indicators than Maryland's pre/post shelter-in-place policy. Specifically, for objective social isolation (DSSI-SI), which drove a large difference in DSSI-10, Maryland had a change in means of -4.54, while Florida had a change in means of -0.72. Perceived social isolation measured through PROMIS-SI did not show the same changes. The loneliness reported between the states was comparable, with Maryland having a change in means of -0.56 in the UCLA-3 and -0.14 in the DSSI-SS and Florida having a change in means of -0.47 in the UCLA-3 and -0.16 in the DSSI-SS. This finding aligns with the pathology of the shelter-in-place policies between the states, with Maryland having more restrictive policies and Florida having less movement-restrictive policies.

Table 2: Chi-Squared Values for PHQ-9				
	Washington	Maryland	Texas	Florida
Clinically Significant	4.52**	0.089	2.18	0.0013
Cardinal	3.56**	1.23	0.77	6.29**
Severe	6.98***	4.47**	0.42	0.064
Moderate Severe	1.36	0.23	0.16	0.34
Moderate	4.09**	2.25	0.29	0.37
Mild	2.96*	0.0060	4.97**	0.0010
None	1.85	0.063	0.92	1.14
Suicidal (Line-Item 9)	14.84***	15.29***	0.30	9.97***
Line-Item 3	2.47	0.24	1.59	0.11
Line-Item 4	9.29***	0.21	4.97**	13.12***
Line-Item 5	2.18	0.23	0.37	3.17*
Line-Item 6	3.56*	2.74*	0.16	2.31
Line-Item 7	4.93**	0.21	0.94	0.43
Line-Item 8	3.34*	10.01***	0.55	0.030
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Table 3: T-Test Values of Social Isolation & Loneliness Full Indicators					
	SI #	Washington	Maryland	Texas	Florida
DSSI-SI (4)	1-4	No Post Sample	-32.17***	Post Sample Too Small	-33.34***
DSSI-SS (6)	5-10	No Post Sample	-29.16***	Post Sample Too Small	-32.85***
DSSI-10	1-10	No Post Sample	-45.37***	Post Sample Too Small	-46.60***
PROMIS-SI	11-16	No Post Sample	-36.67***	Post Sample Too Small	-38.16***
UCLA-3	11, 13, 17	No Post Sample	-37.98**	Post Sample Too Small	-40.76***
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level					

Impact of COVID-19 Shelter-in-Place Policies on Health Services Utilization & Financial Hardship by State

Looking at measures of health service utilization and financial hardship, there was an increase in caregiving for respondents in both Maryland and Florida, which asks, "In the last 12 months, have you provided unpaid care to an adult relative or friend to help them take care of themselves?" For primary care visits, hospital stays, and buying power for medical and other basic needs, respectively, there was a marked decrease in both Maryland and Florida during COVID-lockdown periods (shown in Appendix Table 4).

Relationship Between Shelter-In-Place Policies and Depression-Related Outcomes

Our DID analysis revealed that, on average, our treatment group (Maryland and Washington) reported 0.14-point higher suicidality than our control group (Florida and Texas) after controlling for gender, insurance, race, and age (shown in Appendix Table 6). The treatment group was defined based on having more restrictive initial shelter-in-place policies. The results from our analysis show that community-dwelling older adults in Maryland and Washington reported higher suicidality rates than the control group. This result reinforces the primary findings of a marked increase in suicidality associated with the initial shelter-in-place policies for Washington, Maryland, and Florida; Texas did not show a statistically significant association in that analysis.

We also found that, on average, Washington and Maryland community-dwelling older adults had a 0.085-decrease in cardinal symptoms of depression compared to Florida and Texas when controlling for gender, insurance, race, and age (shown in Appendix Table 7). This finding aligns with the main analysis results, as Florida and Washington both reported an association between their shelter-in-place policy and an increase in reporting for the cardinal symptoms of

depression. We suspect the magnitude of change in Florida drove the difference between the treatment (Washington and Maryland) and control (Florida and Texas) groups in this DID, as Florida had a higher magnitude of correlation in our earlier findings (displayed in Table 2).

Lastly, we found that for DSSI-SI, an objective social isolation sub-indicator from the DSSI-10, there was an increase in social isolation in the treatment group (-1.99-points) compared to the control group when controlling for gender, insurance, race, age, and insurance. This result aligns with the main analysis findings, as Maryland had a higher magnitude in change of means from pre/post policy for the DSSI-SI compared to Florida. Maryland and Florida drove the social isolation indicator DID analyses due to the availability of observations.

Relationship Between Sociodemographic Characteristics and Insurance Status with Shelter-In-Place Policies and Depression, Social Isolation, & Loneliness

We did not find evidence that gender, race, and age influence the impact of initial COVID-19 shelter-in-place policies on depression, social isolation, and loneliness. Nor did we find any statistically significant associations between type of insurance and influence on shelter-in-place policies and our study outcomes for community-dwelling older adults.

Discussion

Results of this study contribute to the existing literature on depression, social isolation, and loneliness in older adults while expanding our understanding of the impact of novel shelter-in-place policies. The Washington state analysis showed significant associations between shelter-in-place policy and depression outcomes. Washington had the earliest shelter-in-place policy among the states included in this analysis and the longest shelter-in-place policy period. While Washington showed an association between shelter-in-place policy and 1) clinically significant depression (PHQ-9 total score) and 2) the level of severe depression, Maryland showed an

association only between shelter-in-place policy and level of severe depression. This difference between Washington and Maryland suggests a clinical under-recognition of severe depression in the older adult population in certain settings, aligning with the existing literature.[48]

The shelter-in-place policy also increased the lethargy, a symptom of depression, reported by older adults in certain states. Line Item 4, "feeling tired or having little energy," from the PHQ-9 showed an association with shelter-in-place policy in three states: Washington, Florida, and Texas. In addition to representing a marker of depression when found in association with the cardinal symptoms of depression (Line Items 1 and 2) in the clinical setting, this symptom is also associated with the symptomology of COVID-19, as well as other respiratory viruses such as influenza (flu). The available data suggests an association between the initial COVID-19 shelter-in-place policies and an increase in lethargy among older adults.

The shelter-in-place policy affected the feelings of suicidality among older adults in three states. Line Item 9, "thoughts that you would be better off dead, or of hurting yourself," from the PHQ-9 showed a strong association with shelter-in-place policy in Washington, Maryland, and Florida. Washington and Maryland had shelter-in-place policies that heavily restricted the general public's movement. This marked increase in suicidality suggests that an unintended consequence of the initial COVID-19 shelter-in-place policies was an increase in suicidality for older adults. This finding is alarming from both a public health and a policy standpoint, as the older adult population has a higher risk of completed suicide compared to other groups.[49] Further, this result mirrors both domestic and international perspectives on the possibility of increases in suicidality due to COVID-19; increased social isolation and loneliness, discussed in the next paragraph potentially connect to this increased suicide risk.[50]

We were only able to analyze Maryland and Florida at the state level due to limitations to the available dataset, further conferred in the following section of this discussion. We found a statistically significant decrease in social isolation and loneliness after the initial shelter-in-place policies in these states. In Maryland and Florida, we found an association between the shelter-in-place policy and a decrease in the utilization of primary care, the number of hospital stays, and buying power related to medical and basic needs. This result mirrors trends observed by other studies examining the impacts of COVID-19 restrictions.[51]

Strengths & Limitations

We used administrative data collected routinely during the PEARLS intervention in different states. We did not place a greater burden on the sample population when gathering this data. However, we do have limited data available for certain sociodemographic variables and the social isolation and loneliness variables. We have minimal data for ethnicity, which is often a control covariate in regression models, with only 410 available data points for ethnicity available out of 1822. We also had limited data for insurance but did find when we reduced to a subset with the insurance information available (to 1125 data points), the sample was comparable in a test of means to our original sample based on PHQ-9 Total Score mean and age. This sample did have differences in terms of state and race. Lastly, we have limited data for social isolation and loneliness but did find that the subset that included this data (to 644 data points) was comparable in a test of means to our original sample based on PHQ-9 Total Score and race. However, there were differences on the basis of age and state. Maryland had 113 observations available, with only ten post-policy period observations, which brings into question the power of the analysis in Maryland. Washington had no observations for the post-shelter-in-place period for social isolation and loneliness. The subset dropped to <100 observations for Texas, with only one post-

policy period observation. We could not run an independent state analysis for Washington and Texas for social isolation and loneliness.

We capture different aspects of "social connectedness" using three measures that assessed different constructs, including social network size, social interactions, satisfaction with social support, perceived social isolation, and loneliness.[52] Social isolation and loneliness are often grouped together in the literature but have significant differences in that social isolation is an objective measure of being disconnected, and loneliness is a subjective measure of feeling distress by lack of connections. Utilizing different indicators captures more minute distinctions between social isolation and loneliness. The UCLA-3, DSSI-10, and PROMIS-SI all have fared well in psychometric testing and measure different aspects of social connectedness.

With self-identified variables, namely race, many groups were too small for the power of the analysis and instead grouped together in the category "Other." Our original data showed 20 unique self-identified racial groupings; this was collapsed into three groupings for our analysis: "White," "Black," and "Other." We lost the nuances of each racial subgroup due to this necessary regrouping for the power of the analysis.

This sample may be more depressed but less connected than the general population,[36] even at baseline, limiting the results' external validity. This dataset comes from PEARLS, a community-based depression intervention program for underserved populations, which means the sample is already connected to an intervention and has the potentially higher baseline depression scores. While generalizability is important, it is essential to center vulnerable populations in research if we are to move the needle on eliminating health disparities.[53]

We do not have information on COVID-19 diagnoses or other chronic health conditions for these individuals, which could impact their score on various measures, namely line item 4

(lethargy) in the PHQ-9. People may underreport depression, social isolation, and loneliness scales initially, as they may be guarded. The honesty in answers can increase over time as the individual grows more comfortable with the case manager collecting the data. As a result, the data could be confounded, with an under or over-estimate of the effect.

We did not restrict the timeframe of the data to be exactly 12 months pre/post initial shelter-in-place policy for each state because doing so cut the 1822-sample dataset in half, and analysis power was lost. When we analyzed the time-restricted subset, the comparison of means showed no difference in PHQ Total Score and race but did show differences on the basis of state. This finding led us to believe that our sample had internal validity.

Implications for Policy

When generating policy analyses and introducing legislation, analysts and legislators should be aware of the implications for depression, social isolation, and loneliness. In this country, we are currently navigating a dual pandemic with COVID-19 and mental health, and loneliness has been called out as an epidemic in and of itself.[54] During policy analysis, one can include a criterion for unintended consequences or specific criteria that estimate the potential impacts of policies on depression, social isolation, and loneliness. COVID-19 has highlighted major gaps in our country's social safety net. There is a need to explore opportunities to further engage the community-dwelling older adult population in social safety nets. Aging in place is considered less expensive than institutional living, but preventative care is not at an accessible and sufficient level for this population. The literature has repeatedly noted the linkage between poor mental health, namely depression, and other health conditions.[55]

Implications for Public Health & Medicine

The Patient Health Questionnaire-9 (PHQ-9) is a trusted resource in clinical settings, with studies documenting high reliability and validity. However, our results point to a potential downside of the PHQ-9 in failing to capture a particular portion of the population due to the current clinical cutoff (>10) for PHQ-9 Total Scores. For PHQ-9 Total Scores between 1-4 and 5-9, patients are considered to have minimal and mild depression, respectively. This is concerning, as older adults with lower severity depression face adverse health outcomes as impactful as higher severity depression. Furthermore, older adults with any range of depression may not be engaging in maintaining their health and well-being. This lack of preventative action, signaled by the lack of depression intervention when the clinical cutoff of the PHQ-9 does not get triggered, can have many negative health consequences. Depression among older adults, including "minor" or lower severity depression, can still impact health and well-being.

Further, measures to capture social isolation and loneliness in the field are important to integrate with the PHQ-9, as there is a direct relationship with other aspects of mental, physical, and emotional health. PROMIS' vision of creating unified measures is promising, but the PROMIS tools, namely the PROMIS-SI highlighted in this study, are hard to use even if they pass psychometric tests. PEARLS programs collected limited social isolation data and will phase out the PROMIS-SI scale due to usability. The measures utilized in research and practice must be synergized to improve the recognition of various mental and emotional health conditions. As a research and clinical community, it is important to find opportunities to improve "gold standard" measures to capture the broad and intersectional range of patient experiences.

Our sample population was 77% female, which mirrors other similar interventions for depression and mental health. Programs similar to PEARLS are often 70-80% female. There is a need to reach out to men to participate in these social safety net interventions, especially with

older men's increased risk for suicide and what this study found about the impact of policy on suicidality.

Opportunities for Future Research

This study analyzed whether initial COVID-19 shelter-in-place policies in four states were associated with increased depression, social isolation, and loneliness in the community-dwelling older adult population. Community-dwelling older adults are a segment of the older adult population greatly affected by COVID-19. However, this study did not include the non-community dwelling older adult population, including those living in nursing homes. Future research should include this population given their vulnerability during COVID-19.[56]

The older adult population is a Medicare-eligible population. Most of the participants in PEARLS Connect are recipients of Medicaid as well. An analysis across ages for the dually enrolled population, who are recipients of both Medicaid and Medicare, would highlight disparities between the experiences of an older population with low socioeconomic status and a younger population with low socioeconomic status. This future analysis would emphasize opportunities to expand and change Medicare benefits for dually eligible populations.

We acknowledged previously in the limitations that the sample size for self-identified racial groups led to the creation of the "Other" category. As racial-ethnic groups have historically been marginalized in research,[57] future studies that are able to collect data should be intentional about the nuances between racial-ethnic groups. Increasing the sample size for these groups, while accounting for the intersectionality of identities, would allow for a better understanding of the unique burdens faced by certain groups and communities.[58] A more gender

balanced group would also be beneficial to account for the experiences of male-identifying individuals in relation to depression, social isolation, and loneliness.

A larger sample of states could help increase the sample size and the power of the analysis. We included four coastal states that only represent certain regions. Washington represented the West Coast, Maryland represented the East Coast, Texas represented the Southwest, and Florida represented the Mid-Atlantic. Notably, the Midwest did not receive representation in the sample.

Lastly, since COVID-19 has numerous impacts and drawing a causal pathway from shelter-in-place policies has many potential confounders, it would be important to engage medical and economic indicators. For the finding associating COVID-19 shelter-in-place policies with lethargy, it would be beneficial to rule out the possibility of a COVID-19 diagnosis. Economic indicators could also add to the analysis by allowing the analysis to control for potentially confounding relationships with unemployment, inflation, and buying power.

Appendix

Appendix Table 1: Comparison Table with Subset Sample Characteristics				
	Main Analysis Dataset	Restricted on Availability of Social Isolation & Loneliness Indicators	Date Restricted to 12 months Pre/Post Lockdown Policy	Restricted on Availability of Insurance Information
Observations (*N*)	1820	644	1007	1125
State				
WA	300 (17%)	74 (11%)	177 (18%)	22 (2%)
MD	390 (21%)	113 (18%)	272 (27%)	356 (32%)
TX	260 (14%)	49 (8%)	223 (22%)	33 (3%)
FL	870 (48%)	408 (63%)	335 (33%)	714 (63%)
Age				
Mean (SD)	72 (10.5)	70 (10.9)	72 (10.3)	72 (10.6)
Range	21-103	21-99	21-100	21-103
NA	128	83	66	13
Race				
White	1040 (57%)	414 (64%)	586 (58%)	750 (67%)
Black	394 (22%)	143 (22%)	194 (19%)	272 (24%)
Other	152 (8%)	37 (6%)	91 (9%)	56 (5%)
NA	234 (13%)	50 (8%)	136 (14%)	47 (4%)
Gender				
Female	1399 (77%)	479 (74%)	768 (76%)	864 (77%)
Male	393 (21%)	156 (24%)	221 (22%)	251 (22%)
NA	28 (2%)	9 (~2%)	18 (2%)	10 (<1%)
Insurance				
Medicare Only	733 (40%)	283 (44%)	390 (39%)	733 (65%)
Medicaid Only	91 (5%)	45 (7%)	49 (5%)	91 (8%)
Dually Enrolled	217 (12%)	102 (16%)	113 (11%)	217 (19%)
Private/Veterans	45 (2%)	23 (3%)	18 (2%)	45 (4%)
None	32 (2%)	10 (1%)	9 (~1%)	32 (3%)
Other	7 (<1%)	1 (<1%)	4 (<1%)	7 (<1%)
NA	695 (38%)	180 (28%)	424 (42%)	N/A
PHQ-9 Total Score				
Mean [Range]	12.79 [0-27]	12.69 [0-27]	12.91 [0-27]	12.46 [0-26]
NA	12	1	4	9

Appendix Table 2: T-Test Values for Line-Item Social Isolation Variables				
	Washington	Maryland	Texas	Florida
SI 1	No Post Sample	-8.02***	Post Sample Too Small	-9.50***
SI 2	No Post Sample	-4.14***	Post Sample Too Small	-10.40***
SI 3	No Post Sample	-23.43***	Post Sample Too Small	-27.92***
SI 4	No Post Sample	-45.54***	Post Sample Too Small	-50.37***
SI 5	No Post Sample	-5.06***	Post Sample Too Small	-62.56***
SI 6	No Post Sample	-11.48***	Post Sample Too Small	-52.85***
SI 7	No Post Sample	-4.47***	Post Sample Too Small	-67.19***
SI 8	No Post Sample	-3.91***	Post Sample Too Small	-68.70***
SI 9	No Post Sample	-6.13***	Post Sample Too Small	-60.95***
SI 10	No Post Sample	-9.01***	Post Sample Too Small	-56.78***
SI 11	No Post Sample	-23.62***	Post Sample Too Small	-48.57***
SI 12	No Post Sample	-19.16***	Post Sample Too Small	-44.16***
SI 13	No Post Sample	-24.57***	Post Sample Too Small	-49.15***
SI 14	No Post Sample	-36.91***	Post Sample Too Small	-45.51***
SI 15	No Post Sample	-31.95***	Post Sample Too Small	-40.11***
SI 16	No Post Sample	-25.82***	Post Sample Too Small	-34.91***
SI 17	No Post Sample	-38.83***	Post Sample Too Small	-46.48***
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 3: Change in Social Isolation & Loneliness Full Indicators Difference of Means					
	SI #	Washington	Maryland	Texas	Florida
DSSI-SI (4)	1-4	No Post Sample	-4.54	Post Sample Too Small	-0.72
DSSI-SS (6)	5-10	No Post Sample	-0.14	Post Sample Too Small	-0.16
DSSI-10	1-10	No Post Sample	-4.61	Post Sample Too Small	-0.84
PROMIS-SI	11-16	No Post Sample	-0.76	Post Sample Too Small	-0.85
UCLA-3	11, 13, 17	No Post Sample	-0.56	Post Sample Too Small	-0.47
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level					

Appendix Table 4: T-Test Values for Line-Item Health Services Utilization & Financial Hardship Variables				
	Washington	Maryland	Texas	Florida
SI 18	No Post Sample	9.89***	Post Sample Too Small	2.25***
SI 19	No Post Sample	-22.93***	Post Sample Too Small	-26.81***
SI 20	No Post Sample	-5.05***	Post Sample Too Small	-10.43***
SI 21	No Post Sample	-34.22***	Post Sample Too Small	-49.55***
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 5: Y_1 = PHQ-9 Total Score				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	DID Main Model
Intercept	17.86*** (1.12, 15.92)	12.77*** (0.17, 75.08)	25.04*** (2.64, 9.47)	18.19*** (1.15, 15.88)
Gender	-0.42 (0.34, -1.25)	n/a	-0.94 (0.60, -1.56)	-0.47 (0.34, -1.38)
Insurance	-0.60 (0.14, 1.25)	n/a	0.084 (0.26, 0.32)	0.19 (0.14, 1.38)
Race	0.17** (0.25, -2.36)	n/a	0.14 (0.52, 0.27)	-0.57 (0.25, -2.26)
Age	-0.073*** (0.01, -4.98)	n/a	-0.16*** (0.03, -5.29)	-0.077*** (0.015, -5.21)
Time Indicator	n/a	-0.049 (0.34, -0.14)	-0.78 (1.87, -0.42)	-0.36 (0.43, -0.83)
State Indicator	n/a	0.30 (0.32, 0.93)	-0.014 (1.47, -0.01)	0.62 (0.42, 1.46)
Cross Indicator (DID Term)	n/a	-0.31 (0.51, -0.61)	-0.38 (1.95, -0.20)	-0.50 (0.66, -0.76)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 6: Y_{1A} = Suicidality				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	DID Main Model
Intercept	-0.081 (0.08, -1.07)	0.12*** (0.012, 10.62)	0.22 (0.20, 1.12)	-0.043 (0.076, -0.57)
Gender	0.0061 (0.02, 0.27)	n/a	-0.022 (0.045, -0.49)	0.0022 (0.023, 0.095)
Insurance	-0.0031 (0.01, -0.34)	n/a	-0.031 (0.019, -1.58)	0.0010 (0.0092, 0.11)
Race	-0.017 (0.02, -1.01)	n/a	0.017 (0.039, 0.43)	-0.0087 (0.017, -0.51)
Age	0.0027*** (0.00098, 2.77)	n/a	-0.0017 (0.0023, -0.74)	0.0019 (0.00099, 1.92)
Time Indicator	n/a	-0.037 (0.023, -1.59)	-0.026 (0.14, -0.19)	-0.058** (0.029, -2.00)
State Indicator	n/a	0.15*** (0.024, 6.08)	0.16 (0.11, 1.45)	0.14*** (0.028, 5.04)
Cross Indicator (DID Term)	n/a	-0.13*** (0.036, -3.71)	-0.10 (0.15, -0.71)	-0.064 (0.044, -1.46)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 7: Y_{1B} = Cardinal Symptoms of Depression from PHQ-9				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	DID Main Model
Intercept	1.02*** (0.06, 17.06)	0.90*** (0.011, 84.42)	1.17*** (0.17, 7.12)	1.013*** (0.061, 16.59)
Gender	-0.022 (0.02, -1.20)	n/a	-0.065 (0.038, -1.73)	-0.021 (0.018, -1.15)
Insurance	0.0015 (0.01, 0.20)	n/a	0.0023 (0.016, 0.14)	-0.0018 (0.0074, -0.24)
Race	-0.016 (0.01, -1.18)	n/a	-0.041 (0.032, -1.27)	-0.022 (0.014, -1.64)
Age	-0.0011 (0.00078, -1.42)	n/a	-0.0032 (0.0019, -1.71)	-0.00063 (0.00079, -0.80)
Time Indicator	n/a	0.023 (s0.031, 1.06)	0.070 (0.12, 0.60)	0.024 (0.023, 1.04)
State Indicator	n/a	-0.056** (0.022, -2.52)	-0.037 (0.092, -0.41)	-0.085*** (0.022, -3.80)
Cross Indicator (DID Term)	n/a	0.033 (0.033, 1.00)	-0.043 (0.12, -0.35)	0.012 (0.035, 0.34)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 8: Y_{1C} = Clinical Cutoff (>10) from PHQ-9 Total Score				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	DID Main Model
Intercept	1.25*** (0.11, 11.61)	0.73*** (0.015, 48.19)	1.48*** (0.24, 6.20)	1.28*** (0.11, 11.63)
Gender	-0.045 (0.03, -1.40)	n/a	-0.074 (0.054, -1.36)	-0.051 (0.033, -1.55)
Insurance	0.016 (0.01, 1.23)	n/a	0.011 (0.024, 0.45)	0.018 (0.013, 1.39)
Race	-0.022 (0.02, -0.89)	n/a	-0.030 (0.047, -0.64)	-0.020 (0.024, -0.81)
Age	-0.0073*** (0.0014, -5.19)	n/a	-0.011*** (0.0027, -4.11)	-0.0077*** (0.042, -0.53)
Time Indicator	n/a	-0.029 (0.030, -0.94)	0.010 (0.17, 0.061)	-0.022 (0.042, -0.53)
State Indicator	n/a	0.025 (0.029, 0.89)	0.13 (0.13, 0.99)	0.064 (0.040, 1.57)
Cross Indicator (DID Term)	n/a	0.054 (0.045, 1.20)	-0.088 (0.18, -0.50)	-0.047 (0.63, -0.75)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 9: Y_2 = DSSI-10 Indicator Score				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	Main Model
Intercept	15.78*** (2.55, 6.19)	15.64*** (0.44, 35.92)	18.58*** (4.74, 3.92)	15.88*** (2.59, 6.14)
Gender	-0.89 (0.77, -1.15)	n/a	0.21 (1.07, 0.20)	-0.87 (0.78, -1.12)
Insurance	-0.23 (0.34, -0.69)	n/a	-0.52 (0.67, -0.78)	-0.24 (0.35, -0.69)
Race	-0.20 (0.55, -0.37)	n/a	0.24 (1.01, 0.24)	-0.18 (0.55, -0.32)
Age	-0.0085 (0.03, -0.26)	n/a	-0.060 (0.060, -1.00)	-0.00054 (0.034, -0.016)
Time Indicator	n/a	-1.27 (0.86, -1.48)	Sample Size Issues	-1.01 (0.81, -1.24)
State Indicator	n/a	-1.62** (0.74, -2.19)	Sample Size Issues	-1.49 (0.91, -1.63)
Cross Indicator (DID Term)	n/a	-2.98 (2.84, -1.05)	Sample Size Issues	-3.49 (2.85, -1.22)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 10: Y_{2A} = DSSI-SI, a generated social isolation sub-indicator				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	DID Main Model
Intercept	12.50*** (2.64, 4.73)	11.74*** (0.45, 26.16)	10.82** (4.71, 2.30)	12.53*** (2.68, 4.68)
Gender	-0.85 (0.81, -1.06)	n/a	-0.24 (1.07, -0.22)	-0.82 (0.81, -1.00)
Insurance	-0.38 (0.36, -1.08)	n/a	-0.91 (0.67, -1.36)	-0.45 (0.36, -1.25)
Race	-0.22 (0.57, -0.39)	n/a	0.18 (1.01, 0.18)	-0.22 (0.58, -0.39)
Age	-0.013 (0.03, -0.38)	n/a	-0.0075 (0.060, -0.13)	-0.0028 (0.035, -0.079)
Time Indicator	n/a	-1.00 (0.88, -1.13)	Sample Size Issues	-0.87 (0.85, -1.03)
State Indicator	n/a	-1.73** (0.76, -2.28)	Sample Size Issues	-1.99** (0.95, -2.08)
Cross Indicator (DID Term)	n/a	-3.34 (2.04, -1.14)	Sample Size Issues	-3.99 (2.99, -1.33)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 11: Y_{2B} = DSSI-SS, a generated loneliness sub-indicator				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	Main Model
Intercept	3.84*** (1.07, 3.59)	3.91*** (0.16, 25.17)	8.46*** (2.87, 2.95)	3.91*** (1.09, 3.59)
Gender	-0.054 (0.32, -0.17)	n/a	0.43 (0.65, 0.65)	-0.08 (0.33, -0.24)
Insurance	0.10 (0.14, 0.70)	n/a	0.36 (0.41, 0.89)	0.16 (0.15, 1.10)
Race	0.076 (0.23, 0.33)	n/a	0.040 (0.62, 0.065)	0.098 (0.23, 0.43)
Age	-0.0028 (0.01, -0.20)	n/a	-0.06 (0.036, -1.69)	-0.0049 (0.014, -0.34)
Time Indicator	n/a	-0.30 (0.31, -0.98)	Sample Size Issues	-0.20 (0.34, -0.58)
State Indicator	n/a	0.096 (0.26, 0.37)	Sample Size Issues	0.48 (0.38, 1.26)
Cross Indicator (DID Term)	n/a	0.29 (0.97, 0.30)	Sample Size Issues	0.52 (1.20, 0.43)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 12: Y_3 = PROMIS-SI Indicator Score				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	Main Model
Intercept	13.84*** (2.40, 5.76)	10.32*** (0.36, 28.93)	31.76*** (5.78, 5.50)	14.26*** (2.46, 5.81)
Gender	-0.70 (0.73, -0.96)	n/a	-0.15 (1.31, -0.11)	-0.81 (0.74, -1.10)
Insurance	0.26 (0.32, 0.81)	n/a	1.91 (0.85, 2.24)	0.31 (0.33, 0.93)
Race	-0.36 (0.53, -0.69)	n/a	-2.32 (1.28, -1.82)	-0.31 (0.54, -0.58)
Age	-0.06 (0.031, -1.77)	n/a	-0.29*** (0.072, -3.93)	-0.06 (0.032, -1.92)
Time Indicator	n/a	-1.03 (0.71, -1.46)	Sample Size Issues	-0.71 (0.78, -0.92)
State Indicator	n/a	0.09 (0.62, 0.15)	Sample Size Issues	0.80 (0.88, 0.91)
Cross Indicator (DID Term)	n/a	0.08 (2.14, 0.038)	Sample Size Issues	1.65 (2.69, 0.61)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

Appendix Table 13: Y_4 = UCLA-3 Indicator Score				
Coefficient (SE, t-value)	Covariates Only	Parsimonious Model (Indicators Only)	DID Without Florida	Main Model
Intercept	7.34*** (1.38, 5.30)	6.41*** (0.20, 31.45)	17.85*** (3.54, 5.04)	7.44*** (1.42, 5.23)
Gender	-0.39 (0.41, -0.93)	n/a	-0.22 (0.80, -0.27)	-0.37 (0.42, -0.88)
Insurance	0.14 (0.18, 0.75)	n/a	0.75 (0.52, 1.44)	0.12 (0.19, 0.63)
Race	-0.31 (0.30, -1.01)	n/a	-1.49 (0.78, -1.90)	-0.33 (0.31, -1.07)
Age	-0.02 (0.018, -0.89)	n/a	-0.16*** (0.045, -3.50)	-0.01 (0.018, -0.80)
Time Indicator	n/a	-0.55 (0.41, -1.33)	Sample Size Issues	-0.39 (0.45, -0.89)
State Indicator	n/a	-0.19 (0.35, -0.53)	Sample Size Issues	-0.33 (0.50, -0.66)
Cross Indicator (DID Term)	n/a	-0.22 (1.22, -0.18)	Sample Size Issues	0.36 (1.54, 0.23)
* Denotes statistical significance at the 10% level **Denotes statistical significance at the 5% level *** Denotes statistical significance at the 1% level				

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