

## FEATURED ARTICLE

# Approaches to engage an aging, rural cohort in southern India during the COVID-19 crisis and the psychological impact of COVID-19 in this cohort

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**Abstract**

**Introduction:** The COVID-19 pandemic produced an unprecedented crisis across the world. Long-term cohort studies were stalled, including our longitudinal aging cohort study in rural India.

**Methods:** We describe approaches undertaken to engage with our cohort ( $n = 1830$ ) through multiple rounds of calls and how we provided useful services to our subjects during the lockdown period. Consenting subjects also underwent telephonic assessments for depression and anxiety using validated, self-report questionnaires.

**Results:** Subjects reported benefitting from our telephonic engagement strategies, including the COVID-related safety awareness and counselling service. The proportion of subjects with depression increased from 7.42% pre-COVID to 28.97% post-COVID.

**Discussion:** We envisage that such engagement strategies would improve subject rapport and cohort retention, and thus, could be adopted by similar cohort studies across the world. This marginalized, rural Indian community had severe, adverse psychological impact in this pandemic. Urgent public health measures are needed to mitigate this impact and develop appropriate preventive strategies.

**KEYWORDS**

anxiety, awareness, cohort engagement, COVID-19, depression, pandemic, psychological impact, rural India

## 1 | INTRODUCTION

### 1.1 | The COVID-19 crisis

The COVID-19 pandemic unexpectedly pushed the entire world into a state of deep turmoil. The pandemic's multipronged assault on health, social, and economic conditions of populations across the world resulted in an unprecedented crisis in several countries. Low- and middle-income countries (LMICs), whose health-care systems were already strained and battling limited resources, probably took the biggest hit.<sup>1</sup>

### 1.2 | COVID-19 impact in India

India faced a serious impact, not only in terms of the case load but also in the enormous socio-economic burden that the crisis placed, especially, on the vulnerable and marginalized populations.<sup>2</sup> On March 24, 2020, the Government of India announced one of the strictest nationwide lockdowns in the world. The total lockdown continued until May 31, 2020, after which phased conditional relaxations were implemented for several months. The pandemic overburdened the country's underfunded public health-care system,<sup>3-4</sup> where the majority of citizens cannot afford expensive private health-care options. It shook

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the nation's economy,<sup>5</sup> and left tens of thousands of unorganized and migrant workers in misery.<sup>6</sup> These challenges were compounded by widespread fear and stigma regarding the disease, with news reports of people escaping from quarantine facilities, COVID-19-positive residents getting evicted from their homes, and health workers being assaulted or chased away.<sup>7-11</sup> There were even reports of suicide due to the fear of COVID-19.<sup>12,13</sup>

### 1.3 | COVID-19 impact in our rural cohort

#### 1.3.1 | Description of our cohort

The Srinivaspura Aging, Neuro Senescence and COGNition (SANSCOG) study,<sup>14</sup> our rural cohort study (projected  $n = 10,000$ ), is a prospective, community-based, cohort study, aimed at comprehensive evaluation of risk and protective factors associated with cognitive changes due to normal aging, dementia, and other related disorders. This is the first-of-its kind, large-scale aging cohort in rural India, which comprises subjects aged 45 years and above.

#### 1.3.2 | Overall impact on our cohort

The COVID-19 crisis brought most studies involving human subjects around the world to a standstill. The SANSCOG study was no exception, and from March 13, 2020, we had to suspend all study activities. Our rural cohort subjects belong to a low socio-economic stratum with no structured income. They are an agriculture-dependent community, wherein thousands of families depend on mango farming for their survival. Their mango produce is predominantly exported to other Indian states for use in the pulp industry. India's nationwide shutdown coincided with the mango season in India (April–June). Thus, mango harvest, interstate transport, and sales were severely hampered.<sup>15</sup> In addition, the area was already facing a less-than-normal crop of mangoes, owing to the previous year's unfavorable weather conditions.<sup>16</sup> Thus, the pandemic jeopardized the meager socio-economic support they had and resulted in our rural cohort facing a major monetary impact.

#### 1.3.3 | Potential psychological impact on our cohort

Evidence has emerged from studies across the world that psychological distress including depression and anxiety symptoms was common during the COVID-19 lockdowns<sup>17-25</sup> but literature from India is limited.<sup>26-29</sup> With the burden of mental health disorders already on the rise in India,<sup>30</sup> a further increase in mental health problems due to such calamities could result in enormous disease burden. India already faces dire shortage of mental health professionals,<sup>31</sup> and has additional challenges due to the stigma and poor awareness regarding mental health disorders.<sup>32</sup>

The aims of this study were to present the approaches we undertook to telephonically engage with our rural cohort during the COVID-19

### RESEARCH IN CONTEXT

- 1. Systematic Review:** We reviewed existing literature, using a PubMed search as well as other published reports and new articles, on the impact of pandemics, including COVID-19, on psychological well-being. We found that such major crises can potentially result in adverse psychological impact, particularly associated with depression and anxiety disorders. However, such data from India, especially from rural Indian communities, is limited.
- 2. Interpretation:** Our findings reveal that the COVID-19 crisis had severe psychological impact on a cohort of marginalized, rural, community-dwelling, older individuals in southern India. The unique approaches that we undertook to usefully engage our subjects during the lockdown period and provide safety-related awareness and counselling can be modelled by similar studies across the world, which, we envisage, would improve subject retention.
- 3. Future Directions:** We propose the urgent need for appropriate public health measures to address this adverse psychological impact. The community mental health framework in India needs to be strengthened, especially at the primary care level, so that vulnerable and marginalized communities in rural areas are benefitted.

lockdown period and assess the psychological impact of the pandemic in this population.

## 2 | METHODS

### 2.1 | Study design

This was a cross-sectional study among subjects enrolled in the SANSCOG longitudinal aging cohort.

### 2.2 | Setting

The study is based in a rural, community setting in southern India, in the villages of the Srinivaspura "taluk" (equivalent of a subdistrict) in the Kolar district in the state of Karnataka.

### 2.3 | Participants

A total of 1830 subjects who were enrolled in the SANSCOG cohort were part of this study. Apparently cognitively healthy subjects aged  $\geq 45$  years were recruited through area sampling from the villages of Srinivaspura taluk, during the period January 2018 to March 2020.

They are a marginalized population, having very low levels of formal education as well as limited access to modern technology and health-care facilities. Individuals were excluded if they had severe/terminal medical or severe psychiatric illness, severe hearing or visual impairment, or locomotor disability that is likely to interfere with study assessments.

## 2.4 | Ethics clearance and informed consent

The SANSCOG study has been cleared by the Institutional Ethics Committee (IEC) of the Centre for Brain Research (CBR), and written, informed consent is obtained from all participants before recruitment. Because periodic depression assessments and periodic telephonic follow-ups were already part of the study protocol, additional IEC approval for these were not required. However, for the inclusion of anxiety assessments as well as the shortened versions of depression and anxiety scales (which were earlier not part of the protocol), we made appropriate amendments to the study protocol, and these were approved by CBR's IEC.

## 2.5 | Cohort engagement strategies during the lockdown

### 2.5.1 | SANSCOG study's field team and resources

The SANSCOG study has a dedicated field team comprising field data collectors (FDCs) and a field data supervisor (FDS). They are the first point of contact for our study subjects and are responsible for recruiting them as well as maintaining periodic contact with them for scheduling follow-up visits. They connect with the local community with the help of women community health workers called ASHAs (accredited social health activists), who are recruited from their respective villages and trained by the government of India, to serve as interface between the community and the public health system. Prior to the pandemic, the SANSCOG field team used to conduct periodic home visits (at least twice a year) in between the scheduled assessment visits (2-yearly for  $\geq 65$  years, 3-yearly for 45–64 years) to maintain contact with our cohort.<sup>14</sup>

### 2.5.2 | Regular telephonic contact with subjects

With the strict nationwide lockdown in effect, telephonic contact was the only means of contact available with our subjects. Though access to landlines is very limited in our cohort, all our cohort participants had provided mobile phone contact numbers of themselves or their children or some household member (most village-dwelling Indians live in joint families). We started our first round of calls on March 18, 2020,  $\approx 1$  week after we halted our study.

The SANSCOG study's pre-established strategy is to try maximally to allot each FDC to a particular village, so that right from recruitment

to clinical/cognitive assessments to blood collection to follow-up, communication with that group of participants is maintained by the same FDC. During the COVID-related calls, we carefully planned as much as possible to assign the same FDCs to their respective participant groups with whom prior rapport had been established. Further, we adopted different strategies to reach the maximum number of our cohort participants, such as following flexible timings including making calls before 8 am or after 6 pm, so that their daily routine was not disturbed, and making at least two further attempts on different days/times for those who were not reachable initially. We made a total of three rounds of calls; details of the specific tasks undertaken for each round of calls are provided in Table 1.

## 2.6 | Assessment tools

Two validated scales were administered telephonically: the Geriatric Depression Scale (GDS-7) and the Generalized Anxiety Disorder (GAD-7) questionnaire. GDS-7,<sup>34</sup> the shortened version of the 30-item Geriatric Depression Scale, is a self-reported screening tool used to identify symptoms of depression in older adults. It consists of seven "yes" or "no" questions, which are scored 1 for "yes," and 0 for "no." A total score of 2 or more is indicative of depression, with high sensitivity (93%) and specificity (91%).<sup>33</sup> The GAD-7<sup>34</sup> is the 7-item version of the Generalized Anxiety Disorder Questionnaire. This is a reliable, valid, and efficient tool for screening for generalized anxiety disorder as well as assessing its severity. It has seven items and the responses are scored as 0 for "not at all," 1 for "several days," 2 for "more than half the days," and 3 for "nearly every day." A total score of 10 or more has an optimal sensitivity of 89% and specificity of 82% for detecting generalized anxiety disorder. GAD-7 has also been found to be moderately good at screening three other common anxiety disorders, such as panic disorder (sensitivity 74%, specificity 81%), social anxiety disorder (sensitivity 72%, specificity 80%), and post-traumatic stress disorder (sensitivity 66%, specificity 81%).

## 3 | RESULTS

The socio-demographic characteristics of SANSCOG cohort subjects ( $n = 1830$ ) are presented in Table 2. The flowchart depicting the numbers of subjects who participated in each round of calls is presented in Figure 1.

### 3.1 | Cohort engagement

#### 3.1.1 | First round calls

During the first round, we attempted to contact all our cohort participants ( $n = 1830$ ) and successfully contacted 1335 participants. We observed that several participants had limited awareness about the causation, mode of spread, and preventive measures regarding

**TABLE 1** Details of different rounds of calls along with their specific tasks

Call round	Aim	Task details	Team responsible
First (n = 1830) March 18–April 12, 2020 <sup>a</sup>	Enquiring	- about their well-being, home/personal situation - about any concerns/problems/fears - about their knowledge regarding pandemic/precautions	SANSCOG Field Team
	Reassuring	- from panicking - that help and support are available - that they can call for guidance, in case of emergency - providing government helpline numbers	
Second (n = 1335) March 28–April 13, 2020 <sup>a</sup>	Requesting consent	- for receiving pandemic safety awareness from DiNC - for participating in survey depression and anxiety	DiNC Team
Counselling service (n = 1133) April 4–April 24, 2020	Providing safety awareness	- about the disease, symptoms, and modes of transmission - precautions/preventive steps to be taken - when and how to seek help	
Third (n = 1179) June 2–August 27, 2020	Getting feedback	- for DiNC's calls on safety awareness	SANSCOG Field Team
	Assessing psychological impact	- Geriatric Depression Scale (GDS-7) - Generalized Anxiety Disorder questionnaire (GAD-7)	SANSCOG Clinical Team
	Guiding medically (if requested)	- for COVID and non-COVID medical problems - referring for further medical attention - clarifying specific doubts/health concerns	

Abbreviations: DiNC, Digital Nerve Centre; SANSCOG, Srinivaspura Aging, Neuro Senescence and COGnition.

<sup>a</sup>Overlapping dates are due to different team members making calls in batches.

**TABLE 2** Socio-demographic characteristics of our cohort

N	1830 subjects enrolled at the time of this study	
Mean age	59.5 (± 10.2) years	Males: 61 (± 10.4) years Females: 58 (± 9.9) years
Sex	Male	861/1830 (47%)
Literacy status	Literates	1070/1830 (58%)
Occupation	Agriculture	1115/1830 (61%)
	Household work	319/1830 (17.5%)
	Other	145/1830 (8%)
	None	248/1830 (13.5%)

COVID-19. When asked about what they knew about the pandemic, a common answer we received was that “some new/unknown disease has come in some places.” We also found that a considerable proportion of our participants expressed displeasure and distress due to the impact of the stringent lockdown that severely hampered harvest, transport, and sales of their agricultural produce. Some participants expressed fear/anxiety about being “locked up” in quarantine centers. Interestingly, only a minority of participants expressed fear about them or their family getting the infection. Some persons even said that they were not specifically concerned about this disease and expressed fatalistic beliefs stating, “if it is time to go, then we go.” Several participants expressed appreciation for our study team’s “concern about their welfare, even during such difficult times.”

### 3.1.2 | Second round calls

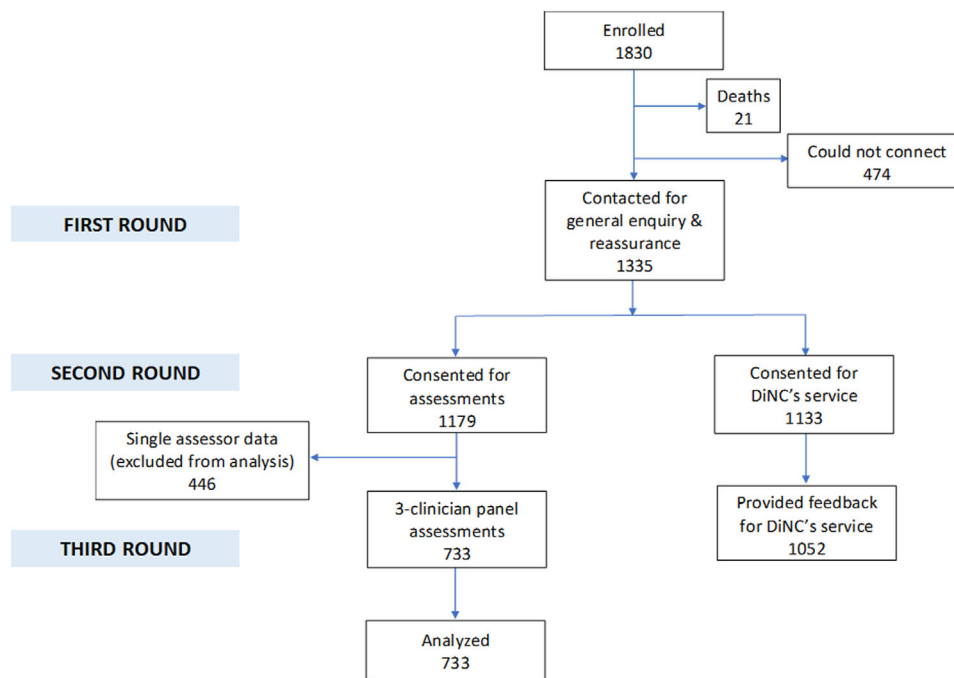
During this round, 1133 subjects consented to receive telephonic counselling services on pandemic-related safety awareness from our collaborator, Digital Nerve Centre (DiNC)—a local digital health service initiative operating in this area, established by an information and technology company in India (Tata Consultancy Services). A total 1179 consented to participate in the psychological impact survey.

### 3.1.3 | DiNC counselling service

The DiNC team provided their safety awareness/counselling services between April 4, 2020 and April 24, 2020 (Table 1).

### 3.1.4 | Third round calls

During the first part of the call, FDCs requested feedback from our subjects on the usefulness of DiNC's safety counselling. Subjects were asked to rate the usefulness of calls as one of the three options: “good,” “average,” or “poor.” We obtained feedback on DiNC's services from 1052 subjects who had used the service. Out of these, 982 subjects (93.3%) rated the service as “good,” 68 (6.5%) as “average,” and 2 (0.2%) as “poor.” After this, the FDCs connected the subjects with our clinical team for administering the psychological impact survey. In addition to this, medical doctors in our clinical team provided medical advice



**FIGURE 1** This flowchart presents the number of subjects who participated in the three rounds of calls that we made to engage with our cohort during the COVID-19 lockdown period. DiNC, Digital Nerve Centre

or guidance (both COVID and non-COVID) whenever any participant requested. Those needing further medical treatment were referred to appropriate health services at the local primary health center or the (secondary level) taluk hospital at Srinivaspura. There were even instances when certain subjects reported difficulty in procuring their regular medication due to the travel restrictions, further to which our FDCs facilitated this, and on one instance delivered the medicines to the subject's home.

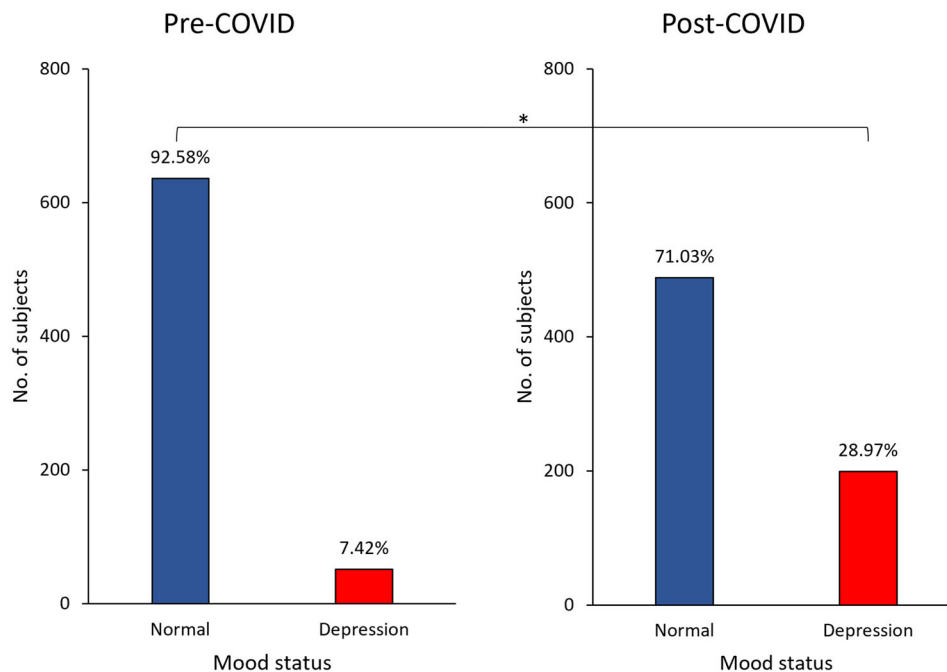
### 3.2 | Depression and anxiety survey results

A total of 1179 subjects consented for the above two surveys (156 refused consent). GDS-7 and GAD-7 scales were administered telephonically in the subjects' primary language by SANSCOG's clinical team. Initially, one assessor administered the surveys but during quality check exercises, assessors reported that they encountered difficulty with interpreting some of the item responses and that some participants gave descriptive answers which, in turn, made it difficult to assign a categorical response as per the options in the scale. Further to this, we adopted a three-clinician panel method, wherein the questionnaires were administered telephonically by one primary assessor and the responses provided by the subjects were independently rated by two secondary assessors. At the end of the assessments, the panel compared the ratings of all three assessors and a common consensus was reached. In case a consensus could not be reached, we planned to exclude those data from analysis. We conducted several mock assessment sessions (on other staff members) as well as multiple inter-rater reliability exercises until the results were satisfactory. Subsequently,

733 subjects completed the depression and anxiety assessments using the above three-clinician panel method (period: June 24 to August 27, 2020). We found that this method yielded excellent inter-rater reliability between the assessors and there was no instance in which data had to be excluded due to inability to reach a consensus on the scoring. To maintain uniformity in data collection, data from the initial period of single clinician assessments were discarded ( $n = 446$ ) and we included only the data from 733 assessments done by the panel method for analysis. Out of these 733 subjects, 211 (28.8%) scored above the threshold score for depressive disorder on GDS-7, whereas 40 (5.5%) scored above the threshold score for anxiety disorder on GAD-7.

### 3.3 | Comparison of pre-COVID and post-COVID depression

Out of the above 733 subjects, pre-COVID GDS scores were available for 687 subjects. These subjects had undergone their baseline assessments from January 2018 to March 2020 (before halting the study due to the COVID-19 crisis). During this period, they had undergone depression assessments using the 30-item version of the GDS administered in person by trained clinicians. Among these 687 subjects, we found that 199 (28.97%) had depression after the COVID-19 pandemic compared to 51 (7.42%) who had depression before COVID-19 (Figure 2). This difference was statistically significant ( $P < .001$ ). Among the subset of 51 subjects who reported depression pre-COVID, 24 subjects remained depressed, and 27 subjects were not depressed post-COVID. On the other hand, 175 subjects who were not depressed pre-COVID reported depression post-COVID.



**FIGURE 2** This figure depicts the comparison between the proportion of subjects diagnosed to have depression (using the Geriatric Depression Scale [GDS]) pre-COVID (using data from baseline clinical assessments, GDS-30,  $n = 687$ ) and post-COVID (using data from current depression assessments, GDS-7,  $n = 687$ ) in a rural, aging cohort from south India. \*\*\* $P < .001$

Throughout the whole exercise, we had periodic online meetings among FDCs, the FDS, the project manager, and study investigators, to get feedback of their interaction experiences during these telephone communications.

#### 4 | DISCUSSION

This paper highlights the unique approaches that we undertook to engage with our rural, aging cohort in southern India, during the COVID-19 lockdown period. Our strategy of conducting three rounds of telephone calls, each with specific objectives, ensured that we were in touch with our cohort throughout the lockdown period. Further, we provided useful services, such as provision of pandemic safety awareness/counselling service to willing subjects through our collaborator (DiNC), and provision of medical guidance by our team's medical doctors. We deemed that such services were particularly important considering that our rural subjects belonged to a marginalized population, and had poor health awareness and limited access to health-care services. Overall, based on the qualitative inputs received from the study's field team, we felt that these multiple telephonic interactions during the lockdown period resulted in better bonding between our study team and cohort. The likely reason for this is as follows. One of the primary roles of the SANSCOG field team is to maintain periodic contact through telephone/home visits with our cohort, which has been ongoing since the start of cohort recruitment (2018). Prior to COVID, these communications were mainly "study-centered," for example, updating them about the study's progress, informing them

about their next scheduled follow-up visits, and checking their willingness for continuing in the study. However, during telephonic communications made during the COVID lockdown period, the agenda for these communications became more "individual/participant-centered," such as enquiring about their personal situation and well-being, providing them pandemic safety awareness, medical guidance when necessary, facilitating delivery of prescription medicines that were difficult to procure, and so on. We envisage that such strategies would improve subject rapport and cohort retention and could be adopted by similar cohort studies across the world.

The second part of our paper presents the results of telephonic depression and anxiety screening assessments on consenting subjects. During the COVID period, GDS-7 was administered rather than GDS-30 as this was a telephonic survey and we wanted to keep it as short as possible. Among the different shortened versions of GDS, GDS-7 has been found to be the most accurate in diagnosing depression.<sup>35</sup> Moreover, GDS-7 has been validated against GDS-15 (which in turn has been well validated with GDS-30) and has been found to have high sensitivity and specificity.<sup>33</sup>

The substantial increase in the proportion of rural, community-dwelling subjects with depression after COVID-19 is likely to be due to the significant financial impact that this crisis had on this already marginalized farming-dependent community, which severely affected harvest and sales of their farm produce. Further, poor health-related awareness in rural areas of India combined with disease stigma and rumors about a "new disease spread" could have also resulted in greater distress. Interestingly, the proportion of subjects in the rural cohort who were screened to have anxiety disorder in the post-COVID

assessments was significantly lower (5.5%) than those who were screened to have depression ( $P < .001$ ). The above finding is in contrast to results from a similar survey from India (conducted at roughly the same time period as our study), wherein the authors observed that anxiety symptoms were slightly higher than depressive symptoms (28% vs. 25%).<sup>27</sup> However, this study was in an urban, non-marginalized community, wherein 92% of this population were well educated (graduation and above) and 84% had a substantial monthly income. When we look at pre-pandemic times, the Global Burden of Diseases survey in India (1990–2017), which estimated the burden of mental disorders in India, reported that 44.9 million and 45.7 million persons had depressive and anxiety disorders, respectively.<sup>36</sup> Therefore, our finding that prevalence of depression was substantially higher than that of anxiety was contrasting to what is expected during both pandemic and non-pandemic situations. We are of the opinion that this is possibly due to cultural factors, wherein rural subjects may be hesitant to explicitly express fear or anxiousness, considering it to be a weakness. In fact, our field team informally reported that several participants vehemently denied questions related to anxiety symptoms and some even felt somewhat offended when these anxiety-related questions were posed.

Though studies from India<sup>27,37–40</sup> have reported varying prevalence of depression, anxiety, and stress-related disorders, on different populations, at different time points during the COVID-19 crisis, our study is unique because we had the opportunity to compare the proportion of depression in pre-COVID and post-COVID era in the same cohorts. We further intend to longitudinally follow-up both our cohorts with depression and anxiety assessments at later time points in the pandemic to observe any patterns of change in the psychological impact. Prior evidence from follow-up studies has revealed that depression significantly increases the risk of dementia;<sup>41–43</sup> the 2020 report of the Lancet Commission recognized depression as one of the 12 modifiable risk factors for dementia.<sup>44</sup> In this scenario, further increase in depression after the pandemic in this rural population could put these individuals at still higher risk for cognitive impairment.

Limitations of this study include non-random sampling and limited generalizability of findings. We were able to contact 72.6% of our cohort; thus, our study results could have limited application to those who were not contactable through telephone. The same would apply for the proportion who did not consent for participating in the surveys as well as for the data that had to be discarded due to poor agreement/concordance in interpretation of answers during the initial assessments done by single assessors. The use of self-reported questionnaires and the chances of recall bias are added limitations. Further, the answer choices in GDS versus GAD scales were not of the same level of complexity (two choices for GDS and four choices for GAD), which could have a possible influence in diagnosis of these conditions. Also, pre-COVID depression assessments were done in person, using the 30-item version of the GDS, whereas post-COVID depression assessments were done telephonically using the shortened, 7-item version of the GDS. We did not have data on pre-COVID anxiety scores for comparison as anxiety assessments were not done as part of our baseline clinical assessments in both cohorts.

This study brings to light the severe psychological impact faced by our rural cohort and underlines the necessity for developing and implementing public health measures to mitigate such adverse impact in marginalized communities. Strengthening community mental health services in the primary health-care system is essential to prevent escalation of mental health problems in such times of crisis. This should be done through promotion of mental health awareness, increasing the availability of trained mental health professionals, conducting mass community screening programs for common mental disorders, and increasing the budget allocation for mental health care in India. We intend to continue this study in the longer term and have periodic evaluations at various stages of the pandemic, to better understand the pattern of progression of this psychological impact, and how this, in turn, affects cognition.

## ACKNOWLEDGMENTS

We acknowledge the valuable contribution of the SANSCOOG field team in regularly connecting with our subjects during the COVID-19 crisis. We are grateful to the Digital Nerve Centre (DiNC) team at Kolar for providing useful COVID-related safety awareness to our subjects. We also acknowledge the valuable advice and academic inputs of CBR's International Advisory Board members. The SANSCOOG study is funded by Mr. Kris Gopalakrishnan through the Centre for Brain Research.

## CONFLICTS OF INTEREST

The authors report no conflicts of interest.

## AUTHOR CONTRIBUTIONS

All authors (Jonas S. Sundarakumar, Shafeeq K.S. Hameed, Babu Dilip, Shylashree Deepak, Vinay Kumar B.R., and Vijayalakshmi Ravindranath) have made a substantial intellectual contribution to the conception, design, or conduct of the study. Specific contributions are as follows: Babu Dilip, Vinay Kumar B.R., and Shylashree Deepak: acquisition of data; Jonas S. Sundarakumar, Shafeeq K.S. Hameed, and Vijayalakshmi Ravindranath: analysis and interpretation of data; Jonas S. Sundarakumar and Vijayalakshmi Ravindranath: drafting and reviewing the manuscript. All authors approved the final version of the manuscript for publication.

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**How to cite this article:** Sundarakumar JS, Hameed SKS, Dilip B, Deepak S, Kumar BRV, Ravindranath V. Approaches to engage an aging, rural cohort in southern India during the COVID-19 crisis and the psychological impact of COVID-19 in this cohort. *Alzheimer's Dement*. 2022;1-9. <https://doi.org/10.1002/alz.12726>