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Back to 'Normal'? Mental Health Functioning After Extended Lockdown during the COVID-19 Pandemic

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ABSTRACT: ***Objectives:*** *Research has established an increased risk of psychological distress related to the onset of the Covid-19 pandemic, particularly in marginalized, low-income communities. However, it remains unclear if mental health symptoms remit once extended lockdown periods are ended. To address this gap, we report on changes in mental health functioning between lockdown and post-lockdown periods in high-risk communities in Guatemala.* ***Methods:*** *Thirty (30) participants who took place in a larger baseline study examining the initial impact of Covid-related lockdown agreed to participate in a follow-up telephone survey conducted 3 months post-lockdown and serve as the sample for this study. Descriptive statistics were used to describe the sample. Bivariate analyses examined differences between lockdown and post-lockdown mental health functioning using paired samples t-tests. Multivariate analyses were performed using multiple linear regressions.* ***Results:*** *We found significant increases in anxiety, depression, stress, and burnout from the lockdown to post-lockdown. We further found that individuals reporting greater control over the environment were significantly less likely to endorse stress at the post-lockdown period, and that the impact of control over environment on depression is stronger for males than females.* ***Conclusion:*** *Recognition of the long-term impact of extended lockdown on mental health functioning is important to normalize and validate the experiences of those individuals with on-going distress. In high-risk, low resource communities, challenges related to development and delivery of mental healthcare and psycho-education at the community level regarding mental well-being require special consideration.*

Keywords: *Covid-19, Extended Lockdown, Psychological Distress, Low-Income Communities, Guatemala.*

INTRODUCTION

Guatemala is the least urbanized country in Central America and it has been ranked as the 5th poorest country in Latin America and the Caribbean (LAC). It has the 6th highest rate of malnutrition in the world and the highest in LAC, with over 60% of the population being food insecure and 47% of all children under age 5 suffering from chronic malnutrition (The World Bank, 2020). Rampant gang violence and high rates of drug trafficking result in further insecurity among the poorest Guatemalan communities, known as "Red Zone Districts (RZDs)". Within Guatemala City, RZDs report rates of poverty, crime, and community and gender violence at the highest levels in Latin America and among the highest in the world (Brands, 2011; Gerkin, 2020; Human Rights Watch, 2020; Odriozola-González et al., 2020; Puac-Polanco et al., 2015; Wilson, 2020).

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Guatemala has among the worst health outcomes in all of Latin America (The World Bank, 2020). Life expectancy is the lowest in Central America, 12 years less than its neighbor, Costa Rica. Other countries in the region that similarly experienced prolonged civil conflict, like El Salvador and Nicaragua also report significantly better health indicators with lower mortality rates, lower malnutrition, and higher life expectancy The world Bank, 2020). Only approximately 11% of the Guatemalan population has access to health services (The world Bank, 2020).

The state of mental health in Guatemala is even more grim, with approximately 1 in 4 Guatemalans experiencing a mental illness in their lifetime (Branas et al., 2013) and only 2-15% of those with a mental illness receiving needed psychiatric treatment (Rissman et al., 2016; World Health Organization, 2011). Previous research reports prevalence rates of 40.7% for depression, 23.3% for alcohol-related disorders, and 50% for PTSD have been

reported in Guatemala (Branas et al., 2013). Rates are even higher among particularly vulnerable groups such as women, indigenous groups, those directly affected by the country's 36-year armed conflict and among the urban poor residing in communities such as RZds (Mercier, 2020; OSAC, 2019; Schwartz, 2020).

With such precarious pre-existing health and mental health conditions, it is not surprising that Guatemala has been hit harder by the Covid-19 pandemic than any other country in Latin America and the Caribbean. According to the Ministry of Health (2020), Guatemala experienced the highest rate of coronavirus infection and death in the region.

In response to the onset of the pandemic, on March 5th 2020, a 'State of Calamity' was declared and strict curfews, lockdown measures, and travel restrictions initiated to mitigate the spread of the virus (GardaWorld, 2020; US Department of State, 2020). All land, sea, and air borders were closed, and entry to most non-Guatemalan nationals was barred, with only diplomatic, health, security personnel, and exceptional cases designated by the government, exempt from the closure. International and domestic flights were suspended and public transport was limited (GardaWorld, 2020). During curfew hours, individuals were required to stay at home and those in breach were subject to a fine or imprisonment. Only essential personnel, including police, private security, medical professionals, and food-delivery driver s were exempt. Outside of curfew hours, all individuals were mandated to comply with social distancing rules, requiring people to stay at least 5 ft apart and utilize facemasks in all public spaces. Failure to comply with these regulations resulted in heavy fines (GardaWorld, 2020). These mitigation efforts would be extended multiple times, amounting to what would total a 7-month period of lockdown that would end on September 30th, 2020 (Ministry of Health, 2020).

Previous studies have conceptualized the pre-existing conditions characterizing the RZDs in Guatemala as precursors for experiencing the pandemic as a complex emergency resulting in significant mental health challenges for those residing in these communities. These studies report rates of mental health issues resulting from the pandemic ranging from 46%-64% for anxiety, 36%-47% for stress, 19%-25% for an exacerbation of pre-existing mental health conditions, 12%-19% for depression, 12%-18% for burnout, and 2%-5% for concerns about being safe at home (Alonzo et al., 2021a). Further it was reported that parents were 70% more likely to endorse feelings of stress during the lockdown period than non-parents (Alonzo e al., 2021b). Significant differences were also found based on gender, age and the number of children in the household with women and older adults experiencing higher rates of stress and anxiety associated with the pandemic, and families with a greater number of children experiencing higher levels of burnout (Alonzo et al., 2021b).

It remains unclear if these mental health symptoms remit once extended lockdown periods are ended or whether they persist as, to date, studies examining the impact of extended lockdown periods on low-income, marginalized communities are not available. However, it is reasonable to expect that in these communities impairments in mental health functioning will endure in light of: 1) the devastating economic and health/mental health consequences of the pandemic and related mitigation efforts; 2) the scarcity of health and mental health resources to support those who are struggling; and, 3) the increased insecurity stemming from the pre-existing perilous state of RZDs. To address this gap, we examined changes in the mental health functioning (anxiety, stress, depression, burn-out) of individuals residing in RZDs in Guatemala from lockdown to two-months after lockdown restrictions had been lifted. Understanding the impact of extended lockdown periods during the Covid-19 pandemic is essential in order to inform the social measures that will need to be developed and implemented to address the mental health needs of individuals in these communities and to stem further marginalization.

METHOD

SAMPLE

With the approval of the appropriate Institutional Review Board and in collaboration with Hunger Relief International (HRI) and International Social Work Solutions (ISWS), a total of 330 individuals from 11 RZDs in and around Guatemala City participated in a larger study, the Covid Care Calls (CCC) Program (described in detail elsewhere, see (Alonzo et al., 2021a; Alonzo et al., 20201b), and completed baseline assessments between June 6th, 2020 and September 30th. Thirty (30) participants who completed the baseline study agreed to participate in a follow-up telephone survey conducted 3 months post the lifting of the lockdown restrictions in December, 2020 and serve as the sample for this study. Verbal consent was obtained for participation in baseline and follow-up calls. The study PIs developed the baseline and follow-up survey instruments, trained the callers and provided support and supervision to in-country staff. Calls were made by HRI staff members.

MEASURES

SOCIODEMOGRAPHICS CHARACTERISTICS:

Through the semi-structured telephone survey, participants provided information regarding their sex, age, district of residence, number of children, and household composition.

BASELINE MEASURES:

All symptoms of psychological distress were assessed using one main single item question with two subsequent

follow-up questions asked of those who responded in the affirmative. Previous research indicates that single item measures of this type for assessing depression and other psychiatric symptoms have both adequate sensitivity and specificity to detect emotional distress in previous studies (Alonzo et al., 2021a; Alonzo et al., 20201b; Rodríguez-Rey et al., 2019; Rodríguez-Rey et al., 2020; Skoogh et al., 2010). Two follow-up questions were asked for every mental health symptom endorsed. First, participants were asked to rate the degree of the mental health symptom as low, moderate or high. Second, the participant was asked "Can you share with me the reasons for your (mental health symptom)?".

ANXIETY:

The lead question to assess for anxiety required participants to respond yes or no to the question, "Have you been feeling anxious since the pandemic began?" If they answered yes, they were than asked the two follow-up questions.

DEPRESSION:

The lead question to assess for depression required participants to respond yes or no to the question, "Have you been feeling depressed since the pandemic began?"

STRESS:

The lead question to assess for stress required participants to respond yes or no to the question, "Have you been feeling stressed since the pandemic began?"

BURNOUT:

The lead question to assess for burnout required participants to respond yes or no to the question, "Have you been feeling burned-out since the pandemic began?"

FOLLOW-UP MEASURES:

The follow-up survey was designed by the study PIs. It was informed by qualitative feedback and quantitative data obtained during the baseline study (Alonzo et al., 2021a; Alonzo et al., 20201b) and by relevant research focused on the impact of extended lockdown periods during previous global crises (i.e., SARS) and during the Covid-19 pandemic in other countries (for example, Goleccha 2020; Lancee et al., 2008; Lee et al., 2018; Msherghi et al., 2021; Richter et al., 2020, Rossi et al., 2020; Schützwohl & Mergel, 2020; Stein et al., 2020).

Control over the Environment

The survey contained 10 items assessing the nature of individual experiences during lockdown associated with mental well-being and sense of control over one's environment. Participants were asked to rate their degree of difficulty in the following areas: balancing family and work; taking care of oneself; finding time for my children; finding time for my partner; finding space to stay alone; finding time to stay alone; doing physical exercise; reading a book; watching a movie; focusing on one's work; helping one's child do homework; playing with one's child; cooking; and, cleaning. Items were rated on a scale of none to very low, moderate and high.

Clinical Characteristics

Informed by the baseline CCC, the follow-up survey assessed for 4 mental health issues including anxiety, stress, depression, and burnout that were operationalized according to culturally relevant conceptualizations of illness and idioms of distress. As such, the depression measure consisted of 3 items assessing mood, difficulty sleeping, and difficulty concentrating. The anxiety measure consisted of 4 items targeting feeling anxious, feeling worried for family members, feeling worried about employment, and, feeling worried about income. The stress measure consisted of 4 items targeting feeling stressed/overwhelmed, having difficulty caring for children, difficulty caring for spouse/partner; and difficulty caring for self. The burnout measure consisted of 4 items targeting feeling burned-out/fatigued, having difficulty completing work/schoolwork, feelings of anger, and, and feelings of frustration.

All mental health items were rated on a scale of none to very low, moderate and high. For all items endorsed, participants were asked follow-up questions of, "Have you sought help for this issue? Yes or No? and "What type of help have you received?

DATA ANALYSIS

The statistical analyses were performed using IBM SPSS Statistics for Windows, version 26 (StataCorp, 2013). All the tests were two-tailed, with a significance level of $p<0.05$.

Descriptive statistics (means, standard deviations, and percentages) were used to describe the socio-demographic characteristics of the sample. Bivariate analyses examined differences between lockdown and post-lockdown mental health functioning (anxiety, stress, depression, burnout) using paired samples t-tests.

Multivariate analyses were performed using multiple linear regressions. Main and interaction effects (unstandardized Beta coefficients) and p values of each predictor and adjusted squares of each model are reported. Level of significance was set to $p=.05$.

RESULTS

Table 1 presents the socio-demographic characteristics of the sample. Participants were on average 38 years old. They were largely female (73%). The majority of participants live with family (73%).

Table 1.
Socio-demographic characteristics of the sample

Sociodemographic Characteristic	N (%)	Mean (± SD)
Age (in years)	24	37.75 (**±18.78**)
Sex		
Female	22 (73)	
Lives with Family		
Yes	23 (96)	
Children under 18 yrs old in the house		
Yes	19 (79)	
Relatives over 60 in the home		
Yes	2 (8)	
Number of Household Members		
1-3	8 (33)	
4-6	13 (54)	
7-10	2 (8)	
11-15	1 (4)	

Table 2.
Changes in Mental Health Symptoms Pre- and Post- Lockdown Measures

Mental Health Variable	Pre-Lockdown (n=30)		Post-Lockdown (n=30)		Comparison			
	Mean	SD	Mean	SD	t	df	p	Cohen's d
Anxiety	3.38	2.13	5.76	2.21	3.31	20	.003	1.10
Depression	.19	.87	3.43	.98	10.79	20	.000	3.50
Stress	.71	1.82	5.52	1.03	13.03	20	.000	3.25
Burnout	.00	.00	3.52	.68	23.76	20	.000	7.32

Table 2 presents the results for the bivariate analyses. Paired samples T-tests were conducted to analyze the change in scores of the mental health variables from lockdown to post lockdown period. The results demonstrated significant increases in all mental health variables from lockdown to post-lockdown periods including anxiety (p=.003), depression (p<.001), stress (p<.001) and burnout (p<.001).

Table 3 reports the results of the linear multiple regressions examining depression. The results demonstrate that the overall model including sex, control over environment and the interaction term of control over environment by sex was significant (p=.025) and the model explained 21.5% of the variance in depression. While no significant main effects were found, there was a significant interaction effect (OR=.147, p=.044) indicating the impact of control over environment on depression is stronger for males than females.

Table 4 reports on the results of the linear multiple regressions examining stress. The overall model predicting stress with age and control over the environment was significant (p=.013). No significant main effect was found for age (p=.103). However, control over the environment was significant in this model (OR= .607, p=.005), indicating that individuals reporting greater control over the environment were approximately 40% less likely to report stress at the post-lockdown period. The model explained 28% of the variance in stress. Once the interaction of control over environment by age was added to the model, no significant main or interaction effects were found. This may be due to the relatively small sample size as the overall model was significant (p=.040).

In addition, the model predicting stress with number of people living in the household and control over environment was also significant (p=.025). No significant main effect was found for number of people living in the household (p=.297). However, control over the environment was significant (OR=.116, p=.010), indicating that individuals reporting greater control over the environment were approximately 90% less likely to report stress at the post-lockdown period. This model explained 24% of the variance in stress. Once the interaction of control over environment by number of people living in the household was added to the model, no significant main or interaction effects were found. This may again, be due to the relatively small sample size as the overall model was once again significant (p=.049).

The regressions examining the socio-demographic variables and control over the environment did not predict anxiety (see Table 5). The regressions examining socio-demographic variables and control over the environment predicting burnout were also not significant (Table 5).

Table 3.

Multiple Regressions for Predictors of Depression

Variables	Model 1 (n=23)				Model 2 (n=23)			
	β	**t**	**p**	**Adj. R^2**	**β**	**t**	**p**	**Adj. R^2**
Depression			.075	.114			.025*	.215
Sex	.629	1.691	.102		-2.344	-1.623	.117	
control over environment	.047	1.314	.200		-.156	-1.538	.136	
sex X Con.envir.					.147	2.121	.044*	
Depression			.190	.068			.155	.116
Age	.003	.245	.809		.059	1.457	.161	
control over environment	.070	1.855	.078		.157	2.224	.038*	
age X Con.envir.					-.003	-1.440	.166	
Depression			.106	.121			.175	.102
household #	.050	.637	.531		.417	.856	.403	
control over environment	.077	2.094	.049*		.179	1.296	.211	
household #X Con.envir.					-.020	-.763	.455	

Table 4.

Multiple Regressions for Predictors of Stress

Variables	Model 1 (n=23)				Model 2 (n=23)			
	β	**t**	**p**	**Adj. R^2**	**β**	**t**	**p**	**Adj. R^2**
Stress			.063	.125			.143	.092
Sex	.191	.450	.656		.434	.243	.810	
control over environment	.094	2.293	.030*		.110	.879	.387	
sex X Con.envir.					-.012	-.141	.889	
Stress			.014*	.280			.040*	.244
Age	.019	1.787	.089		.029	.647	.525	
control over environment	.124	3.159	.005*		.138	1.808	.086	
age X Con.envir.					-.001	-.225	.824	
Stress			.025*	.240			.049*	.226
household #	-.087	-1.071	.297		.307	.617	.545	
control over environment	.109	2.867	.010*		.217	1.542	.140	
household #X Con.envir.					-.022	-.801	.433	

Table 5.

Multiple Regressions for Predicting Anxiety and Burnout

Variables	Model 1 (n=23)				Model 2 (n=23)			
	β	**t**	**p**	**Adj. R^2**	**β**	**t**	**p**	**Adj. R^2**
Anxiety			.228	.037			.349	.015
Sex	-.752	-.920	.366		.292	.376	.710	
control over environment	.131	1.665	.107		.639	1.126	.270	
sex X Con.envir.					-.101	-.615	.544	
Anxiety			.438	-.013			.495	-.024
Age	-.018	-.668	.512		-.110	-1.018	.322	
control over environment	.082	.836	.413		-.059	-.315	.756	
age X Con.envir.					.005	.881	.389	

Variables	Model 1 (n=23)				Model 2 (n=23)			
	β	t	p	Adj. R^2	β	t	p	Adj. R^2
Anxiety			.362	.006			.393	.007
household #	-.100	-.526	.605		-1.257	-1.078	.294	
control over environment	.125	1.400	.177		-.194	-.588	.563	
household #X Con.envir.					.063	1.006	.327	
Burnout			.988	-.073			.870	.415
Sex	.046	.154	.879		-.947	-.766	.450	
control over environment	.000	-.005	.996		-.068	-.783	.441	
sex X Con.envir.					.049	.828	.415	
Burnout			.966	-.096			.969	-.143
Age	.000	-.031	.975		-.015	-.421	.678	
control over environment	.007	.235	.816		-.015	-.243	.811	
age X Con.envir.					.001	.427	.674	
Burnout							.999	-.157
household #	.006	.094	.926		.018	.047	.963	
control over environment	.002	.081	.936		.006	.053	.958	
household #X Con.envir.					-.001	-.033	.974	

DISCUSSION

This is the first study to examine the mental health consequences of an extended lockdown period during the Covid-19 pandemic on individuals residing in low-income, marginalized, high-risk communities in Guatemala. Importantly, we found significant increases in anxiety, depression, stress, and burnout from the lockdown to the post-lockdown period. We further found that individuals reporting greater control over the environment were significantly less likely to endorse stress at the post-lockdown period. Lastly, we also found that the impact of control over environment on depression is stronger for males than females.

Our findings regarding increased mental health distress post the Covid-19 extended lockdown period emphasize that simply lifting restrictions and expecting individuals to "return to normal life" is not realistic for individuals residing in low-income, marginalized communities. While there is a paucity of information about how mental health will evolve following this public health crisis, the little prospective research that does exist is consistent with our findings of increased mental health consequences post-lockdown including significant stress, depression, irritability, insomnia, fear, confusion, anger, frustration, boredom, and stigma (Brooks et al., 2020; Galea et al., 2020; Hawryluck et al., 2004; Pieh et al., 2021; Wang et al., 2020). Such adverse mental health effects have been found after even just 1 week of isolation and quarantine, particularly in terms of depression, anxiety, stress, and anger (Hennssler et al., 2020). Longer periods of quarantine are associated with even greater severity of symptoms (Brooks et al., 2020; Hawryluck et al., 2004). Additionally, research has found that certain groups are at particular risk for on-going adverse psychological impact including, children and parents, those with a history of psychiatric illness, those with a chronic illness, those who have lost a family member, and, those with lower levels of education (Nobles et al., 2020). However, this is the first study to establish an increased risk of persistent adverse psychological impact of extended lockdown among individuals residing in low-income, marginalized communities. Ensuring the adequate provision of mental healthcare support to individuals struggling with ongoing adverse mental health consequences of extended lockdown periods during covid-19 requires special consideration in communities that are characterized by pre-existing conditions marked by extreme poverty and violence and limited available health and mental healthcare resources. This begs the question, how can the needs of individuals struggling with on-going impaired mental health functioning find the support they need in communities where formal mental healthcare services are sorely lacking or entirely unavailable?

The SPACE (Strengths and Participation to Achieve Capacity and Empowerment) Framework is a model of community capacity building in low resource settings. This framework can serve a guide for addressing the unique challenges in meeting the on-going mental health care needs of individuals in marginalized communities affected by extended lockdown periods.

The SPACE framework is grounded in the strengths perspective, and utilizes a participatory method to achieve capacity and empower communities to engage in developing sustainable solutions to the problems they are confronted with. Particularly relevant for meeting the prolonged mental health needs of individuals experiencing persistent adverse mental health consequences post extended lockdown is the SPACE framework's emphasis on facilitating access to professional development and on-going mobile support and expert consultation as a means to grow the mental healthcare workforce and create a community network that serves to address on-going and emerging needs of the community. Further, the SPACE Framework focuses on capacity building from micro to macro levels of intervention. Through this systems approach, communities actively participate in an initial capacity mapping, identifying existing resources in their own communities, those they could access through existing local networks, and those they need to expand or develop to effectively address the challenges they identify. The SPACE Framework provides a guide for engaging community members in a participatory training process that aims to strengthen existing capacity, foster community wellbeing, and to build networks to participate in developing and implementing effective, sustainable solutions to the complex problems marginalized communities face in providing community members access to adequate mental healthcare. A training-of-trainers (TOT) model is the main tool for implementing the SPACE Framework's participatory approach. The TOT builds community capacity by creating local leadership and professional expertise thereby reducing the dependency of local communities on international "experts" outsiders with restricted understanding of the relevant cultural, social, and economic context of local communities. Further, within the SPACE framework, the TOT model allows for the transfer of knowledge and training capacity to the trainees. As such, communities are empowered to take ownership of the sustainable solutions they design and sustaining and growing a new network of mental healthcare resources where they where formerly lacking. As a result, a safe space is created for addressing ongoing mental health challenges and increasing family and community safety and wellbeing.

One notable finding of our study is that individuals reporting greater control over the environment were significantly less likely to endorse stress at the post-lockdown period. This is largely consistent with previous research regarding self-efficacy. Self-efficacy represents a belief that one is capable of controlling one's own motivation, behavior, and social environment. Perceived self-efficacy not only influences persistence when faced with barriers but also one's degree of recovery from setbacks and one's subsequent behavior. The greater the degree of self-efficacy, the more one will persist in the face of struggles, the greater one's recovery will be from setbacks, and the less impaired subsequent behavior will be. Intervention efforts focused on increasing opportunities for individuals to build their self-efficacy and sense of control over their environment are essential. Proving psycho-education regarding low resource interventions to improve well-being, restore a sense of calmness, and reduce feelings of stress and anxiety (i.e., relaxation techniques, mindfulness, breathing exercises, identifying negative automatic thoughts), for example, may be effective at helping individuals gain a sense of self-regulation and control in an otherwise hectic environment. Indeed, prior research examining the impact of a public service campaign in Guatemala that utilized social media to promote brief activities to support mental health and well-being showed such information and activities are relevant and acceptable to individuals residing in marginalized, high-risk communities.

We also found that control over the environment was related to depression among males but not females. During the Covid-19 pandemic, loss of employment and restricted movement and activity resulted in significant financial strain for many families and caused an undue burden on those who were already struggling with insufficient economic resources to meet daily needs. In Guatemala and other Latin American countries, males are largely responsible for securing employment and are, more often than women, the primary financial providers in families. Women, on the other hand, are more often than males responsible for maintaining the home and caring for children. For these women, lockdown restrictions resulted in increased time at home with children, having partners at home when they formerly would have been out or at work, and the decreased opportunities for social support and socializing with other mothers/women. However, for males, the lockdown forced them into reconfiguring their space and restricting their activities to their own households, establishing novel daily routines, and taking on potentially new responsibilities for children, spouses, and their household. The significant role displacement and loss of identity resulting from extended lockdown restrictions, related loss of employment, and being the provider of the family may have been experienced more adversely among males as compared to females (who were largely able to maintain their traditional role of and identity as care-taker and/or homemaker), thus leading to greater depression.

LIMITATIONS

Methodological limitations related to the current study merit acknowledgement when considering our findings. First, we focused on individuals residing in high-risk communities in a low-income country. Caution should be taken when generalizing the findings to high risk, low-income communities within middle and/or high-income countries as their mental health profile may differ. Second, we examined mental health functioning 2-months prior to the lifting of lockdown restrictions. Further research with longer follow-

up periods are required to understand the on-going impact of extended lock periods on mental health functioning. Third, data was collected via participant self-report and therefore subject to recall bias. However, it has been emphasized that bias in the recall of adverse experiences is not sufficient to invalidate studies that employ this data collection method (Hardt & Rutter, 2004).

CONCLUSIONS

The current study is the first to provide evidence of increased impairment in mental health functioning even after the lifting of strict lockdown restrictions related to the covid-19 pandemic in low-income, high-risk communities. While further research is needed to better understand the factors contributing to on-going mental health challenges, findings suggest it would be imprudent to assume that mental health challenges experienced during extended lockdown will remit once imposed restrictions are lifted. For many, on-going mental health support is needed. Assessment and intervention efforts are likely to benefit from including consideration of the degree of control individuals feel they have over their environment.

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