

Socio-Demographic Influences on Perceived Stress and Mental Health During the COVID-19 Pandemic: A Multinational Study

Syed Irfan Karim¹, Farhana Irfan², Kamran Sattar³, Ashfaq Akram⁴, Tauseef Ahmad⁵, Noel Ayesha Ahmed⁶, Abdullah MA Ahmed⁷ and Syed Yusha Rashid^{*8}

¹Syed Irfan Karim, MD, FRCGP, Associate Professor, Family Medicine, Department of Family and Community Medicine, College of Medicine, King Saud University, Riyadh, Saudi Arabia.

²Farhana Irfan, MCPS, FRCGP, Associate Professor, Medical Education Research and Development, College of Medicine, King Saud University, Riyadh, Saudi Arabia.

³Kamran Sattar, MBBS, PhD, Medical Educator, Department of Medical Education, College of Medicine, King Saud University, Riyadh, Saudi Arabia.

⁴Ashfaq Akram, BDS, PhD, Medical Educator, Department of Medical Education, College of Medicine, King Saud University, Riyadh, Saudi Arabia.

⁵Tauseef Ahmad, MCA, PhD, Researcher, Department of Medical Education, College of Medicine, King Saud University, Riyadh, Saudi Arabia.

⁶Noel Ayesha Ahmed, Bio MedSc, Student, York University, Honors Biomedical Science, Toronto, Canada.

⁷Abdullah MA Ahmed, King Saud University Chair for Medical Education Research and Development, Department of Family and Community Medicine, College of Medicine, King Saud University, Riyadh, Saudi Arabia.

^{8*}Syed Yusha Rashid, Medical Student, College of Medicine, Alfaisal University, Riyadh, Saudi Arabia.

ABSTRACT

The present cross-sectional multinational study explores the effect of perceived stress during the COVID-19 pandemic on various socio-demographic factors, including gender, marital status, age groups, work abilities, social activities, and family relationships from Saudi Arabia, Canada, and Pakistan from April to July 2022. This cross-sectional study investigated perceived stress during the COVID-19 pandemic on various socio-demographic factors, work abilities, social activities, and family relationships. Online questionnaires were distributed to participants in Saudi Arabia, Canada, and Pakistan. Mental health indicators were assessed using the Work and Social Adjustment Scale. Spearman's correlation analysis revealed moderate impairment in working capacity and home management, with a significant effect ($r = .565, p < .001$). A significant association was observed between gender and engagement in leisure activities such as watching movies, indicating influence on mental well-being ($\chi^2(1, N = 295) = 6.83, p = .009$). Analysis of variance (ANOVA) showed significant differences in commitment to home management across four age groups (adolescent, young adult, adult, and mature adult) ($F(3, 294) = 3.887, p = .010$). Significant variations were also found in maintaining relationships with family members among different age groups ($F(3, 294) = 5.506, p = .001$). The findings underscore the association between anxiety and impairment in work and home management activities, and disruptions in leisure activities. These insights highlight the importance of targeted interventions to address mental health challenges during current and future healthcare crises. Further prospective studies are warranted to inform comprehensive intervention strategies and enhance resilience in future global challenges.

KEY WORDS: MENTAL HEALTH, STRESS, COVID-19, SOCIO-DEMOGRAPHIC FACTORS.

Article Information:*Corresponding Author: syr2252005@gmail.com
 Received 02/06/2025 Accepted after revision 19/08/2025
 Published: 30th September 2025 Pp- 120- 126
 This is an open access article under Creative Commons License,
<https://creativecommons.org/licenses/by/4.0/>.
 Available at: <https://bbrc.in/> DOI: <http://dx.doi.org/10.21786/bbrc/18.3.1>

INTRODUCTION

The advent of the COVID-19 pandemic has prompted unprecedented shifts in societal norms, influencing various facets of human behaviour and mental health worldwide. As the virus spread rapidly across the globe, governments implemented stringent measures such as lockdowns, social distancing, and quarantine protocols to curb transmission rates. These measures, albeit crucial for public health, have profoundly altered individuals' ways of life, posing significant challenges to their mental well-being and social interactions.

The interconnectedness between mental health and social behavior during the pandemic era has garnered increased attention from researchers and healthcare professionals. Numerous studies have elucidated the detrimental effects of prolonged isolation, economic strain, and uncertainty on individuals' psychological welfare (Torales et al., 2020). Furthermore, the disruption of daily routines, closure of communal spaces, and limited access to social support networks have exacerbated feelings of loneliness, anxiety, and depression among diverse demographic groups (Gagné et al., 2022).

Observations indicate that individuals aged 65 and above are more susceptible to infection due to compromised immunity and the presence of multiple co-morbidities (Monahan et al., 2020). Younger people are more likely to experience depression, stress, anxiety, and a negative outlook on life (Cohen et al., 2014). Moreover, it has been seen that the younger age group between 18-30 years has reported greater psychological distress during pandemics as compared to other age groups (McGinty et al., 2020). It has been seen that older age groups may also experience more social separation and solitude due to the COVID-19 Pandemic, which ultimately affects their mental health (WHO, 2020). Research indicates that the mental well-being of the global populace has been impacted during pandemics (Ahmad et al., 2020). There is another study reporting that females with poor self-related health status have shown medium to severe anxiety, depression, and stress ranks (Wang et al., 2020).

While the pandemic has underscored the importance of maintaining social connections, it has also catalysed the adoption of virtual platforms for communication and social interaction (Hards et al., 2022). Despite serving as a lifeline for many individuals during periods of physical distancing, the efficacy of digital mediums in mitigating social isolation and preserving mental health remains a subject of ongoing investigation (Abdulghani et al., 2022). Considering these developments, there is a compelling need for comprehensive,

multicenter studies that examine the intricate interplay between mental health and social behavior amidst the pandemic. By elucidating the diverse manifestations of psychological distress, such research endeavors hold the potential to inform targeted interventions and policy initiatives aimed at promoting resilience and well-being on a global scale. Despite the growing body of literature examining the impact of the COVID-19 pandemic on mental health and social behavior, there remains a notable research gap in the understanding of these phenomena across diverse demographic groups and geographical regions.

Existing studies predominantly focus on specific populations or employ single-center methodologies, limiting the generalizability of findings and obscuring potential variations in the psychological responses to the pandemic. Therefore, through a collaborative approach, we aim to contribute valuable insights to the ever-expanding field of pandemic psychology and foster evidence-based practices for enhancing mental health outcomes in the post-pandemic landscape. Thus, we explored the effect of perceived stress during the pandemic on gender, marital status, different age groups, work abilities, social activities, and relationships with family members.

METHODOLOGY

This study employed a cross-sectional design to investigate the effect of perceived stress during the COVID-19 pandemic on various socio-demographic factors, work abilities, social activities, and relationships with family members. Participants were recruited from diverse demographic groups across North America, the Middle East, and Southeast Asia from April to July 2022. Inclusion Criteria: Individuals aged 18 years or older, fluent in the study language (English), and willing to provide informed consent. Exclusion Criteria: Individuals under the age of 18 or unable to comprehend English, as this could compromise the accuracy and reliability of their responses. Incomplete questionnaire submissions were also excluded from the final analysis. Additionally, individuals who did not provide informed consent or withdrew their consent at any point were not included.

Participants were recruited using an online questionnaire that was disseminated through social media platforms. The two primary platforms utilized in the study were Google Docs and WhatsApp. The Work and Social Adjustment Scale (WSAS) (Mundt et al., 2002), which is used to quantify functioning impairment, served as the foundation for mental health indicators in this study. Five items on this self-report form evaluated impairment in the five aspects of life: work, home management, social leisure activities, private leisure activities, and family and relationships. We examined the different influences of socio-demographic characteristics and impairment in functioning with WSAS as indicators of mental health among three different continents at one time.

The first part of the questionnaire includes questions on socio-demographic characteristics (age, gender, marital status, place of residence, religion, family size, occupation, level of education, average household income, family income minimum wage,

and living in an owned or rented house). The second part of the questionnaire was developed to understand the participants' experiences, such as the current and long-term effects of the current pandemic on mental health, pressures during the current situation, and activities that helped with mental well-being during the pandemic.

Descriptive statistics were computed to characterize the study sample in terms of demographic variables, perceived stress levels, work abilities, social activities, and relationships with family members. Inferential statistical analyses, such as chi-square tests and t-tests, were conducted to examine the associations between perceived stress and the previously mentioned variables while controlling for potential confounders. Subgroup analyses were performed to explore variations across gender, marital status, age groups, and work arrangements. Statistical significance was set at $p < 0.05$. This study received approval from the Institutional Review Board, College of Medicine, King Saud University, Riyadh, Saudi Arabia (Reference No. E-21-5897). All the participants provided informed consent before participation, and all data were anonymized to ensure confidentiality and privacy.

RESULTS AND DISCUSSION

Married participants ($n=200$) with postgraduate qualifications ($n=114$ (79.7%)) were the highest who participated in the study. The least number of participants based on marital status was divorced / widowed. However, they were highly qualified. Considering the educational level and marital status, a higher number of participants with high school certificates ($n=26$ (55.3%)) were not married. [Table 1]

Table 1. Demographic characteristics

Characteristics Total No (295)		N (%)
Age	15-25	74 (25.1%)
	25-35	69 (23.4%)
	35-45	79 (26.8%)
	45+	73 (24.7%)
Gender	Males	101 (34.2%)
	Females	194 (65.8%)
Education level	High School	47 (15.9%)
	Undergraduate	105 (35.6%)
	Postgraduate	143 (48.5%)
Social Status	Single	79 (26.8%)
	Married	200 (67.8%)
	Divorced	9 (3.1%)
	Widowed	7 (2.4%)
Countries	Middle East	118 (40%)
	Southeast Asia	111 (37.6%)
	North America	66 (22.4%)
type of housing	Own house	153 (51.9%)
	Rented house	142 (48.1%)

The anxiety level of participants was observed across three continents. It was found that almost forty per cent of the people had uncertainty about their future and felt anxiety about their mental health. [Fig.1] When asked about feelings regarding the current COVID-19 situation, almost thirty per cent of participants expressed that whatever is happening is happening, and we must figure out how to proceed. [Fig.2]

Figure 1: Top concerns about the effects of the current pandemic on mental health.

What are your top two concerns about the effects of the current pandemic on your mental health?

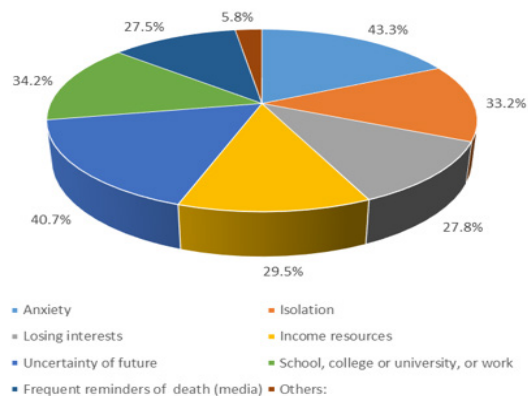
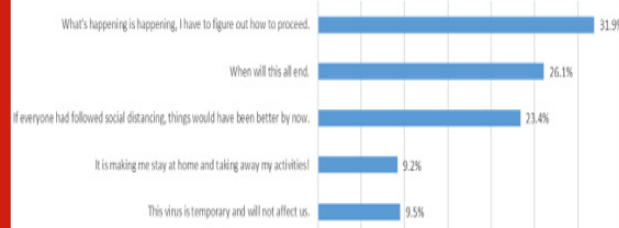


Figure 2: Feelings best described regarding the current COVID-19 situation.

Chart Title



A chi-square test of independence was executed to observe the association between gender and physical activity as a mental wellbeing cure during the COVID era. Men are more active in physical activity compared to women, and this gender difference was found to be statistically significant ($\chi^2 = 5.33$, $p = .021$). The participants also watched movies to get relief from pandemic depression. There was a significant association between watching movies and gender for mental wellbeing, ($\chi^2 = 6.83$, $p = .009$) However, listening to news about COVID from the media ($\chi^2 = 2.39$, $p = .122$) and adopting new hobbies ($\chi^2 = 2.05$, $p = .152$) had no significant association with restoring mental wellbeing (table 2). In our current study, we observed that during the COVID-19 pandemic, people primarily engaged in physical activities and consumed online content such as movies, compared to media exposure and adopting new habits for maintaining mental health.

This suggests that factors beyond media consumption or the adoption of new hobbies may not play a more significant role

in restoring mental wellbeing during challenging times like the COVID-19 pandemic [Table 2].

Table 2: Maintaining the well-being of mental health through different activities.

Mental Wellbeing during COVID-19		Gender		X ² (p)
		Male N (%)	Female N (%)	
Physical activity	No	63 (62.4%)	146 (75.3%)	5.33 (0.021)
	Yes	38 (37.6%)	48 (24.7%)	
Media Exposure	No	68 (67.3%)	147 (75.8%)	2.39 (0.122)
	Yes	33 (32.7%)	47 (24.2%)	
Movies / TV watching	No	80 (79.2%)	125 (64.4%)	6.83 (0.009)
	Yes	21 (20.8%)	69 (35.6%)	
New Hobbies	No	82 (81.2%)	143 (73.7%)	2.05 (0.152)
	Yes	19 (18.8%)	51 (26.3%)	
Staying calm	No	57 (56.4%)	132 (68.0%)	3.88 (0.049)
	Yes	44 (43.6%)	62 (32.0%)	
Staying connected	No	51 (50.5%)	96 (49.5%)	0.027 (0.869)
	Yes	50 (49.5%)	98 (50.5%)	

Spearman's rho correlation between working capacity (more likely office working) and home management (shopping, washing, cooking, etc.) was moderately impaired, and the effect was significant ($r = .565$, $p < .001$). This showed that COVID has badly affected the working capacity of participants and their home management activities. Other variables, such as social activities

and leisure activities, were also weakly impaired, and the disability was significant ($r = .267$, $p < .001$). There was a positive moderate effect on keeping the family relationships and leisure activities ($r = .514$, $p < .001$). In summary, it can be said that COVID-19 had a thorough effect on all types of activities. [Table 3].

Table 3: Correlation of Impairment in working capacity, home management, social activities, leisure activities, and family members' relationships because of the Pandemic.

Correlation	Working capacity	Home management	Social activities	Leisure activities	Family relationships
Working capacity	1				
Home management	0.565**	1			
Social activities	0.234**	0.312**	1		
Leisure activities	0.335**	0.495**	0.267**	1	
Family relationships	0.387**	0.458**	0.405**	0.514**	1

** . Correlation is significant at the 0.01 level (2-tailed).

The hypothesis tests whether the different age participants experienced the same workability or not. The participants were allocated into four age groups (Group 1: (15-25 years), Group 2: (26-35 years), Group 3: (36-45 years), Group 4: (46+ years). A one-way between-subjects ANOVA was run with four groups of participants as independent variables and their impairment regarding home management, retaining relations with family members, ability to work, and leisure activities as the Dependent variable [Table 4].

Similarly, the mean score of adult groups ($n = 69$, $M = 4.25$, $SD = 2.654$) was significantly different from the mature adult group (46+ years) ($n = 73$, $M = 3.04$, $SD = 2.276$; $p = .024$). However, there was no significant difference ($P = .319$) in the mean score of impairment in home management between age group 2 (young) and age group 3 (adult young) ($n = 79$, $M = 3.48$, $SD = 2.782$). [Table 4].

Table 4: Analysis of Variance (Pandemic impaired working capacity, home management, social activities, leisure activities, family relations).

Characteristics	Age	N	Mean(SD)	95% CI of the difference		ANOVA (df) F and P
				Lower	Upper	
Work capacity	15-25	74	3.77(2.6)	3.15	4.39	1.40 (0.241)
	25-35	69	4.03(2.04)	3.43	4.63	
	35-45	79	3.23 (2.1)	2.74	3.71	
	45+	73	3.51 (2.6)	2.89	4.12	
Home management	15-25	74	2.96 (2.2)	2.43	3.49	3.88 (0.010)
	25-35	69	4.25 (2.6)	3.61	4.88	
	35-45	79	3.48 (2.7)	2.86	4.10	
	45+	73	3.04 (2.2)	2.51	3.57	
Social activities	15-25	74	5.66 (2.1)	5.18	6.15	1.14 (0.332)
	25-35	69	5.77 (2.3)	5.21	6.33	
	35-45	79	5.14 (2.5)	4.58	5.70	
	45+	73	5.59 (2.1)	5.11	6.07	
Leisure activities	15-25	74	2.45 (2.3)	1.89	3.00	1.92 (0.126)
	25-35	69	3.30 (2.7)	2.64	3.97	
	35-45	79	3.10 (2.5)	2.52	3.68	
	45+	73	3.33 (2.4)	2.76	3.90	
Relations with Family members	15-25	74	3.76 (2.5)	3.17	4.34	5.50 (0.001)
	25-35	69	4.65 (2.8)	3.98	5.33	
	35-45	79	2.96 (2.6)	2.38	3.55	
	45+	73	3.40 (2.4)	2.82	3.98	

This multicenter research investigated the effect of perceived stress during the pandemic lockdown among adults across three continents, focusing on associations with demographic variables like gender, marital status, age, and family/work dynamics. It was found that around 50% experienced mental health-related anxiety. Married individuals reported more financial worries and future uncertainty than singles or divorcees. Another study found a greater decline in the emotional well-being of married people as compared to singles during this pandemic (Arafat et al., 2020; Sancassiani et al., 2024).

One of the studies reported that because of the pandemic, social life gets more restricted, and more confinement at home, which changed the whole family dynamics, so more arguments and less marital harmony (Abdulghani et al., 2023). Pandemic confinement affected family dynamics through more parental expectations from children, more expectations from either spouse, more domestic violence, or less mental harmony.

On the contrary, this study also showed that among married couples, the majority didn't perceive any long-term effect on their mental health, which seems to be a healthy outcome. Most married participants (n=200) held postgraduate degrees, which could be the

reason that no long-term effects of this stress persist in their daily lives after the pandemic ended. Overall, male respondents (n =49; 48.5%) of different age groups considered no long-term effect of the pandemic on their mental health. This study also found that the pandemic had impaired home management among different age groups. Young adults (15–25) faced more isolation and distress. Similar findings were reported by studies elsewhere in which all these factors are associated with poor psychological well-being (Mushtaq et al., 2014; Alrashed et al., 2022; Mak et al., 2023).

Additionally, younger adults also experienced the impact of social isolation during the pandemic, even though middle-aged and older adults were already habitual living alone. Similar findings were reported by another study in which young adults reported poor mental health outcomes, probably due to high professional demand, more young parental duties, and a volatile economy (Arndt et al., 2006; Connor et al., 2022). It was also found that there was a significant difference in maintaining relationships with family members between the four age groups ($P = .001$). All age groups usually come across different types of social support. This mainly depends on the community and the social environment, and how they respond in times of need. There is a need to pay special attention and provide good and focused social support to

older age groups during the pandemic. Mental health resilience training helps to manage complex interactions and anticipate and manage stressors for vulnerable individuals, challenging any age boundaries. Fear during the pandemic significantly affected work, leisure, and home management ($p=0.001$). Changes in work hours, such as remote work during family time, disrupted both home and job life.

Another study has reported that fewer working hours due to pandemic restrictions (but more job obligations) cause a lot of disruption in routine work, with even fears of losing the job and ultimately more mental distress (Koh et al., 2020). This can be further explained in another report, in which 28% were affected by changes in their employment contract and 49% by changes in the quantity of work (Ahrendt et al., 2020). We also observed that in this study, social activities and leisure activities were significantly impaired, but the disability was significant ($r=267$, $p < .001$). This disability leads to a major impact on people's daily leisure routines, like exercising in gyms, playing video games, music, or using any other social media tools. Similarly, mixed patterns were seen in other studies found more engagement in leisure activities because of staying more time at home and having less travel time (Meyer et al., 2020).

Another study also showed significant variations in their exercise routine disruptions and highlighted a great deal of differences before and during the pandemic (Furman et al., 2023). Similarly, in a study in Qatar with 1114 people, it was reported that less physical activity led to a more sedentary lifestyle during the pandemic (Hidalgo-Andrade et al., 2021). So social isolation worsened anxiety, apathy, and detachment. This study reveals that passive social involvement with fewer leisure activities instigates a feeling of alienation; this ultimately affects health among all age groups during the pandemic. Longer-term studies are needed to assess the mental health burden and guide interventions for future crises.

LIMITATIONS

Limitations of this study include potential sampling bias inherent in online recruitment methods, reliance on self-report measures susceptible to social desirability bias, and the cross-sectional nature of the study design, precluding causal inferences. Additionally, the generalizability of findings may be limited by the study's reliance on convenience sampling and the exclusion of individuals with limited internet access or digital literacy.

CONCLUSION

The study found that the inability to do tasks related to working and managing the home was linked to anxiety symptoms. Moreover, certain activities were linked to degradation in social and private leisure activities during the pandemic. These findings highlight the broader impact of perceived stress on functional impairment across multiple domains. Longer-term prospective research is required to better understand the impact of psychopathology on various communities and social functioning, as well as to develop

effective intervention techniques in response to the present and upcoming health problems.

Data Availability: All data will be available with the corresponding author on reasonable request

Conflict of Interest: None

Funding Source: None

Authors' Contribution: The following authors have made substantial contributions to the manuscript as under: Karim SI: Study conception, design, writing, manuscript revision, and reviews. Irfan F: Literature review, initial draft, and revision of subsequent drafts. Sattar K: Drafting, writing revision, and language editing of manuscript drafts. Akram A: Statistical analysis, results write-up, and critical revision of the manuscript. Ahmad T: Literature review, final editing, and submission. Ahmed NA: Data collection and language editing of manuscript drafts. Ahmed AMA: Statistical analysis. Rashid SY: Final edit, review, and journal submission.

All authors agree to be accountable for all aspects of the work in ensuring that any questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval: This study received approval from the Institutional Review Board, College of Medicine, King Saud University, Riyadh, Saudi Arabia (Reference No. E-21-5897). All the participants provided informed consent before participation, and all data were anonymized to ensure confidentiality and privacy.

REFERENCES

- Abdulghani AH, Ahmad T, Abdulghani HM (2022) The impact of COVID-19 pandemic on anxiety and depression among physical therapists in Saudi Arabia: a cross-sectional study. *BMC Medical Education* Vol 22 No 1 Pages 751.
- Abdulghani HM, Marwa K, Alghamdi NA, Almasoud RN, Faraj AT, Alshuraimi AF, Mohamed KM, Alnafisah OS, Ahmad T, Ahmed MZ, et al (2023) Prevalence of the medical student syndrome among health professions students and its effects on their academic performance. *Medicine* Vol 102 No 43:e35594.
- Ahmad A, Rahman I, Agarwal M (2020) Early psychosocial predictors of mental health among Indians during coronavirus disease 2019 outbreak. *Journal of Health Sciences* Vol 10 No 2 Pages 147–156.
- Ahrendt D, Cabrita J, Clerici E, Hurley J, Leončikas T, Mascherini M, Riso S, Sándor E, et al (2020) Living, working and COVID-19. Vol 2020.
- Alrashed FA, Alsubiheen AM, Alshammari H, Mazi SI, Al-Saud SA, Alayoubi S, Kachanathu SJ, Albarrati A, Aldaihan MM, Ahmad TJS, et al (2022) Stress, anxiety, and depression in pre-clinical medical students: prevalence

and association with sleep disorders. *International Journal of Environmental Research and Public Health* Vol 14 No 18:11320.

Arafat SY, Alradie-Mohamed A, Kar SK, Sharma P, Kabir R (2020) Does COVID-19 pandemic affect sexual behaviour? A cross-sectional, cross-national online survey. *Psychiatry Research* Vol 289 Pages 113050.

Arndt V, Merx H, Stegmaier C, Ziegler H, Brenner H, et al (2006) Restrictions in quality of life in colorectal cancer patients over three years after diagnosis: a population based study. *European Journal of Cancer* Vol 42 No 12 Pages 1848–1857.

Cohen M, Baziliansky S, Beny A (2014) The association of resilience and age in individuals with colorectal cancer: an exploratory cross-sectional study. *Journal of Geriatric Oncology* Vol 5 No 1 Pages 33–39.

Connor C, De Valliere N, Warwick J, Stewart-Brown S, Thompson A, et al (2022) The COV-ED Survey: exploring the impact of learning and teaching from home on parent/carers' and teachers' mental health and wellbeing during COVID-19 lockdown. *BMC Public Health* Vol 22 No 1:889.

Furman CR, Volz SC, Rothman AJ, et al (2023) Contextual disruption and exercise: mapping changes to exercise routines and engagement during the COVID-19 pandemic. *Psychol Health* Vol 38 No 9 Pages 1215–1233.

Gagné T, Schoon I, McMunn A, Sacker A (2022) Mental distress among young adults in Great Britain: long-term trends and early changes during the COVID-19 pandemic. *Social Psychiatry and Psychiatric Epidemiology* Vol 57 No 6 Pages 1261–1272.

Hards E, Loades ME, Higson-Sweeney N, Shafran R, Serafimova T, Brigden A, Reynolds S, Crawley E, Chatburn E, Linney C, et al (2022) Loneliness and mental health in children and adolescents with pre-existing mental health problems: A rapid systematic review. *The British Journal of Clinical Psychology* Vol 61 No 2 Pages 313–334.

Hidalgo-Andrade P, Paz C, Hermosa-Bosano C, García-Manglano J, Sádaba-Chalezquer C, López-Madrigal C, Serrano C, Fernández-Zapico A, et al (2021) Psychological factors, leisure activities, and satisfaction during the COVID-19 pandemic: A cross-sectional study in eleven Spanish-speaking countries. *International Journal of Environmental Research and Public Health* Vol 18 No 21:11104.

Koh D, Goh HP, et al (2020) Occupational health responses to COVID-19: What lessons can we learn from SARS?

Journal of Occupational Health Vol 62 No 1:e12128.

Mak HW, Bu F, Fancourt D (2023) Mental health and wellbeing among people with informal caring responsibilities across different time points during the COVID-19 pandemic: a population-based propensity score matching analysis. *Perspectives in Public Health* Vol 143 No 5 Pages 275–284.

McGinty EE, Presskreischer R, Han H, Barry CL (2020) Psychological distress and loneliness reported by US adults in 2018 and April 2020. *Jama* Vol 324 No 1 Pages 93–94.

Meyer J, McDowell C, Lansing J, Brower C, Smith L, Tully M, Herring M, et al (2020) Changes in physical activity and sedentary behavior in response to COVID-19 and their associations with mental health in 3052 US adults. *International Journal of Environmental Research and Public Health* Vol 17 No 18:6469.

Monahan C, Macdonald J, Lytle A, Apriceno M, Levy SR (2020) COVID-19 and ageism: How positive and negative responses impact older adults and society. *The American Psychologist* Vol 75 No 7 Pages 887–896.

Mundt JC, Marks IM, Shear MK, Greist JM (2002) The Work and Social Adjustment Scale: a simple measure of impairment in functioning. *The British Journal of Psychiatry* Vol 180 No 5 Pages 461–464.

Mushtaq R, Shoib S, Shah T, Mushtaq S, et al (2014) Relationship between loneliness, psychiatric disorders and physical health? A review on the psychological aspects of loneliness. *Journal of Clinical and Diagnostic Research* Vol 8 No 9:WE01.

Sancassiani F, Cossu G, Cantone E, Romano F, Perra A, Urban A, Pinna S, Del Giacco S, Littera R, Firinu D, et al (2024) The stability of social and behavioral rhythms and unexpected low rate of relevant depressive symptoms in old adults during the COVID-19 pandemic. *Journal of Clinical Medicine* Vol 13 No 7.

Torales J, O'Higgins M, Castaldelli-Maia JM, Ventriglio, A (2020) The outbreak of COVID-19 coronavirus and its impact on global mental health. *International Journal of Social Psychiatry* Vol 66(4) Pages 317–320.

Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC (2020) Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health* Vol 17 No 5 Pages 1729.

WHO (2020) Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020. In: World Health Organization; 2020.