Effects of perceived social isolation, fear of social isolation and gratitude during COVID-19 pandemic on anxiety in Malaysia

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Abstract

Background: The COVID-19 pandemic compelled many countries including Malaysia to impose movement restrictions to curb spreading the virus. Evidence shows that prolonged isolation has negative effects on both physical and mental health.

Objective: Our aims were to examine (1) the mediating effect of perceived social isolation (SI) and fear of social isolation (FSI) on the relationship between gratitude and anxiety, and (2) to explore the moderating effect of age, education and socioeconomic status on the mediation model.

Methods: We collected data from 427 participants currently living in Malaysia during the movement restriction order (Mage = 37.90, SD = 16.51, 313 females) from an online survey containing questions pertaining to isolation and gratitude.

Results: were similar for FSI in that it was significant for middle aged and not significant for older adults (all CIs does not include zero). However the mediation effect was not significant for young adults (B = -.020, ? = -.011, 95% bootstrap CI [-.066, .016]). When we examined the moderating effect of education and SES in the parallel mediation model, results showed that the mediation effect of SI and FSI for those with lower levels of education was significant for all SES levels (all CIs did not contain zero). As for those with medium levels of education, the conditional indirect effect of SI and FSI was significant only for low and medium levels of SES but not for high SES.

Conclusions: Our findings highlight the importance of having some coping mechanism and social connection during the pandemic to have higher wellbeing and quality of life, especially for middle-aged sample and people from low education and SES background. Clinical Trial: None

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wellbeing and quality of life, especially for middle-aged sample and people from low education and SES background.

Keywords: COVID-19; anxiety; perceived social isolation; fear of social isolation; gratitude; socioeconomic status; education

Introduction

Almost no country has been spared from the devastating effects of the SARS-CoV-2 virus (severe acute respiratory syndrome coronavirus 2) with over 3 million deaths in 219 countries and territories worldwide as of April 2021. Apart from physical health complications, the COVID-19 pandemic has been reported to negatively affect mental health[1–3]. This impact on mental health is not unusual as we have observed similar negative consequences in previous global pandemic such as the SARS outbreak in 2003[4] and 2008[5], and in natural disasters e.g. earthquake[6].

Early evidence reported psychological distress, depressive symptoms and anxiety across various age groups globally in the early days of the pandemic[7]. However, not much is known about mental health outcomes in other less developed parts of the world e.g. Malaysia. Although it is not likely that developing nations are spared from the psychological distress, developing nations have a harder time in managing the impact due to weaker economy and less than ideal healthcare systems[8,9].

Perceived Social Isolation (SI) and Fear of Isolation (FSI) as Mediators of the Relationship between Gratitude and Anxiety (Model 1)

Social isolation. To curb infection, many governments imposed physical distancing measures that hindered many social activities resulting in involuntary physical and social isolation that might contribute to increased fear and anxiety. A recent paper showed the detrimental effect of isolation on traumatic stress (TS), in that indirect effect of perceived vulnerability COVID on TS through COVID-19-related worries was stronger for participants who reported greater SI[10]. The loss or reduced connections with others has been linked to poor health and well-being[11], more so for some

specific groups e.g. children and adolescents, older adults, minority groups, those from lower socioeconomic groups, females and people with pre-existing mental health conditions[12].

Fear of social isolation. During the SARS outbreak, people reported increased anxiety in relation to returning to the workplace, hygiene, public spaces[5] which subsequently led to a reduction in social interactions. The current COVID-19 situation is now well into the third or fourth wave, and many expects this situation to exacerbate symptoms of poor mental health[2]. Additional worry may also include fear of future social isolation from their friends "fear of social isolation". One way is to maintain social networks online to cope with feelings of SI as it may help ease boredom[13], and as a coping mechanism when 'stuck' with unsupportive family members[14].

Gratitude. Gratitude is a type of life orientation towards identifying, noticing and appreciating the positivity in life[15], and is interdependent on having social interactions with others[16]. Caputo[17] reported that gratitude accounts for almost 20% in loneliness when controlling for other variables such as social desirability, well-being (subjective happiness and life satisfaction) and socio-demographic characteristics. Positive effects of gratitude on mental health has been reported in some studies, in that having higher gratitude were associated with lower self-reported levels of loneliness which in turn predicted more favorable self-reported physical health symptoms[18]. Lies and colleagues reported that those with higher levels of gratitude had lower posttraumatic stress symptoms eight months later in the 2009 Sumatra earthquake[19]. Gratitude intervention studies have reported improvement in life satisfaction and a reduction in negative affect and depression, and the protective effect was demonstrated in both young adults[20] and older adults[21]. Ni et al. further reported that young adults with good social support had partially mediated the relationship between gratitude and loneliness[20]. When individuals develop strong bonds and connection with others, they feel less isolated from others[22] and less fear of exclusion from group[23], in which results in higher psychological well-being[24]. That said, there is still a lack of literature investigating the impact of gratitude on mental health 'anxiety' during the COVID-19 pandemic.

Other factors such as SI and FSI may also influence anxiety[25] and that managing both may mediate the effect on anxiety. SI is an inevitability during this pandemic and the mental health consequences associated with it may remain for long[2]. Due to constantly changing public health rules and governmental decisions on movement[26], people are likely to fluctuate between periods of isolation "lockdown" and periods of freer social movement (easing of movement restrictions) when the disease is more "controlled" which may further exacerbate FSI worries. The severity of these mental health outcomes highlights the importance of managing SI and FSI to prevent a mental health crisis on top of the pandemic, and that gratitude may be the key in encouraging helpful behaviors to reduce feelings of SI.

Exploring Sociodemographic Variables as Moderators of the Indirect Relationship between Gratitude and Anxiety (Model 2)

Age. Age difference in gratitude has been argued to differ across the lifespan and priorities[27]. In young adolescents, gratitude was not significant to feeling negative affect[28] but in young adults, those with more gratitude had higher life satisfaction[29]. Older adults were reported having higher gratitude compared to middle-age and young adults[27]. Some posited that increased gratitude in older adults is related to time left in life, and increased willingness to experience more positivity.

When comparing the experiences of young adults and late middle-age adults, young adults reported experiencing twice as many days feeling lonely and isolated as compared to the late middle-age adults[30]. A global study reported that younger adults are at a greater risk of poor mental health especially with increased feelings of loneliness which could be attributed to isolation[3]. Furthermore, their social isolation experience was related to different factors; connectedness of the social network and close network ties were more relevant for young adults and late middle-age adults respectively. The result suggests the different age cohorts may anchor their perception of SI on different types or aspects of social relationships. Given mental health is associated with SI across the lifespan[31,32], this presents a curious line of inquiry concerning how individuals of different age groups may potentially

experience SI differently during the pandemic, which in turn may also then affect their mental health differently. We suspect that the differences in SI experience may also be revealed in their experience of anxiety.

Education and SES. Other factors such as education level and socio-economic status (SES) may influence how gratitude is expressed and subsequently effect health and wellbeing. Bono et al. reported that compared to high-education, the low-education participants had expressed higher gratitude and that this contributed to better academic performance[33], suggesting that gratitude practices are different between education levels. Similar to education, SES may also play a role in how individuals from high or low SES backgrounds practices gratitude. Hartanto et al. reported significant associations between SES (measured from education and income) and an inflammatory biomarker among individuals with low dispositional gratitude but not in high gratitude group[34], suggesting that gratitude may function as a possible psychological resource in managing the negative effects of SES disparities on physical health.

Education level and SES have also been found to be associated with perceptions of SI which also has an effect on health. Evidence has shown that those from low SES had higher prevalence of SI and loneliness compared to medium or high SES[35] and those lower levels of education was associated with higher anxiety and depression[36]. Shankar et al. reported that low SES and lower education participants had higher SI and slower walking speed compared to higher SES[37]. They posited that the conditions or resources associated with different SES levels may offset or facilitate the influence of their perception of SI or loneliness on an individual's physical health. It is possible that a similar outcome i.e. limited resources often associated in low education and SES individuals may be found in increased anxiety, given the relationship between SI and mental health has been established[38].

This study

Our aim was to examine the relationships between anxiety, gratitude, perceived social isolation and fear of social isolation in the Malaysian population during restricted movement order "lockdown". Empirical evidence suggests that those with lower perceived SI and FSI should have lower anxiety, and that those with higher gratitude will experience lower anxiety and lower perceived SI. We hypothesized that perceived SI and FSI would mediate the relationship between gratitude and anxiety. Following empirical evidence on SI and FSI on anxiety, we explored other socio-demographic variables e.g. age, education and SES which may explain the variance in anxiety and gratitude.

Methods

Participants

A total of 479 respondents participated in this survey. We removed a total of 52 respondents for not meeting specific eligibility criteria; below 18 years old (n = 1), non-residents (n = 51), leaving us a final sample of 427 respondents for analyses. Out of the 427 respondents, there were 313 females with a mean age of 37.90 years (SD = 16.51) (see table 1). Participants were recruited from social media posts and word of mouth references. We obtained ethics approval from Sunway University Research Ethics Committee (SUREC2020/053) and participants provided consent on the website before completing the survey.

Table 1

Demographic Characteristics of Participants (n=427)

		n	%
Gender			
	Female	313	73.3
	Male	114	26.7
Age (18 to 76 years old)			
	18 – 30	194	45.4
	31 – 59	167	39.1
	60 and above	66	15.5
Marital status			
	Single	233	54.6
	In a relationship	177	41.5
	Prefer not to say	17	4.0
Highest educational attainment			
	Completed postgraduate	105	24.6
	Completed undergraduate	240	56.2
	Completed high school	79	18.5
	Completed primary school	1	.2
	Did not finish school	2	.5
	10 (top)	3	.7

Measures/Procedure

All participants completed a set of questionnaires on their demographic status, subjective levels of socioeconomic status (SES), gratitude, Hospital Anxiety and Depression Scale (HADS), SI, and FSI. Participants completed the demographics and HADS before moving on to others. The order of gratitude, SI, and FSI were randomised for each participant.

Gratitude. This scale had three items rated on a 5-point scale from 1 = Strongly disagree to 5 = Strongly agree[39]. Total score was obtained by summing the scores of three items, where higher score represents greater feeling of gratitude gratitude. Example of the question was “I have much to be thankful for”.

Anxiety. The 14-item HADS consists of two subscales – Anxiety and Depression – with seven items each[40]. For this study, we included the Anxiety subscale only. The score of each item ranged between 0 and 3, and total score was obtained by summing up individual score from each item after adjusting the three items (Q3, Q7, and Q13) that were reversed score. Example of the item was “I feel tense or wound up”. Zigmond & Snaith[40] noted that a score of 7 and below is considered normal, 8 to 10 as borderline, and 11 and above as a definite case of anxiety.

Perceived Social Isolation. This was a 3-item questionnaire to assess participant’s SI in present time[41]. An example of this item was “How often do you feel that you lack companionship?”. Each item was coded from 1 = none at all to 5 = a great deal, and total score was calculated by summing up score of all three items, in which higher score indicates higher SI.

Fear of Social Isolation. This questionnaire was intended to measure participant’s perceived FSI in the future[42]. This 5-point Likert scale contained five items, ranging from 1 = strongly disagree to 5 = strongly agree. Example of an item is “It is scary to think about not being invited to social gatherings by people I know”. The total score was summed up for all five items and a higher total

score indicated a higher FSI.

SES. We used a subjective measure of SES[43] to capture the large diversity in our sample. Objective SES does not include other factors (i.e. ethnicity and rurality) that are related to individual status in the society[44] which helps us to understand how an individual perceived themselves in a community and a nation. Participants rated themselves on a ladder with ten rungs from 1 (lowest) to 10 (highest) SES with the following instruction: "Imagine a ladder. This ladder pictures how the society in your country is set up. At the top of the ladder are the people who have the most money, most education, and most respected jobs. At the bottom are the people who have the least money, least education, and least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top, and the lower you are, the closer you are to the people at the very bottom. Where would you place yourself on this ladder? Please select a number to represent "on the rung" where you think you stand at this time in your life, relative to others." A higher number denotes a higher perceived SES.

Data Analysis

We first analyzed our data for normality and outliers. Shapiro-Wilk test indicated non-normally distributed data for gratitude, perceived social isolation, fear of social isolation and anxiety (all *Ps* < .001), hence we used bootstrap analyses. Further, there was no significant influential outlier based on boxplots and no other problems such as missing values, multicollinearity.

We performed parallel mediation analysis (Model 4) and moderated mediation analyses (model 75) on SPSS version 25 with PROCESS v3.4[45]. For parallel mediation, we included anxiety as outcome variable, gratitude as predictor variable, and SI and FSI as mediators. Then, we tested moderated mediation with similar variables in the parallel mediation with age as moderator. We repeated this again with education and SES as moderators simultaneously. For the moderated mediation analysis, age and SES were mean-centered (i.e., individual score minus mean score). For

age, the indirect effect referred to three centerings: young (mean – 1SD = 16.51), middle-aged (mean = .00) and older (mean + 1SD = 16.51) adults, and for SES, the indirect effect was examined at: low (mean – 1SD = -1.37), medium (mean = .00) and high (mean + 1SD = 1.37). Unlike age and SES, education was examined at low (completed secondary school), medium (completed undergraduate) and high (completed postgraduate) levels.

The significance of the indirect effects of SI and FSI on anxiety through our proposed mediators was determined using a percentile bootstrap analysis with 5000 samples. If the upper and lower boundaries of the CI do not include zero, the moderated mediation effect is considered significant. As SPSS does not explicitly include the index of moderated mediation for this model, the conditional indirect effects (refers to the moderated mediation relationship) were examined in order to further probe the moderated mediation effect.

Results

Preliminary analyses

Bivariate correlations for our main variables; gratitude, anxiety, SI and FSI, and socio-demographic variables: age, education, and SES are reported in Table 2. The results showed that there was a significant negative correlation between gratitude and anxiety, r = -.18, P < .001. Significant negative relationships were also found between gratitude and SI, r = -.233 and FSI, r = -.183 (both Ps < .001). SI and FSI were positively related to each other, r = .508, P < .001.

Table 2

Means, Standard Deviations, and Bivariate Correlations among Study Variables

Variables	1	2	3	4	5	6	7	*M*	*SD*
1. Gratitude (.725)	-	-.180**	-.233**	-.183**	.237**	.161**	.121*	12.096	2.226
2. Anxiety (.852)		-	.506**	.413**	-.384**	-.162**	-.179**	6.644	3.975
3. Perceived Social Isolation (.888)			-	.508**	-.339**	-.189**	-.201**	6.452	3.02
4. Fear of Isolation (.875)				-	-.345**	-.172**	-.148**	15.300	4.817
5. Age					-	.237**	.167**	37.900	16.511
6. Education						-	.176**	-	-
7. Socioeconomic Status							-	5.771	1.367

Note. *N = 427. * p < .05, ** p < .001, Education – Completed primary school is 1, completed secondary school is 2, completed undergraduate is 3, completed postgraduate is 4, ( ) reflects Cronbach alpha for the measures.*

Model 1 Parallel mediation analysis

The results of the mediation analysis showed that all direct effects were significant. Higher gratitude was associated with lower SI, B = -.316, β = -.233, *P* < .001, and FSI, B = -.397, β = -.183, *P* < .001. In addition, both higher SI, B =.514, β = .390, *P* < .001 and FSI, B = .169, β = .205, *P* < .001 predicted higher anxiety. We found that anxiety was mediated by SI and FSI with higher gratitude (B = -.229, β = .128, bootstrap SE = .049, 95% bootstrap CI = [-.332, -.138]). This meant that those with higher gratitude reported having less SI (B = -.162, β = -.091, bootstrap SE = .041, 95% bootstrap CI = [-.249, -.090]) and also less FSI (B = -.067, β = -.038, bootstrap SE = .024, 95% bootstrap CI = [-.118, -.026]). The results supported our hypothesized model, indicating that the relationship between gratitude and anxiety is mediated by SI and FSI.

Model 2 Moderated Mediation Analyses

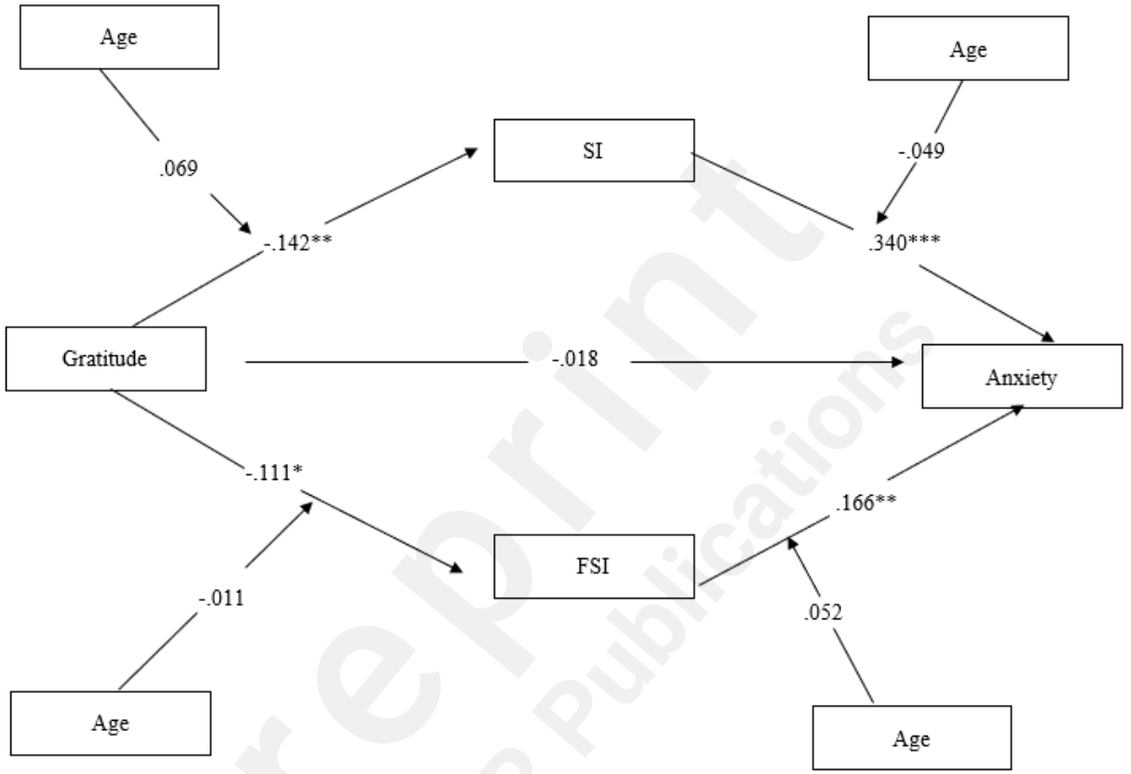
***Age as Moderator*.** First, we explored the moderating role of age in the parallel mediation model. The results demonstrated that the direct effect of gratitude on anxiety was not significant (B = -.032, β = -.018, bootstrap SE = .077, 95% bootstrap CI = [-.179, .115]) (see Fig 1a). Second, the conditional indirect effects (mediator) of SI and FSI were significantly moderated by age. Specifically, the mediation effect of SI, that is the conditional indirect effect, was significant for young adults (centering on M-SD; B = -.148, β = .083, bootstrap SE = .060, 95% bootstrap CI [-.274, -.042]) and middle-aged (centering on M; B = -.099, β = -.055, bootstrap SE = .037, 95% bootstrap CI [-.177, -.033]) but not for older adults (centering on M+SD; B = -.026, β = -.015, bootstrap SE = .045 , 95% bootstrap CI [-.129, .047]). As for FSI, the mediation effect was significant for middle-aged (centering on M; B = -.030, β = -.017, bootstrap SE = .017, 95%

bootstrap CI [-.068, -.001], but not for young adults (centering on M-SD; B = -.020, β = -.011, bootstrap SE = .021, 95% bootstrap CI [-.066, .016]) and older adults (centering on M+SD; B = -.052, β = -.029, bootstrap SE = .044 , 95% bootstrap CI [-.147, .029]).

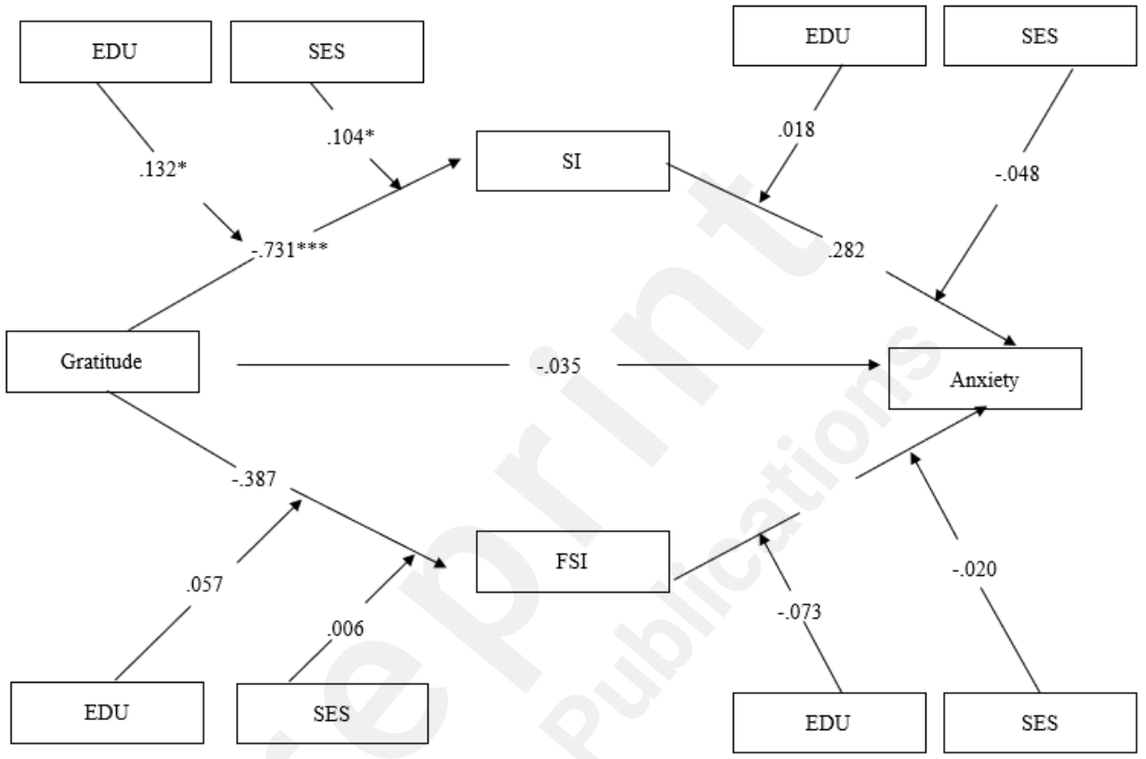
Education and SES as Moderators. We examined the moderating effect of education and SES in the parallel mediation model, similar to the one previously. First, the direct effect of gratitude on anxiety was not significant (B = -.063, β = -.035, bootstrap SE = .077, 95% bootstrap CI = [-.214, .088]) (see Fig 1b). Second, we found that the conditional indirect effects of SI and FSI were significantly moderated by education and SES. Results showed that those with lower levels of education (completed secondary school), the mediation effect of SI, that is the conditional indirect effect, was significant at low (centering on M-SD; B = -.263, β = -.147, bootstrap SE = .092, 95% bootstrap CI [-.471, -.109]), medium (centering on M; B = -.193, β = -.108, bootstrap SE = .083, 95% bootstrap CI [-.386, -.065]) and high level of SES (centering on M+SD; B = -.133, β = -.074, bootstrap SE = .085 , 95% bootstrap CI [-.343, -.014]). For the medium level of education (completed undergraduate degree), the mediation effect of SI was significant at low (centering on M-SD; B = -.150, β = -.084, bootstrap SE = .044, 95% bootstrap CI [-.243, -.075]) and medium SES (centering on M; B = -.088, β = -.049, bootstrap SE = .036, 95% bootstrap CI [-.168, -.025]), but not for the high level of SES (centering on M+SD; B = -.037, β = -.021, bootstrap SE = .046 , 95% bootstrap CI [-.139, .044]). Similarly, for the low education level, the mediation effect of FSI was also significant and all three SES levels: low (centering on M-SD; B = -.129, β = -.072, bootstrap SE = .062, 95% bootstrap CI [-.265, -.025]), medium (centering on M; B = -.121, β = -.068, bootstrap SE = .054, 95% bootstrap CI [-.236, -.024]) and high level of

SES (centering on M+SD; B = -.113, β = -.063, bootstrap SE = .060 , 95% bootstrap CI [-.235, -.002]). In addition, the mediation effect of FSI for the medium education level was significant at low (centering on M-SD; B = -.055, β = -.031, bootstrap SE = .028, 95% bootstrap CI [-.121, -.009]) and medium level of SES (centering on M; B = -.050, β = -.028, bootstrap SE = .028, 95% bootstrap CI [-.097, -.012]), but not at high SES level (centering on M+SD; B = -.045, β = -.025, bootstrap SE = .028 , 95% bootstrap CI [-.103, .006]).

(1a) Age as moderator



(1b) Education and Socioeconomic status as moderator



Note.*Edu = education - Completed primary school is 1, completed secondary school is 2, completed undergraduate is 3, completed postgraduate is 4, SES = socioeconomic status *p < .05, ** p < .01, *** p < .001.*

Fig 1. Moderated mediation analyses for (a) age as moderator and (b) education and socioeconomic status as moderator

Discussion

Principal Results

Our results clearly showed that gratitude significantly lowered SI and FSI, which in turn reduces anxiety. These findings suggest that gratitude may exert indirect effects on anxiety through SI and FSI and is concordant with gratitude literature as an effective life orientation to manage mental health issues in general[46,47]. Social network and participation in social activities is important for psychological well-being because social connection is a resource to boost our mood, self-esteem and well-being when needed. Likewise, a lack of social connection experienced in our sample - a higher feeling of SI and higher FSI – were associated to higher anxiety, an indicator of poor mental health.

Comparison With Prior Work

While we cannot infer whether the feelings of SI or FSI were caused by isolation or vice versa from our study, our results were in concordant with other studies that examined gratitude and SI[17] and FSI[48]. Empirical studies on SI and loneliness studies reported that higher gratitude was related to lower levels of loneliness and that the relationship was completely mediated by psychological flexibility[49]. The ability to engage in flexible coping would be especially relevant during a pandemic when conventional socializing methods i.e. face-to-face are no longer an option. It is possible that the individuals in our study who were more grateful were able to manage and lower their SI and FSI through their ability to identify or engage in alternative methods of socializing, thus indirectly reducing their anxiety levels.

We also examined three socio-demographic variables that may explain the variance between gratitude and anxiety that was indirectly affected by SI and FSI. First,

age. We examined whether age may influence the indirect effect of gratitude on anxiety via SI and FSI by moderating the effect of gratitude on SI and FSI and also moderating the effect of SI and FSI on anxiety. Young and middle-aged adults with higher gratitude experienced a much lower anxiety level due to lower SI and this was not observed in the older adults. Some studies reported that older adults were likely to experience more anxiety and depressive symptoms[50] and they had a greater concern about COVID-19 compared to younger adults, more so if they have chronic health conditions which increases their mortality risk[51]. Yet, we found that older adults were likely to be more grateful as indicated by a positive relationship between age and gratitude. One possibility is that older adults are likely to focus on the positives of current moment as they perceive their future time shorter compared to young adults, providing a natural buffer against negative emotions[52]. As for FSI, we found that middle-aged adults with higher gratitude reported lower anxiety level as a result of lower FSI. This relationship was not observed in the young and older adults. One possibility is that the middle-aged adults faced multiple roles (e.g. spouse, employee, parent) and stressful life demands (e.g. employment, empty nest, death of a spouse) that may impact both physical and mental health negatively[53], unlike in young and older adults. Past literature showed that fear for the future such as fear for death and uncertainties in future grow in young adulthood, peak around middle age and decline with aging[54]. Together with increased responsibilities for their children, aging parents and themselves, this may have contributed as to why middle-aged adults had a significant negative outcome to FSI and anxiety.

Second, education and SES. We found that the indirect effect of gratitude on anxiety via FI and FSI was moderated by both education and SES. Specifically, for those

with lower levels of education (having completed secondary school), those who had higher gratitude experienced a lower SI and FSI which in turn reduce their anxiety across all three levels of SES. While for those with medium level of education (having completed undergraduate studies) and from low and middle level of SES, the higher gratitude participants reported lower anxiety due to lower FI and FSI. While studies have shown that those with lower levels of education and SES had poorer mental health outcomes[55,56], many lost employment due to the COVID-19 pandemic and this is likely to have hit the poor the hardest as they are more vulnerable to job insecurity, food insecurity and housing instability[57].

Contrary to the low and medium levels, we did not find any significant effects for those with high education and high SES. Past evidence on SES may shed some light on the differential demands and expectations in explaining the mechanisms underlying the relationship between SES, education, and mental health. People from lower education and low SES background were reported having fewer psychosocial resources such as lower sense of control and resilience[58], smaller social networks and more social isolation and loneliness[35] and that their living environment with less material and psychological resources have a long-term impact on their cognition and behavior[55,56]. All of these has an indirect effect onto mental health. There has been reported success in increasing one's gratitude[21,46] and this targeted intervention may be particularly useful for those in the low SES background as means of protection during this difficult time.

Our results also showed that by lowering SI and FSI, anxiety could be reduced as well. Our findings are similar to one study that indicated a moderate positive effect of social support on mental health[29]. When comparing the psychological distress of

university students before and during the pandemic, Hamza et al. found students without preexisting mental health conditions showed increased psychological distress during the pandemic[59], coinciding with their increased feelings of SI. It suggests that these individuals who are not accustomed to SI may suffer deteriorating mental health. Although some may argue that the online connection is not the same as physical meetings, having social connection and support from online platforms is important in combating mental health issues during this pandemic. For example, people can communicate and conduct activities together in an online community that mimics a physical community in real world where people can seek help and exchange ideas for problem solving such as Reddit or Quora for online community discussions or Sacred Space where people can do daily prayer together online.

Limitations

Evidence has shown that insomnia or difficulty in maintenance of sleep does contribute to mental health issues including anxiety and depression and stress including current pandemic[3]. As we did not include questions related to sleep quality, we are unable to ascertain whether the feelings of anxiety were in part contributed by poor sleep. Future studies could include sleep quality into account as one of the factors in impacting mental health during a global pandemic.

In our study, we examined gratitude as a coping mechanism, and found it to be effective for the low and medium education and SES groups. However, there are other forms of coping styles that may be of relevance in current times. Past studies conducted during the SARS outbreak have revealed that different of coping styles were associated with different behaviors engaged in response to health threats. Lee-Baggley et al. found

those who engaged in empathic responding in the face of the SARS threat were more likely to report engaging in effective health behaviors as compared to those who engaged in wishful thinking[60]. Future studies could include other types of coping styles to give us a better understanding on how people cope, respond and inform policy-makes on possible alternatives for interventions.

Resilience has been touted as a trait that helps an individual to cope with adversity, although some has argued that resilience also comes from the environment[61]. Zhang et al. found that resilience was a protective factor for anxiety and depression among 296 mild-COVID19-symptom patients from China[62]. This is because resilience is the ability to adapt well with changes in life and promote positive changes in adversity or trauma and hence individual with high resilience is able to adapt with the changing environment and also protect own mental health when faced with difficulties by using both internal (e.g. self-encouragement) and external resources e.g. seeking help from family[63]. Future studies could examine the role of resilience and its protective effect on mental health over time.

Conclusions

It should be emphasized that feeling anxious is a normal response to a threatening and uncertain situation. Our findings showed that gratitude significantly lowered SI and FSI, which in turn reduces anxiety, and those in low education and SES experience a greater reduction in anxiety when they have higher gratitude. Further, our study highlights the importance of having some coping mechanism and social connection during the pandemic to have higher wellbeing and quality of life, especially for people from low education and SES background. Having new knowledge specifically addressing

the mental health challenges during the COVID-19 pandemic would help not only for individuals but also policy makers and those who working in the field of mental health care. For example, gratitude intervention can be targeted for those from low education and low SES across adulthood lifespan to reduce feelings of anxiety during the pandemic. Consistent with past literature in that gratitude intervention can enhance well-being in young adults[16], middle-age adults[64] and older adults[65], gratitude as a coping mechanism could be an easy and cheaper mechanism to tide us over during this difficult time.

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Conflicts of Interest

None declared

Abbreviations

SI: social isolation
FSI: fear of social isolation
EDU: education
SES: socio-economic status

References

1. Kontoangelos K, Economou M, Papageorgiou C. Mental Health Effects of COVID-19 Pandemia: A Review of Clinical and Psychological Traits. *Psychiatry Investig*. 2020;17(6):491-505. doi:10.30773/pi.2020.0161

2. Saltzman LY, Hansel TC, Bordnick PS. Loneliness, isolation, and social support factors in post-COVID-19 mental health. *Psychol Trauma Theory Res Pract Policy*. 2020;12(S1):S55. doi:10.1037/tra0000703

3. Varma P, Junge M, Meaklim H, Jackson ML. Younger people are more vulnerable to stress, anxiety and depression during COVID-19 pandemic: A global cross-sectional survey. *Prog Neuropsychopharmacol Biol Psychiatry*. 2021;109:110236. doi:10.1016/j.pnpbp.2020.110236

4. Maunder R, Hunter J, Vincent L, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ*. 2003;168(10):1245-1251.

5. Reynolds DL, Garay JR, Deamond SL, Moran MK, Gold W, Styra R. Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiol Infect*. 2008;136(7):997-1007. doi:10.1017/S0950268807009156

6. Kılıç C, Ulusoy M. Psychological effects of the November 1999 earthquake in Turkey: an epidemiological study. *Acta Psychiatr Scand*. 2003;108(3):232-238. doi:https://doi.org/10.1034/j.1600-0447.2003.00119.x

7. Torales J, O'Higgins M, Castaldelli-Maia JM, Ventriglio A. The outbreak of COVID-19 coronavirus and its impact on global mental health. *Int J Soc Psychiatry*. 2020;66(4):317-320. doi:10.1177/0020764020915212

8. Bruckner M, Mollerus R. UN/DESA Policy Brief #66: COVID-19 and the least developed countries. United Nations: Department of Economic and Social Affairs. Published May 1, 2020. Accessed November 24, 2020. https://www.un.org/development/desa/dpad/publication/un-desa-policy-brief-66-covid-19-and-the-least-developed-countries/

9. Hawker E. COVID-19: The Impact On Developing Economies. Published June 25, 2020. Accessed November 22, 2020. https://www.businessbecause.com/news/insights/7052/covid-19-impact-on-developing-economies

10. Boyraz G, Legros DN, Tigershtrom A. COVID-19 and traumatic stress: The role of perceived vulnerability, COVID-19-related worries, and social isolation. *J Anxiety Disord*. 2020;76:102307. doi:10.1016/j.janxdis.2020.102307

11. Cacioppo JT, Hawkley LC. Perceived social isolation and cognition. *Trends Cogn Sci*. 2009;13(10):447-454. doi:10.1016/j.tics.2009.06.005

12. Perrin PC, McCabe OL, Everly GS, Links JM. Preparing for an Influenza Pandemic: Mental Health Considerations. *Prehospital Disaster Med*. 2009;24(3):223-230. doi:10.1017/S1049023X00006853

13. Sadiković S, Branovački B, Oljača M, Mitrović D, Pajić D, Smederevac S. Daily Monitoring of Emotional Responses to the Coronavirus Pandemic in Serbia: A Citizen Science Approach. *Front Psychol*. 2020;11. doi:10.3389/fpsyg.2020.02133

14. Fish JN, McInroy LB, Paceley MS, et al. "I'm Kinda Stuck at Home With Unsupportive Parents Right Now": LGBTQ Youths' Experiences With COVID-19 and the Importance of Online Support. *J Adolesc Health*. 2020;67(3):450-452. doi:10.1016/j.jadohealth.2020.06.002

15. Wood AM, Froh JJ, Geraghty AWA. Gratitude and well-being: A review and theoretical integration. *Clin Psychol Rev*. 2010;30(7):890-905. doi:10.1016/j.cpr.2010.03.005

16. Emmons RA, Mccullough ME. Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *J Pers Soc Psychol*. 2003;84(2):377-389. doi:10.1037/0022-3514.84.2.377

17. Caputo A. The Relationship Between Gratitude and Loneliness: The Potential Benefits of Gratitude for Promoting Social Bonds. *Eur J Psychol*. 2015;11(2):323-334. doi:10.5964/ejop.v11i2.826

18. O'Connell BH, O'Shea D, Gallagher S. Mediating effects of loneliness on the gratitude-health link. *Personal Individ Differ*. 2016;98:179-183. doi:10.1016/j.paid.2016.04.042

19. Lies J, Mellor D, Hong RY. Gratitude and personal functioning among earthquake survivors in Indonesia. *J Posit Psychol*. 2014;9(4):295-305. doi:10.1080/17439760.2014.902492

20. Ni S, Yang R, Zhang Y, Dong R. Effect of Gratitude on Loneliness of Chinese College Students: Social Support as a Mediator. *Soc Behav Personal Int J*. 2015;43(4):559-566. doi:10.2224/sbp.2015.43.4.559

21. Killen A, Macaskill A. Using a Gratitude Intervention to Enhance Well-Being in Older Adults. *J Happiness Stud*. 2015;16(4):947-964. doi:10.1007/s10902-014-9542-3

22. Hajek A, König H-H. The association between use of online social networks sites and perceived social isolation among individuals in the second half of life: results based on a nationally representative sample in Germany. *BMC Public Health*. 2019;19(1):40. doi:10.1186/s12889-018-6369-6

23. Lin X, Li S, Qu C. Social network sites influence recovery from social exclusion: Individual differences in social anxiety. *Comput Hum Behav*. 2017;75:538-546. doi:10.1016/j.chb.2017.05.044

24. Saeri AK, Cruwys T, Barlow FK, Stronge S, Sibley CG. Social connectedness improves public mental health: Investigating bidirectional relationships in the New Zealand attitudes and values survey. *Aust N Z J Psychiatry*. 2018;52(4):365-374. doi:10.1177/0004867417723990

25. Mertens G, Gerritsen L, Duijndam S, Salemink E, Engelhard IM. Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *J Anxiety Disord*. 2020;74:102258. doi:10.1016/j.janxdis.2020.102258

26. Malaysian movement control order. In: *Wikipedia*. ; 2021. Accessed April 21, 2021. https://en.wikipedia.org/w/index.php?title=Malaysian_movement_control_order&oldid=1017930783

27. Chopik WJ, Newton NJ, Ryan LH, Kashdan TB, Jarden AJ. Gratitude across the life span: Age differences and links to subjective well-being. *J Posit Psychol*. 2019;14(3):292-302. doi:10.1080/17439760.2017.1414296

28. Froh JJ, Yurkewicz C, Kashdan TB. Gratitude and subjective well-being in early adolescence: Examining gender differences. *J Adolesc*. 2009;32(3):633-650. doi:10.1016/j.adolescence.2008.06.006

29. Kong F, Ding K, Zhao J. The Relationships Among Gratitude, Self-esteem, Social Support and Life Satisfaction Among Undergraduate Students. *J Happiness Stud*. 2015;16(2):477-489. doi:10.1007/s10902-014-9519-2

30. Child ST, Lawton L. Loneliness and social isolation among young and late middle-age adults: Associations with personal networks and social participation. *Aging Ment Health*. 2019;23(2):196-204. doi:10.1080/13607863.2017.1399345

31. Matthews T, Danese A, Wertz J, et al. Social Isolation and Mental Health at Primary and Secondary School Entry: A Longitudinal Cohort Study. *J Am Acad Child Adolesc Psychiatry*. 2015;54(3):225-232. doi:10.1016/j.jaac.2014.12.008

32. Santini ZI, Jose PE, York Cornwell E, et al. Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis. *Lancet Public Health*. 2020;5(1):e62-e70. doi:10.1016/S2468-2667(19)30230-0

33. Bono G, Reil K, Hescox J. Stress and wellbeing in urban college students in the U.S. during the COVID-19 pandemic: Can grit and gratitude help? *Int J Wellbeing*. 2020;10(3). doi:10.5502/ijw.v10i3.1331

34. Hartanto A, Lee STH, Yong JC. Dispositional Gratitude Moderates the Association between Socioeconomic Status and Interleukin-6. *Sci Rep*. 2019;9(1):802.

doi:10.1038/s41598-018-37109-1

35. Algren MH, Ekholm O, Nielsen L, Ersbøll AK, Bak CK, Andersen PT. Social isolation, loneliness, socioeconomic status, and health-risk behaviour in deprived neighbourhoods in Denmark: A cross-sectional study. *SSM - Popul Health*. 2020;10:100546. doi:10.1016/j.ssmph.2020.100546

36. Bjelland I, Krokstad S, Mykletun A, Dahl AA, Tell GS, Tambs K. Does a higher educational level protect against anxiety and depression? The HUNT study. *Soc Sci Med*. 2008;66(6):1334-1345. doi:10.1016/j.socscimed.2007.12.019

37. Shankar A, McMunn A, Demakakos P, Hamer M, Steptoe A. Social isolation and loneliness: Prospective associations with functional status in older adults. *Health Psychol*. 2017;36(2):179-187. doi:10.1037/hea0000437

38. Leigh-Hunt N, Bagguley D, Bash K, et al. An overview of systematic reviews on the public health consequences of social isolation and loneliness. *Public Health*. 2017;152:157-171. doi:10.1016/j.puhe.2017.07.035

39. Krause N, Hayward RD. Hostility, Religious Involvement, Gratitude, and Self-Rated Health in Late Life. *Res Aging*. 2014;36(6):731-752. doi:10.1177/0164027513519113

40. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*. 1983;67:361-370.

41. Cotten SR, Anderson WA, McCullough BM. Impact of Internet Use on Loneliness and Contact with Others Among Older Adults: Cross-Sectional Analysis. *J Med Internet Res*. 2013;15(2):e39. doi:10.2196/jmir.2306

42. Hayes AF, Matthes J, Eveland WP. Stimulating the Quasi-statistical Organ: Fear of Social Isolation Motivates the Quest for Knowledge of the Opinion Climate. *Commun Res*. 2013;40(4):439-462. doi:10.1177/0093650211428608

43. Adler N, Singh-Manoux A, Schwartz J, Stewart J, Matthews K, Marmot MG. Social status and health: A comparison of British civil servants in Whitehall-II with European- and African-Americans in CARDIA. *Soc Sci Med*. 2008;66(5):1034-1045. doi:10.1016/j.socscimed.2007.11.031

44. Rubin M, Denson N, Kilpatrick S, Matthews KE, Stehlik T, Zyngier D. “I Am Working-Class”: Subjective self-definition as a missing measure of social class and socioeconomic status in higher education research. *Educ Res*. 2014;43(4):196-200. doi:10.3102/0013189X14528373

45. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis, Second Edition: A Regression-Based Approach*. Guilford Publications; 2017.

46. Jans-Beken L, Lataster J, Peels D, Lechner L, Jacobs N. Gratitude, Psychopathology and Subjective Well-Being: Results from a 7.5-Month Prospective General Population Study. *J Happiness Stud*. 2018;19(6):1673-1689. doi:10.1007/s10902-017-9893-7

47. Petrocchi N, Couyoumdjian A. The impact of gratitude on depression and anxiety: the mediating role of criticizing, attacking, and reassuring the self. *Self Identity*. 2016;15(2):191-205. doi:10.1080/15298868.2015.1095794

48. MacKenzie MJ, Baumeister RF. Motivated gratitude and the need to belong: Social exclusion increases gratitude for people low in trait entitlement. *Motiv Emot*. 2019;43(3):412-433. doi:10.1007/s11031-018-09749-3

49. Frinking E, Jans-Beken L, Janssens M, et al. Gratitude and loneliness in adults over 40 years: examining the role of psychological flexibility and engaged living. *Aging Ment Health*. 2020;24(12):2117-2124. doi:10.1080/13607863.2019.1673309

50. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen Psychiatry*. 2020;33(2).

51. Sanyaolu A, Okorie C, Marinkovic A, et al. Comorbidity and its Impact on Patients with COVID-19. *SN Compr Clin Med*. 2020;2(8):1069-1076. doi:10.1007/s42399-020-00363-4

52. Reed AE, Carstensen LL. The Theory Behind the Age-Related Positivity Effect. *Front Psychol*. 2012;3. doi:10.3389/fpsyg.2012.00339

53. Scott SB, Whitehead BR, Bergeman CindyS, Pitzer L. Combinations of Stressors in Midlife: Examining Role and Domain Stressors Using Regression Trees and Random Forests. *J Gerontol Ser B*. 2013;68(3):464-475. doi:10.1093/geronb/gbs166

54. Russac RJ, Gatliff C, Reece M, Spottswood D. Death Anxiety across the Adult Years: An Examination of Age and Gender Effects. *Death Stud*. 2007;31(6):549-561. doi:10.1080/07481180701356936

55. Arokiasamy P, Uttamacharya U, Jain K, et al. The impact of multimorbidity on adult physical and mental health in low- and middle-income countries: what does the study on global ageing and adult health (SAGE) reveal? *BMC Med*. 2015;13(1):178. doi:10.1186/s12916-015-0402-8

56. Luo Y, Waite LJ. The Impact of Childhood and Adult SES on Physical, Mental, and Cognitive Well-Being in Later Life. *J Gerontol Ser B*. 2005;60(2):S93-S101. doi:10.1093/geronb/60.2.S93

57. Kantamneni N. The impact of the COVID-19 pandemic on marginalized populations in the United States: A research agenda. *J Vocat Behav*. 2020;119:103439. doi:10.1016/j.jvb.2020.103439

58. Niemeyer H, Bieda A, Michalak J, Schneider S, Margraf J. Education and mental health: Do psychosocial resources matter? *SSM - Popul Health*. 2019;7:100392. doi:10.1016/j.ssmph.2019.100392

59. Hamza CA, Ewing L, Heath NL, Goldstein AL. When social isolation is nothing new: A longitudinal study on psychological distress during COVID-19 among university students with and without preexisting mental health concerns. *Can Psychol Can*. 2021;62(1):20-30. doi:10.1037/cap0000255

60. Lee-Baggley D, DeLongis A, Voorhoeave P, Greenglass E. Coping with the threat of severe acute respiratory syndrome: Role of threat appraisals and coping responses in health behaviors. *Asian J Soc Psychol*. 2004;7(1):9-23. doi:https://doi.org/10.1111/j.1467-839X.2004.00131.x

61. Foster K. Resilience in the face of adversity: A shared responsibility. *Int J Ment Health Nurs*. 2020;29(1):3-4. doi:https://doi.org/10.1111/inm.12688

62. Zhang J, Yang Z, Wang X, et al. The relationship between resilience, anxiety and depression among patients with mild symptoms of COVID-19 in China: A cross-sectional study. *J Clin Nurs*. 2020;29(21-22):4020-4029. doi:https://doi.org/10.1111/jocn.15425

63. Poudel-Tandukar K, Chandler GE, Jacelon CS, Gautam B, Bertone-Johnson ER, Hollon SD. Resilience and anxiety or depression among resettled Bhutanese adults in the United States. *Int J Soc Psychiatry*. 2019;65(6):496-506. doi:10.1177/0020764019862312

64. Noor NM, Rahman NDA, Zahari MIAM. Gratitude, Gratitude Intervention and Well-being in Malaysia. *J Behav Sci*. 2018;13(2):1-18.

65. Lau RWL, Cheng S-T. Gratitude lessens death anxiety. *Eur J Ageing*. 2011;8(3):169-175. doi:10.1007/s10433-011-0195-3