

Stress and coping strategies between domestic and overseas Taiwanese people early during the COVID-19 crisis: government guiding as a stress-coping strategy

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Abstract

Objective: This study examined the domestic and overseas people's perceived stress during the early COVID-19 pandemic in relation to measures of coping strategies, some of which links to the government's actions.

Methods: We recruited 2727 respondents as Taiwanese from the COVIDiSTRESS Global Survey collected psychological and behavioral responses to the early COVID-19 pandemic between 30th March and 30th May, 2020 (N=173,426). The self-reported questionnaire included a modified 10-item Perceived Stress Scale to evaluate stress in the last week and a 16-item coping strategy scale. We applied a case-control design to compare 2469 domestic and 258 overseas Taiwanese participants. Three stress-coping factors were extracted by principal component analysis: government guiding, supportive social network, and personal entertainment. Their effects were examined by regression and mediation analysis.

Results: Overseas Taiwanese participants had a significantly higher level of stress than domestic counterparts (2.89 to 2.69, $p < 0.001$). Domestic participants relied more on the government guiding as coping strategies, which explains lower stress after controlling for demographics, while the government guiding was ineffective for overseas Taiwanese. The effect of residency ($p < 0.01$) is mediated by the coping strategies, especially for the government's action and supportive social network.

Conclusion: Our case-control design isolating residency and mediation analysis verified that the government guiding in COVID-19 renders an important channel for stress coping. The authorities should recognize the importance of various mental health interventions during pandemics.

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Keywords: Coping, COVID-19, Disease Outbreak, Health Policy, Mental Health, Stress

Introduction

A new coronavirus (SARS-CoV-2) emerged an epidemic of acute respiratory syndrome (COVID-19) in humans, centered from Wuhan, China since December 2019. The virus had spread to hundreds of countries in few months, and World Health Organization (WHO) to declare a global pandemic. Acute life-threatening stress, e.g., the SARS disease outbreak in 2003, resulted in a sustained psychological impact [1]. However, the emergency preventative policies implemented by many governments and the WHO rely mainly on surveillance and early detection, community containment, and mass prophylaxis using vaccines; the effectiveness of strategies for addressing mental and social aspects has been underestimated[2, 3].

Literature has shown that outbreaks of infectious diseases cause a broad spectrum of profound psychological effects in all people, not only in those with preexisting mental illnesses [4-6]. Psychological stress occurs when people perceive the environmental change that taxes their additional adaptive capacity to respond [7, 8]. Stress related to the pandemic may be exacerbated by self-isolation policies that can increase social isolation and relationship difficulties globally [9]. During a pandemic, people experience feelings of helplessness, hopelessness, and fear induced by the threat of their own death and the death of family members and friends. Increasing media coverage and misinformation in early stages may induce anxiety in communities [10-12]. In particular, social and physical distancing strategy adopted in many countries during the COVID-19 pandemic continuously affects the public's mental health and has caused an economic recession [10, 13, 14]. Furthermore, stressors and negative emotions influence the immunity interacting between the central nervous and endocrine systems, to modify various antiviral responses [15]. Therefore, the ways in which

people cope with the stress caused by the COVID-19 pandemic warrant further investigation for social and behavior science [9, 16-18].

Residency Status, Stress, and Coping Strategies

A pandemic may exacerbate the stigmatization of and discrimination against immigrants, resulting in immigrants facing additional challenges when they experience acute stress and mental health problems while governments implement social isolation at individual and community levels [19]. In the buffering hypothesis, social support may prevent stress appraisal for events or facilitation of adjustive counter response for illness prevention [20]. Immigration or residency status may have an effect in this crisis, as people who have emigrated from their country of origin may have less intergroup contact, access to formal assistance, social support, and cultural inclusion in their host countries [21, 22]. Previous studies showed that individuals' demographic characteristics, stress types experienced by individuals, and the community in which they lived are related to their coping strategies [8, 9, 16, 23]. There is a call to understand the migrants' psychological health and coping strategies during the ongoing COVID-19 pandemic, especially to understand the importance of government actions [16, 24].

At the early stage of the outbreak, Taiwan Centers for Disease Control (Taiwan CDC) detected the news about an outbreak with unknown etiology in Wuhan, China [25, 26]. Taiwan established real-time surveillance with rapid risk assessment, border control and quarantine, and laboratory capacity building at the early stage, and Taiwan had achieved relatively successful control of the epidemic with an extremely low infection rate and mortality in community [27-30]. It makes Taiwan a significant testbed to explore issues related to citizens' coping strategies, with trusting the authority included.

Aims

Based on an analysis of data from the urgent online survey, we report the level of stress and the coping strategies adopted by Taiwanese people during the COVID-19 outbreak in early 2020. By identifying differences between domestic and overseas Taiwanese, we further estimated the correlations of residency status, level of stress and coping strategies. Through our identification of the differences between domestic and overseas Taiwanese people, this study is the first of its kind to offer empirical evidence on psychological health status and stress-coping behaviors for immigrants.

Method

Data Collection

Taiwanese participants were recruited for participation in the COVIDiSTRESS global survey. This cross-cultural survey was designed to gain insight into psychological and behavioral responses while governmental orders like stay home and cancellation of public functions implemented in many countries during the early COVID-19 pandemic [31, 32]. From 30th March and 30th May, 2020, 173,426 respondents worldwide anonymously participated in the survey. The survey was translated into 47 languages via a dual translation procedure and launched in 179 countries. The survey was preregistered on the Open Science Framework platform (<https://osf.io/2ftma/>) on March 30, 2020, and was approved by the Research Ethics Committee at Aarhus University, Denmark, with case number 2019-616-000009. The dataset is publicly available on the abovementioned website.

They were invited by a Qualtrics link posted on the collaborators' Facebook page, Twitter account, and private messaging app. All participants were invited to answer the survey titled "How is coronavirus affecting your life?" The survey has 113 questions. No reward was

provided for completing this survey. All subjects received the consent form at the beginning of the survey, and they must click the button to express their consent before taking the survey. All participants were asked a series of sociodemographic questions in the first part. The participants were asked their primary language, age, gender, level of education, mother's level of education, employment status, country of residence, and whether their country of residence is their home country. The survey did not ask respondents to indicate their biological sex. The coding, distribution, and descriptive analysis of the respondents' backgrounds are shown in the Appendix.

Domestic and Overseas Taiwanese participants

We identify the domestic and overseas Taiwanese participants by the following procedure. Domestic Taiwanese is defined as those who lived in Taiwan, answered the traditional Chinese version (ZH-T), and considered Taiwan as their home country. Overseas Taiwanese is defined as those who did not live in Taiwan, answered the ZH-T version, and did not consider their current residency as their home country. Among all 3089 ZH-T respondents, 2469 (79.9%) was defined as domestic Taiwanese, 258 (8.3%) as overseas Taiwanese, while 362 (11.7%) who did not fit the criteria mentioned above were excluded from further analysis (N=2727). We equated respondents selecting the traditional Chinese version in Taiwan and abroad as Taiwanese for three practical reasons: First, this survey was not disseminated in Hong Kong, another major region with respect to the use of traditional Chinese. Second, most overseas Chinese – including those in Singapore, Malaysia, Indonesia, and the U.S. – were offered the simplified Chinese version at the beginning of the survey. Third, we use the item “considering their current residency as the home country” to further screen possible overseas Taiwanese, which may mitigate the issue of the second-generation overseas Chinese or Taiwanese and also exclude the foreigners in Taiwan.

Level of Stress

All participants were asked to complete a modified version of the 10-item Perceived Stress Scale (PSS-10) [33-35]. The only modification was that all participants were asked to evaluate their condition "in the last week" instead of "in the last month." The modification was made to capture the rapidly changing situation during the pandemic [31, 32]. The internal consistency of the scale, as measured by Cronbach's alpha, ranges from 0.66 to 0.90 [32]. **In our select data, Cronbach's alpha for the ten items answered by the Taiwanese participants was 0.898.** We, therefore, averaged the responses to create a single indicator of the participants' level of stress when the participants were answering the question (**range: 1-5, mean: 2.70, variance: 0.54**).

Coping Strategies

In the second part, participants were also asked sets of items related to people's experiences of distress and worry during the COVID-19 epidemic, and items of coping behaviors [31]. (Section title—"I have found the following helpful for coping with feelings of discomfort raised by the Coronavirus situation": Q1—"Information from the government"; Q2—"Face-to-face interactions with friends and family"; Q3—"Phonecalls or other long-range interactions with friends and family"; Q4—"Face-to-face interactions with colleagues"; Q5—"Phonecalls or other long-range interactions with colleagues"; Q6—"Social media"; Q7—"Video games (alone)"; Q8—"Video games (online)"; Q9—"Watching tv-shows or movies"; Q10—"Dedicating myself to helping others"; Q11—"Dedicating myself preparing for the crisis"; Q12—"Dedicating myself to following the government's advice"; Q13—"Dedicating myself to my work/vocation"; Q14—"Dedicating myself to an activity or hobby"; Q15—"God, religion or spirituality"; Q16—"Knowledge of actions taken by the government or civil services") Their

answers were recorded ranging from strongly disagree (1) to strongly agree (6). Cronbach's alpha for the sixteen items answered by the Taiwanese participants was **0.831**.

Data Analyses

Estimating the effect of country of residence raises the potential threat that differences in the individual backgrounds of domestic and overseas Taiwanese participants may be associated with their level of stress. Therefore, we applied a case-control design to reduce this potential threat for comparing stress level [36, 37]. Propensity score matching was used to select domestic participants who share a similar background with overseas participants [37, 38]. The matching was conducted by using the MatchIt package in R 3.1.3 with the *nearest* method. In the logit model, the dependent variable was the binary variable of the participant's country of residence, while the independent variables were age, education, mother's level of education, gender, and employment. Overall, 396 overseas and domestic Taiwanese participants were selected respectively by using propensity score matching.

Linear regression analysis was used to estimate the effect of the government's response via the Taiwanese dataset (n=2727). Principal component analysis with the varimax rotation method was applied to reduce the 16 coping strategies to make the results more interpretable. All three factors with eigenvalues larger than 1 are the independent variables, while the government-action-related factor serves as the research of interest [39]. The dependent variable was the level of stress. Control variables included a dummy variable for the country of residence, age, education, mother's level of education, gender, and employment.

Mediation analysis was applied to examine whether the coping strategies chosen by domestic and overseas Taiwanese mediate the effect of residency on their level of stress [40]. The analysis was conducted using the Psych package in R 3.1.3. All three major factors were set

as mediators, while residency and level of stress were independent and dependent variables, respectively.

Results

Demographic Characteristics and the Level of Stress

Before matching, education and employment status were different between domestic and overseas Taiwanese (Table A1, n=2727). The characteristics and stress level of the matched respondents are shown in Table 1. The age distribution ranged from 18 to 64 years with a mean of 33.0 years and a standard deviation of 8.5. The gender distribution after matching was 262 (67.9%) females, 119 (30.1%) males, and 5 (1.3%) who answered "other/would rather not say." After matching, there were no significant differences between the overseas and domestic Taiwanese participants in terms of age ($p = 0.47$), gender ($p=0.89$), education ($p=0.76$), mother's education ($p=0.99$), and employment status ($p=0.94$). The distributions of variables before the propensity score matching analysis can be found in Table A2. Among the 193 overseas respondents, 74 (38.3%) lived in the United States, 36 (18.7%) in Japan, 13 (6.7%) in Germany, 11 (5.7%) in Netherlands, 12 (4.7%) in Germany, and 59 (30.5%) in other countries.

	Domestic (n=193)	Overseas (n=193)	Test	p-value
Age (years)			T-test, $t = -0.0679$	0.473
Mean (S.D.)	33.3 (9.13)	32.7 (7.91)		
Min	19	18		
Max	64	64		
Gender			$\chi^2 = 0.22$	0.89
Male (%)	59 (30.6%)	60 (31.1%)		
Female (%)	132 (68.4%)	130 (67.4%)		
Other (%)	2 (1.0%)	3 (1.5%)		
Education			$\chi^2 = 1.15$	0.77
Senior High and below	5 (2.6 %)	6 (3.1%)		
College	64 (33.2%)	64 (33.2%)		
Graduate	124 (64.2%)	123 (63.7%)		
Employment			$\chi^2 = 1.23$	0.94
Students	52 (26.9%)	57 (29.5%)		
Full-time	95 (49.2%)	89 (46.1%)		
Part-time	18 (9.3%)	17 (8.8%)		
Self-employed	6 (3.1%)	5 (2.6%)		

Unemployed	20 (10.3%)	21 (1.9%)		
Retired	2 (1.0%)	4 (2.1%)		
PSS-10 score (SD)	2.61 (0.73)	2.89 (0.80)	T-test, $t = 3.60$	0.0003

* χ^2 : Chi-square test

Table 1. Sociodemographic factors of Taiwanese participants after propensity score matching (n=396)

There was a significant difference in the perceived level of stress on PSS-10 between the overseas and domestic Taiwanese participants after the matching (2.89 to 2.61, $t = 3.60$, $p = 0.0003$, $n=396$), while before the matching the difference is also significant (2.89 to 2.69, $t = 3.67$, $p = 0.0002$. Table A1). Hence, the overseas Taiwanese participants generally suffered from a higher level of stress than the domestic Taiwanese participants during the early COVID-19 outbreak.

Differences in Coping Strategies among participants

The coping strategies that the matched domestic and overseas Taiwanese participants used are shown in Table 2. Given the similar socio-economic background after the propensity score matching, there is a significant difference in the coping strategies chosen by the domestic and overseas Taiwanese participants. Among the domestic Taiwanese participants, the top three strategies used to reduce stress were "Knowledge of actions taken by the government or civil services (4.98)", "Information from the government (4.93)", and "Dedicating myself to an activity or hobby (4.96)". Among the overseas Taiwanese participants, the top three strategies were "Dedicating myself to an activity or hobby (4.73)", "Phone calls or other long-range interactions with friends and family (4.56)", and "Watching T.V. shows or movies (4.49)."

The coping strategies scores of unmatching participants is shown in Table A3.

Coping strategies	Domestic (n=193)	Overseas (n=193)	Diff. (T-test)
Q1. Information from the government	4.93^a	3.97	$p < 0.001$
Q2. Face-to-face interactions with friends and family	4.30	4.02	$p = 0.03$

Q3. Phone calls or other long-range interactions with friends and family	4.54	4.56	p = 0.85
Q4. Face-to-face interactions with colleagues	3.51	3.15	p = 0.005
Q5. Phone calls or other long-range interactions with colleagues	3.87	4.06	p = 0.14
Q6. Social media	4.24	4.06	p = 0.14
Q7. Video games (alone)	4.17	3.61	p = 0.003
Q8. Video games (online)	3.76	3.42	p = 0.04
Q9. Watching T.V. shows or movies	4.52	4.49	p = 0.82
Q10. Dedicating myself to helping others	4.26	4.08	p = 0.09
Q11. Dedicating myself to preparing for the crisis	4.34	4.06	p = 0.01
Q12. Dedicating myself to following the government's advice	4.70	4.05	p < 0.001
Q13. Dedicating myself to my work/vocation	4.26	4.08	p = 0.16
Q14. Dedicating myself to an activity or hobby	4.96	4.73	p = 0.02
Q15. God, religion or spirituality	2.95	2.70	p = 0.11
Q16. Knowledge of actions taken by the government or civil services	4.98	4.29	p < 0.001

Table 2. Coping Strategies of Taiwanese Participants (n=396)

^aEach item scoring is 1-6: 1- strongly disagree, 6- strongly agree

It is worthy noticing that the biggest differences in the coping strategies between the matched domestic and overseas Taiwanese are Q1, Q12, and Q16. All of these coping strategies are government-related action or information. Hence, domestic Taiwanese may rely much heavily on the government than the overseas counterparts to reduce their level of stress. The correlation analysis showed that there was a negative correlation between government-related coping strategies and stress levels among the matched Taiwanese respondents. Participants who agreed that "the knowledge of actions taken by the government" reduced their stress had, on average, a lower level of stress (Pearson's $r = -0.15$, $p < 0.001$).

Principal component analysis with varimax rotation [37] reveals, among the 16 coping strategies from all domestic and overseas Taiwanese respondents (n= 2727), three optimal components with eigenvalues larger than 1 that explain 53% of overall variances. All three government-related coping strategies (Q1, Q12 and Q16) are heavily loaded on the first component, while the other strategies are lower than 0.6 (all loadings larger than 0.6 were marked in Table 3). The second component is mainly about the supportive social network, such as interaction with colleagues and friends; the third component includes mostly the

strategies involving personal entertainment such as video game and television. The loading can be found in Table 3.

	Factor 1 (government guiding)	Factor 2 (supportive social network)	Factor 3 (personal entertainment)
Q16. Knowledge of actions taken by the government or civil services	0.87	0.05	0.11
Q1. Information from the government	0.85	0.05	0.08
Q12. Dedicating myself to following the government's advice	0.82	0.15	0.12
Q11. Dedicating myself to preparing for the crisis	0.56	0.33	0.12
Q14. Dedicating myself to an activity or hobby	0.49	0.12	0.48
Q6. Social media	0.38	0.31	0.21
Q4. Face-to-face interactions with colleagues	-0.07	0.74	0.20
Q5. Phone calls or other long-range interactions with colleagues	0.16	0.71	0.07
Q10. Dedicating myself to helping others	0.34	0.61	0.04
Q2. Face-to-face interactions with friends and family	0.20	0.60	0.03
Q15. God, religion or spirituality	-0.05	0.57	-0.03
Q13. Dedicating myself to my work/vocation	0.23	0.55	0.05
Q3. Phone calls or other long-range interactions with friends and family	0.44	0.49	0.20
Q7. Video games (alone)	0.09	-0.10	0.88
Q8. Video games (online)	0.04	0.02	0.87
Q9. Watching T.V. shows or movies	0.30	0.17	0.48
Sum of squares loadings	3.38	2.92	2.14
Variance explained	21%	18%	13%
Overall variance explained	53%		

Table 3. Principal Component Analysis of Coping Strategies (with Varimax Rotation)

(n=2727)

Confirmatory factor analysis (CFA) was further carried out for the three main factors generated in Table 3. When the bold factors in Table 3 were assigned to the three factors, the overall comparative fit index (CFI) is 0.949 with RMSEA 0.082 [0.074 – 0.089], with all 9 items have the loading larger than 0.6 on the three factors. When all factors in Table 3 were assigned to the three factors by their heaviest loaded factor, CFA shows that the CFI 0.831 is with RMSEA 0.095 [0.091 – 0.099], while all 16 items except two have the loading larger than 0.6. Since the coping strategies asked in the survey were not meant to build a establish a clear theory-driven construct, it is not unreasonable that the three factors only provide a

moderate fit to the 16 coping strategies. Nevertheless, the three factors can still be used to summarize the coping strategies and to estimate the relationship between the factors and the level of stress.

The Mediation Effect of Coping Strategies and Stress by Residency

As summarized in Table 4, regression analysis showed a significant correlation between the government-related coping strategies and the level of stress among the domestic Taiwanese but not the overseas Taiwanese participants (n=2727). Model 1 and 2 are used to explain the level of stress among domestic Taiwanese participants, while 3 and 4 is for overseas Taiwanese; Model 1 and 3 only includes the three factors of coping strategies, while 2 and 4 also includes the respondent's sociodemographic characteristics. After controlling for other sociodemographic characteristics, the partial coefficient of the first component, which the government guiding is heavily loaded, was still significantly negative for domestic Taiwanese participants in Model 1 and 2 (-0.097, $p < 0.001$, 95% C.I. = [-0.131, -0.063]) but not the overseas Taiwanese in Model 3 and 4 (0.025, $p = 0.72$, 95% C.I. = [-0.114, 0.163]). The result suggests that the government guiding can effectively reduce the level of stress among the domestic but not overseas Taiwanese participants.

Meanwhile, the second component (mostly related to the supportive social network) significantly reduces participants' level of stress for both group of participants. The individual coping strategy (Factor 3, mostly about playing video games and watching TV) can reduce the level of stress among overseas but not domestic Taiwanese participants.

	Model 1 ^c Domestic	Model 2 ^c Domestic- full	Model 3 ^c Overseas	Model 4 ^c Overseas - full
Factor 1 (government guiding)	-0.081*** [-0.116, -0.047]	-0.097*** [-0.131, -0.063]	0.001 [-0.124, 0.127]	0.025 [-0.114, 0.163]
Factor 2 (supportive social network)	-0.136*** [-0.171, -0.101]	-0.092*** [-0.127, -0.056]	-0.253*** [-0.374, -0.131]	-0.230*** [-0.368, -0.091]
Factor 3 (personal)	0.084 ***	0.026	-0.137**	-0.155**

entertainment)	[0.049, 0.119]	[-0.011, 0.63]	[-0.257, -0.018]	[-0.285, -0.025]
Age ^b		YES		YES
Gender ^b		YES		YES
Education ^b		YES		YES
Mother's education ^b		YES		YES
Employment ^b		YES		YES
Constant	2.720*** [2.685, 2.755]	3.208*** [3.030, 3.385]	2.651*** [2.530, 2.773]	3.297*** [2.543, 4.050]
N	1641	1641	127	127
Adjusted R ²	0.059	0.148	0.160	0.285
Variance inflation factor	1.00	2.05	1.01	4.15

^a *P < 0.05, **P < 0.01, ***P < 0.001)

^b Coefficients of control variables are neglected because the variables were coded as a long list of dummies. The complete result can be provided upon request.

^c Model 1 and 2 are used to explain the level of stress among domestic Taiwanese participants, and Model 2 includes the respondent's sociodemographic characteristics; Model 3 and 4 are used to explain the level of stress among domestic Taiwanese participants, and Model 4 includes the respondent's sociodemographic characteristics.

Table 4. Coping Strategies and the Level of Stress (n=2727)

The vanished significance of the first factor in Model 3 and 4 in Table 4 suggests the possible mediation effect of the coping strategies. The result of the mediation analysis is shown in Figure 1. The total effect of residency is 0.20 ($p < 0.01$). After adding the three coping strategy factors, the direct effect of residence is still significant (0.19, $p < 0.001$); the total effect suggests that a different environment will directly change the level of stress among individuals. Meanwhile, the first component also heavily mediates the effect of residence to the stress. Bootstrapping shows that the mediation effects of the government guiding (0.04, 95% range [0.01, 0.07]) and supportive social network (-0.03, 95% C.I. = [-0.05, -0.01]) are statistically significant, while personal entertainment (factor 3) is not (0.00, 95% C.I. = [-0.01, 0.01]). Hence, the psychological impact of the pandemic to individuals could be mediated by the government's action and information provision.

Fig. 1. Mediation Analysis of Country of Residence, Coping, and Stress (n=2727)

Discussion

The study shows that the overseas Taiwanese participants have a significantly higher level of stress than the domestic Taiwanese participants, even after controlling for sociodemographic characteristics. The early actions taken by the Taiwan government and some individual coping strategies may help explain the difference in the levels of stress between overseas and domestic Taiwanese respondents in our sample. This finding is consistent with the findings of previous studies that showed that immigrants or those involved in diaspora would face additional challenges [21, 22].

First, the analyses found that the domestic Taiwanese participants tended to trust the government more, as they cope by knowing what actions have been taken by the government or civil services and obtaining information from the government. As people have more power and the right to hold the government accountable, they have more faith in governmental decisions regarding disease control and prevention [29]. Taiwan ensured the coordination of different government agencies and activated the Central Epidemic Command Center (CECC) with daily reassurance and education for the public beginning in January 2020 [26-29]. To improve the public's awareness of prevention, the CECC provided daily updates on surveillance, the number of confirmed cases, infection control information (including face mask management; physical distancing principles; and guides for screening and quarantine via public press conferences, Facebook, and Line). These procedures not only provided accurate information but also enhanced the social support system to help people maintain a normal lifestyle. This finding may reflect Taiwanese people's closer connection with political institutions than people in other countries given that Taiwan is a democracy. Not all exposure to media has the same effect. If media reports focus on what to do instead of the crisis itself, then they can reduce stress, as shown in our study [29, 41]. Hence, it is also reasonable that the domestic Taiwanese participants would agree that they engage in activities based on the government's advice to prepare for the crisis.

Second, the overseas Taiwanese participants, on the other hand, being immigrants, do not enjoy the same level of political power and rights in these host countries and lack other forms of social participation and cultural inclusion. The strategies of these participants tend to be more inward focused, such as personal activities, hobbies, and interactions with friends and family. Regarding the use of these two strategies, there were no significant differences between the overseas and domestic Taiwanese participants.

Compared to the overseas Taiwanese participants, the domestic Taiwanese participants reported significantly higher levels of agreement with the use of the night coping strategies. This finding might be associated with the lower stress level in the domestic Taiwanese participants, thus implying that the strategies they adopted enabled them to more successfully cope with the stress. However, considering the relatively successful containment of the COVID-19 epidemic in Taiwan, the difference in the level of stress might simply be due to the different experiences of the intensity of the epidemic. Furthermore, the current study falls short to explore the resilience developed among immigrants to help them adapt well in the face of various adversities.

Limitations

This study has several limitations. First, the number of overseas respondents was too small to analyze the connection between their perceived level of stress and the governmental responses in their various countries of residence. However, this limitation may not have biased our main findings, given Taiwan's relatively successful control of the pandemic in March and April of 2020 (more than 60% of the overseas Taiwanese respondents lived in North America, the Netherlands, and Germany). Second, perceived stress may be influenced by family infected experiences, personality, or preexisting psychiatric disorders, but the COVIDiSTRESS dataset did not include such items [31]. We controlled sociodemographic factors by applying

propensity score matching to estimate the "treatment" effect of country of residence.

Nevertheless, these aspects should be considered in further investigations of the relationship between stress and government responses. Third, there is still no consensus in the literature on the definition of stress. The PSS-10 used in this study is widely accepted as a reliable measure of stress, and PSS-10 scores are highly correlated with anxiety and depression [1, 42]. The connection between short-term stress coping strategies and long-term mental health still need to be further investigated [4, 17, 43]. Fourth, this data collection process of the emergency mental health survey cannot fully represent the demographic of Taiwanese people [44].

Generally, relatively young individuals and females were overrepresented in our unmatched dataset [31, 32]. However, the significant correlations between complying with government policies and stress relief among the respondents provide valuable evidence addressing the importance of government intervention during the early outbreak of COVID-19.

Conclusion

Our result provides evidence that perceived stress among a population can be related to the immediate response of the government, thereby suggesting the connection between the government and community resilience. Dealing with stress during pandemics is a substantial and dynamic challenge worldwide. Prolonged states of emergency and stressors related to isolation could decreased compliance with set behavioral objectives during pandemics, especially among those immigrants [10, 32]. Facing the formidability of COVID-19, it is useful for researchers to go back to pre-Hans Selye's time before the science of stress became the investigation of the neuro-hormonal regulation of damage/defense reactions [45]. While the definition of stress has evolved with immense influence by political economies and sociocultural realities, with the "new normal" forming ahead that might fundamentally transform the world's definition of productivity and growth and rewrite the social contract in

demand of care and government accountability, we suggest that intense collaboration and communication is needed among governments, scientists, and healthcare professionals.

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Competing Interest

The authors have no competing interests to report.

Ethical Approval

The survey was preregistered on the Open Science Framework platform (<https://osf.io/2ftma/>) on March 30, 2020, and was approved by the Research Ethics Committee at Aarhus University, Denmark, with case number 2019-616-000009.

Informed Consent**Data Availability**

The full survey form in English can be accessed at [10.17605/OSF.IO/Z39US](https://doi.org/10.17605/OSF.IO/Z39US).

The full list of variables included in the COVIDiSTRESS global survey as well as the response options participants used to answer the survey are available at <https://osf.io/v68t9/>

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