

Variations in the Association between Economic Distress and Anxiety by Availability of Emergency Cash Reserves: Findings from a Longitudinal Study

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ABSTRACT

Objective: 1) to describe the extent that experience of economic distress is associated with incidence of anxiety, and; 2) modification of the mentioned association by availability of emergency cash reserves.

Material and Methods: We conducted a longitudinal study using two phone-based surveys in the general population of Thailand in April and May, 2021. We analyzed data using descriptive statistics and log-binomial regression analyses.

Results: There were 1135 persons who met the inclusion criteria and participated in both surveys (non-participation at baseline=31.7%; loss-to-follow-up=420/1555=14.4%). The association between economic distress and anxiety was stronger among participants with no emergency cash reserves (Adjusted RR=2.05, 95% CI=0.86, 4.90) and more moderate among participants with emergency cash reserves (Adjusted RR=1.70, 95% CI=0.31, 9.43).

Conclusion: The study results appeared to support our hypothesis despite lack of statistical significance. However, the lack of adjustment for other predictors of anxiety, and the lack of ability to generalize to other phases of the COVID-19 pandemic should be considered as caveats in the interpretation of our study findings.

Keywords: anxiety; economic distress; emergency savings; longitudinal study

INTRODUCTION

Anxiety refers to the state of emotion characterized by an inner state of turmoil and includes feelings of dread, worry, and fear. Complications from anxiety include physical health problems (e.g., coronary heart disease), behavioral health problems (e.g., other mental health disorders, suicidality, adverse health behaviors), and reduction in

one's productivity and quality of life¹. Identification of factors associated with anxiety, and factors that help to moderate these associations, can contribute to improvement in public health.

The COVID-19 pandemic did not only cause physical illness and deaths, but also induced the biggest global economic recession in nearly 100 years². Disease

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prevention and control measures led to the closure of businesses, employment losses, and worldwide economic distress, all of which created an unstable and unpredictable environment, that could potentially exacerbate the occurrence of anxiety. This notion was supported by the observed rise of anxiety-related illnesses worldwide during the first year of the pandemic³. Studies during the pandemic showed an association between financial problems and anxiety⁴, thus it is possible that experience of broader economic problems (e.g., inability to pay for mortgage or rent in addition to loss of income or loss of employment) was also associated with anxiety during this period.

According to the ABC-X Family Stress Model⁵, an adverse event or situation can induce stress (and, effectively, anxiety), but the level of induced stress depended on other factors, including availability of resources and perception of the event or situation. The term “emergency cash reserves” refers to the availability of cash in small amounts to help meet unexpected expenses⁶. Maintenance of emergency cash reserves, even in small amount, ensures availability of resource and can potentially help reduce the extent that economic distress induces anxiety during the COVID-19 pandemic. However, studies on the association between financial or economic distress and mental health outcomes were mostly cross-sectional⁷⁻¹² results suggested that soldiers with higher credit card debts and lower perceived net worth had lower levels of subjective well-being. Soldiers with greater perceived financial knowledge and larger emergency savings accounts had higher levels of subjective well-being. Results also indicated that automobile loan debt may play a small role in the subjective well-being of soldiers. Personal financial managers, financial planners, counselors, and other military service providers can use this knowledge to identify those whose subjective well-being might be or might become impaired by personal financial distress. (PsycINFO Database Record (c, which did not allow for assessment of whether the economic distress event actually preceded the occurrence of mental health problems. Furthermore, longitudinal studies on

the association between financial or economic distress and health did not include anxiety as an outcome^{4,13} or were conducted in a population sub-group instead of the general population of a country^{14,15}. Based on the Family Stress Model, we hypothesize that: 1) economic distress is associated with anxiety, and; 2) the association between economic distress and anxiety is more moderate among those with emergency cash reserves, and stronger among those with no emergency cash reserves.

We previously conducted a cross-sectional study on the modification of the association between economic distress and prevalence of anxiety by availability of emergency cash reserves¹². Among the participants of this study, we asked for their permission to conduct a follow-up data collection in approximately 30 days after the first interview, effectively making the study a prospective cohort study with relatively short follow-up time and allowing for measurement of incidence of anxiety at follow-up among those who screened negative for anxiety at baseline. Longitudinal analysis of the findings from the follow-up study can allow for a stronger level of empirical evidence in support of the findings from the initial cross-sectional study, and further contribute empirical data to relevant stakeholders in mental health and economics. The objectives of this study are: 1) to describe the extent that experience of economic distress during the COVID-19 pandemic is associated with incidence of anxiety, and; 2) to describe the extent that the association between experience of economic distress and anxiety is modified by availability of emergency cash reserves.

MATERIAL AND METHODS

Study design and setting

This was a longitudinal study which included two surveys (baseline and follow-up) with approximately one month of interval period. The surveys were conducted via telephone in the general population of Thailand. We commissioned a survey research firm (Research Centre for Social and Business Development Co., Ltd. (SAB),

Bangkok, Thailand) to conduct the surveys. The first survey was conducted during 24–28 April 2021. The second survey was conducted during 26–29 May 2021 among the participants who indicated in the first survey that they wished to participate in the follow-up survey.

Study population and participants

The study population included residents of Thailand living in 15 provinces who had a cell phone number. The baseline survey's primary purpose was to assess alcohol consumption behavior in the Thai population. For this purpose, we assumed that 50% of the population were current drinkers ($p\text{-value}=0.50$). We also assumed 3% margin of error, the design effect of 1.2, and response rate of 80% (i.e., that there was a need to recruit 20% additional participants). Using R with *epicalc* package¹⁶, we obtained the final sample size of 1,537 respondents for the baseline survey.

For the analyses in this article, which included data from both surveys, our inclusion criteria were: 1) Age 18 years or older, and; 2) Agreed to participate in the follow-up survey. Our exclusion criteria were: 1) Having anxiety at baseline; 2) Being unreachable or refused to participate when contacted for the follow-up survey.

Measurement of exposure: experience of economic distress in past 30 days

Our measurement questions for experience of economic distress within 30 days prior to the survey were based on a previous study on financial stress and mental health during the COVID-19 pandemic¹⁵, and an earlier study on the association between financial stress and smoking¹⁰ and relapse among ex-smokers. **DESIGN AND PARTICIPANTS:** Data came from the first two waves of the Household Income and Labour Dynamics in Australia (HILDA). We modified the questions to suit the context of Thailand (e.g., removing the term “heating” from the question on inability to pay for utilities) and translated the questions to the Thai language.

Measurement of outcome: anxiety

We measured anxiety in the surveys with the Thai version of the GAD-7 questionnaire¹⁷, which was directly translated from the English-language version. In both baseline and follow-up survey, we considered participants who had the GAD-7 score of 10 points or higher as having anxiety. The cut-off point allows for 68% sensitivity and 88% specificity in screening for ‘any anxiety disorder’¹⁸. However, as the diagnosis of anxiety disorders required a thorough assessment of the extent that anxiety affected daily lives and functions, which was not possible in the context of a phone-based interview, we decided to refer to the participants with GAD-7 score above the cut-off point in the broad sense of having “anxiety”, and those with score below the cut-off point as having “no anxiety”.

Measurement of effect modifier: availability of emergency savings

We adapted a question from a survey of the United States Federal Reserve on how US household members would cover an emergency expense of approximately 400 US dollars¹⁹, with adjustment for purchasing power based on the ratio between Thailand's GDP (PPP) per capita and GDP (nominal) per capita^{20,21}. We referred to the amount of 5,000 Thai Bahts (approximately 150 US Dollars) in our survey question, and directly translated both the question format and the answer choices, allowing for multiple-item responses. We also added the terms “within one week” to the question, with the intention to create a timeline to meet the expense and more closely mimic real-world scenarios. We considered participants who answered that they would cover the expense with cash or cash equivalent who did not report the intention to use credit cards, bank loans, payday loans, lines of credit, or selling/pawning personal possession to be those with available emergency cash reserves. We treated those who refused to answer as having missing data.

Measurement of characteristics of the study participants

We measured the characteristics of the study participants, including age, sex, marital status, education, occupation, and income, using routine measurement questions used by SAB.

Study instruments

Our study instrument was a structured phone-based interview questionnaire, which was based on a template routinely used by SAB and subjected to our further modifications to add the study variables. The developed instrument was pilot-tested by SAB enumerators among randomly selected potential participants, and SAB staff made further modifications in collaboration with the investigators based on the feedback obtained during pilot-tests. The final version of the questionnaire required approximately 5–10 minutes to administer to each participant.

Participant recruitment and data collection

The SAB survey team had a list of mobile phone users and their phone numbers in their possession, from which the potential participants in the study were randomly selected. The SAB management team assigned a minimum target number of respondents in each province to each data collection team, who then used a software package to assist in completing the interview questionnaire with auto-checks for data inconsistencies and potential errors.

Data management and analysis

SAB assigned supervisors to data collection teams, whose responsibility was to perform validation assessments during data collection and data entry. We performed descriptive statistical analyses using primarily frequencies and percentages. We grouped those who finished junior high school or below (i.e., those who finished Matthayom 3 or Grade 9, or below) to increase statistical power. We also grouped those who reported having finished vocational education with those who finished senior high

school (i.e., Matthayom 6 or Grade 12), and those who finished an associate's degree with those who finished the higher vocational diploma, as both of these required the same length of formal education (12 years and 14 years, respectively). Similarly, we grouped similar occupations into the same categories.

We assessed the association between experience of economic distress and anxiety using univariate and multivariate log-binomial regression analyses. We designated demographic characteristics of the study participants as covariates in multivariate analyses based on the protocols of previous studies on similar questions^{4,10}. To assess effect modification in the association between economic distress and anxiety, we stratified the analyses by the availability of emergency cash reserves (or lack thereof), assessed the heterogeneity of the Unadjusted RR using the Breslow-Day Test of Heterogeneity, and considered the p -value < 0.05 to be an indication of potential effect modification. All regression analyses were conducted at 95% level of confidence.

We also performed sensitivity analyses to assess the extent to which non-response and loss-to-follow-up could have introduced selection bias into our study findings. For this purpose, we re-analyzed our study data based on two assumptions: 1) that all those lost to follow-up had anxiety, and; 2) that all those lost to follow-up did not have anxiety. Analyses based on each of the assumptions were conducted separately.

Ethical considerations

SAB routinely conducted public opinion polls on behalf of public and private sector organizations. Specifically for the surveys in this study, we drafted a participant information, age verification question, and verbal informed consent for the baseline and follow-up surveys for the SAB data collection team. The participant information script included the identification of SAB and the investigators' organization, the title of the study, the approximate length of interview, the purpose of the study, assessment of whether

the participant was 18 years of age or older (which was followed by inclusion or exclusion of the participant), the ability of the participant to refuse to answer question or stop the interview at any time, the name and contact information of SAB's manager in case of questions regarding the survey, and a prompt for the participant to ask question regarding the survey. The participant information script was followed by the verbal informed consent script for both the baseline and the follow-up surveys (for those who consented to the baseline survey). We opted for verbal informed consent based on practicality in the context of phone-based interviews. Before conducting baseline data collection, SAB trained the data collection team on the survey interview procedures, including the participant information and verbal consent processes.

SAB sent anonymized study data to the investigators for analyses and publication of this manuscript. The investigators have received approval for the analysis of the anonymized study data as a secondary data analysis (Human Research Ethic Committee, Faculty of Medicine, Prince of Songkla University; Approval Number: REC. 62-054-18-1).

RESULTS

At baseline, enumerators at the research firm telephoned a total of 2277 persons, 1555 of whom agreed to participate in the baseline survey (non-participation=722/2277=31.7%). Among baseline survey participants, 1326 participants were found to be free from anxiety at baseline and agreed to participate in the follow-up survey, 1135 of whom could be reached and participated in the survey (loss-to-follow-up=191/1326=14.4%). The numbers of potential participants and the exclusion processes are shown in detail in [Figure 1](#).

The majority of participants were female, married with child(ren), had a high school education or less, worked in manual labor or agriculture, and earned 20,000 THB (approximately 600 USD) per month or less ([Table 1](#)). Three-fifths of participants experienced at least one form

of economic distress within 30 days prior to the survey. Only one-fifth of the study participants said that they would cover an emergency expense of 5,000 Thai Baht using cash without resorting to other measures. Approximately 4 percent of the participants reported incident anxiety at follow-up.

Assessment of the association between experience of economic distress in 30 days before the survey and anxiety showed that those who experienced distress had a higher incidence of anxiety than those who did not experience distress, although this association was not statistically significant after adjusting for covariables (Adjusted RR=1.81; 95% CI=0.89, 3.65) ([Table 2](#)). When stratified by the availability of emergency cash reserves, the association was stronger among participants with no emergency cash reserve than among participants with emergency cash reserves ([Table 3](#)). However, the Breslow-Day test indicated that the difference was not statistically significant, and that the difference became smaller after adjustment for covariables (among participants with no emergency cash reserves: Adjusted RR=2.05, 95% CI=0.86, 4.90; among participants with emergency cash reserves: Adjusted RR=1.70, 95% CI=0.31, 9.43).

Sensitivity analyses suggested that if all of those lost to follow-up had anxiety, the association between economic distress and anxiety was not statistically significant (Adjusted RR=1.27; 95% CI=0.98, 1.64) ([Table 4](#)). Assuming that those lost to follow-up had anxiety, the association between economic distress and anxiety was statistically significant (Adjusted RR=2.18; 95% CI=1.09, 4.35). When stratified by availability of emergency cash reserves and assumed that all of those lost to follow-up had anxiety, the association between economic distress and anxiety did not significantly differ between the two strata (Breslow-Day Test of heterogeneity p-value=0.110). However, when stratified by availability of emergency cash reserves and assumed that all of those lost to follow-up did not have anxiety, the association between economic distress and anxiety significantly differed between the two strata (Breslow-Day

Table 1 characteristics of the study participants (n=1,135 participants)

Characteristic	Frequency (%)
Gender	
Male	536 (47.2)
Female	599 (52.8)
Age (years) (mean±S.D.)	41.2±13.0
Marital status	
Single	358 (31.5)
Married with child(ren)	553 (58.4)
Married, no children	48 (4.2)
Widowed/divorced/separated	66 (5.8)
Highest level of education completed	(n=1,133)
Junior high school or lower	421 (37.2)
High school or equivalent	313 (27.6)
Associate's degree or equivalent	115 (10.2)
Bachelor's degree	264 (23.3)
Graduate degree	20 (1.8)
Primary occupation	
Group 1 (civil service employees, private company employee, own business, independent professionals e.g., lawyer or architects)	367 (32.3)
Group 2 (vendors, manual labors, agricultural workers)	612 (53.9)
Group 3 (retired, students, unemployed, others)	156 (13.7)
Personal monthly income	(n=1,124)
No more than 5,000 THB	112 (10.0)
5,001–10,000 THB	291 (25.9)
10,001–20,000 THB	465 (41.4)
20,001–30,000 THB	174 (15.5)
30,001–40,000 THB	56 (5.0)
40,001–50,000 THB	18 (1.6)
More than 50,000 THB	8 (0.7)
Experience of economic distress in the past 30 days (measured at baseline)	
Lost work or primary source of income for three months or longer (n=1,132)	449 (39.7)
Had reduced pay or days of work (n=1,133)	188 (16.6)
Been unable to pay for electricity, water, or telephone bills on time (n=1,132)	220 (19.4)
Been unable to make mortgage payment/car payment/installments/rent payments on time (n=1,134)	302 (26.6)
Pawned or sold something in order to raise enough cash to pay for necessity (n=1,134)	214 (18.9)
Gone without meals at least once (n=1,134)	11 (1.0)
Asked for financial help from friends or family (n=1,132)	267 (23.6)
Asked for help from welfare/community organization (n=1,133)	12 (1.1)
Experienced at least 1 economic distress in past 30 days (n=1,127)	665 (59.0)
Emergency expense: suppose that you have an emergency expense that costs 5,000 THB, how would you pay for this expense within one week? (measured at Baseline; multiple responses allowed)	(n=1,100)
Put it on my credit card and pay it off in full at the next statement	14 (1.3)
Put it on my credit card and pay it off in installments	25 (2.3)
With the money in my savings account, cash, or other liquid assets	392 (35.6)
Using money from a bank loan or line of credit	35 (3.2)
Borrowing from friends or family members	606 (55.1)
Using a payday loan, deposit advance, or overdraft	106 (9.6)
Selling a personal belonging	189 (17.2)
Pawning a personal belonging	243 (22.1)
I would not be able to find money to pay for the expense	83 (7.5)
Participant with emergency cash reserve available*	211 (19.2)
Anxiety screening test (GAD-7) results at follow-up	
No anxiety (GAD-7 score <10 points)	1,087 (95.8)
Anxiety (GAD-7 score ≥10 points)	48 (4.2)

THB=Thai baht

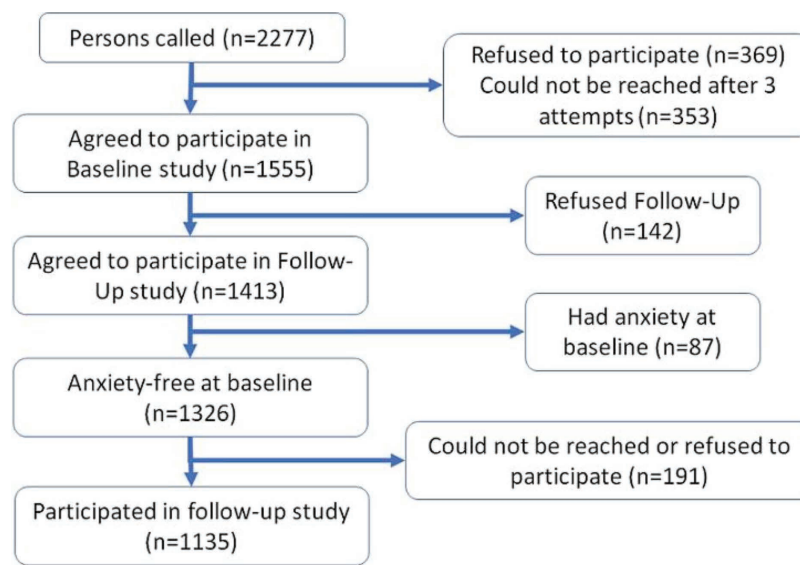


Figure 1 Flow chart of study participants

Table 2 Association between experiences of economic distress during COVID-19 pandemic and incidence of anxiety (n=1,127 participants)

Economic distress	No anxiety (%)	Anxiety (%)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)*
Did not experience distress (n=462)	451 (97.6)	11 (2.4)	1 (Ref.)	1 (Ref.)
Experienced distress (n=665)	629 (94.6)	36 (5.4)	2.27 (1.17, 4.42)	1.81 (0.89, 3.65)

RR=relative risk, CI=confidence interval

*Adjusted for sex, age, marital status, education level, occupation, personal monthly income, and experience of economic distress during the interim period between baseline and follow-up

Test of heterogeneity p -value=0.020). However, under both assumptions, the association between experience of economic distress and anxiety was lower among participants with emergency cash reserves than among participants with no emergency cash reserves.

DISCUSSION

In this study, we described the extent that experience of economic distress was associated with incidence of anxiety during the COVID-19 pandemic, and the extent that the mentioned association varied by availability of emergency cash reserves. Our hypothesis was that having

emergency cash reserves, even in small amount of 5000 THB (approximately 150 USD or 135 EUR), would act as a cushion against the supposed effect of economic distress on health. Although not statistically significant, our study findings did concur with the study hypothesis: the association between experience of economic distress and incidence of anxiety was smaller among participants with emergency cash reserves than participants without emergency cash reserves. The findings of this study contribute to the empirical evidence that is potentially useful for stakeholders in behavioral health and economics.

Table 3 Variation in the association between experience of economic distress during COVID-19 pandemic and incidence of anxiety by availability of THB 5,000 in emergency cash reserve (n=1,092 participants)

	No anxiety (%)	Anxiety (%)	Unadjusted RR (95% CI)*	Adjusted RR (95% CI)**
Among those with no emergency cash reserves (n=882)				
Did not experience distress (n=302)	296 (98.0)	6 (2.0)	1 (Ref.)	1 (Ref.)
Experienced distress (n=580)	547 (94.3)	33 (5.7)	2.86 (1.21, 6.76)	2.05 (0.86, 4.90)
Among those with emergency cash reserves (n=210)				
Did not experience distress (n=128)	124 (96.9)	4 (3.1)	1 (Ref.)	1 (Ref.)
Experienced distress (n=82)	79 (96.3)	3 (3.7)	1.17 (0.27, 5.10)	1.70 (0.31, 9.43)

RR=relative risk, CI=confidence interval

*Breslow-Day test of homogeneity p-value=0.299; the unadjusted RR in the two strata did not significantly differ from one another

**Adjusted for sex, age, marital status, education level, personal monthly income, and experience of economic distress during the interim period between baseline and follow-up

Table 4 Sensitivity analyses on the association between experience of economic distress and anxiety, assuming that those who were lost to follow-up did and did not have anxiety (n=1,316 participants)

	No anxiety (%)	Anxiety (%)	Unadjusted RR (95% CI)*	Adjusted RR (95% CI)**
Assuming that all of those lost to follow-up had anxiety				
Overall association (n=1316)				
Did not experience distress (n=533)	451 (84.6)	82 (15.4)	1 (Ref.)	1 (Ref.)
Experienced distress (n=783)	629 (80.3)	154 (19.7)	1.28 (1.00, 1.63)	1.27 (0.98, 1.64)
Among those with no emergency cash reserves (n=1029)				
Did not experience distress (n=344)	296 (86.0)	48 (14.0)	1 (Ref.)	1 (Ref.)
Experienced distress (n=685)	547 (79.9)	138 (20.1)	1.44 (1.07, 1.95)	1.37 (1.01, 1.87)
Among those with emergency cash reserves (n=249)				
Did not experience distress (n=154)	124 (80.5)	30 (19.5)	1 (Ref.)	1 (Ref.)
Experienced distress (n=95)	79 (83.2)	16 (16.8)	0.86 (0.50, 1.50)	1.00 (0.55, 1.81)
Assuming that all of those lost to follow-up did not have anxiety				
Overall association (n=1316)				
Did not experience distress (n=533)	522 (97.9)	11 (2.1)	1 (Ref.)	1 (Ref.)
Experienced distress (n=783)	747 (95.4)	36 (4.6)	2.23 (1.14, 4.34)	2.18 (1.09, 4.35)
Among those with no emergency cash reserves (n=1029)				
Did not experience distress (n=344)	339 (98.3)	6 (1.7)	1 (Ref.)	1 (Ref.)
Experienced distress (n=685)	652 (95.2)	33 (4.8)	2.76 (1.17, 6.53)	2.67 (1.12, 6.38)
Among those with emergency cash reserves (n=249)				
Did not experience distress (n=154)	150 (97.4)	4 (2.6)	1 (Ref.)	1 (Ref.)
Experienced distress (n=95)	92 (96.8)	3 (3.2)	1.22 (0.28, 5.31)	1.11 (0.22, 5.48)

RR=relative risk, CI=confidence interval

*Assuming those lost to follow-up had ANXIETY, Breslow-Day test of homogeneity p-value=0.110; the unadjusted RR in the two strata did not significantly differ from one another

*Assuming those lost to follow-up did not have ANXIETY, Breslow-Day test of homogeneity p-value=0.020; the unadjusted RR in the two strata significantly differed from one another

**Adjusted for sex, age, marital status, education level, personal monthly income, and experience of economic distress during the interim period between baseline and follow-up

Remark: the risk ratios in "the two strata" in this footnote refers to the RR when assumed that all of those who were lost to follow-up had anxiety, and the RR when assumed that all of those who were lost to follow-up did not have anxiety

Although there was considerable non-participation and loss-to-follow-up among our study participants (final sample size=1135 of 2277 persons contacted at baseline=49.8%), the demographics of the participants who were included in the analyses closely reflected the general population of Thailand aged 18 years and over with regard to sex and age distributions²². Sensitivity analyses results also showed that the associations between economic distress and anxiety (overall and stratified) were robust and not affected by loss-to-follow-up. These findings suggested that non-participation and loss-to-follow-up might have occurred at random and were unlikely to introduce selection bias to the study findings.

We assessed the role of having emergency cash reserves as a potential modifier (moderator) of the effect of economic distress and anxiety. However, if we were to fully consider ABC-X Family Stress Model⁵, financial resources that can potentially help to moderate the effect of economic distress may also include availability of health insurance, social security, and other forms of public welfare²³. Social support, the availability of services and resources from one's social circle, can also moderate symptoms of anxiety²⁴. Future studies should include these variables on the measurement of available resources.

We found an association between experience of economic distress and anxiety. The findings of this study supported a previous longitudinal study with similar follow-up timeline⁴, although we incorporated additional indicators of economic distress¹⁰ in order to broaden the context of the stressor. Anxiety is associated with hyperreactivity to stressors¹, and the longitudinal study design enabled us to measure the experience of economic distress among those who were free from anxiety, then measure anxiety at follow-up, allowing for a clearer temporal sequence in the association of interest. However, more than half of our participants were past their mid-30s, i.e., past the average age of onset of anxiety¹. Thus, the reported anxiety in this study could be interpreted either as first onset or recurrence

of anxiety at follow-up among the study participants who did not report prevalent anxiety at baseline.

Although not statistically significant, our study findings did seem to support our hypothesis regarding the role of emergency savings as an effect modifier, i.e., a moderator. One implication of these findings for stakeholders in mental health would be to consider incorporating the identification of those who are vulnerable to job or income loss and providing information or resources to help improve adaptability into their routine practice. A notable example of this would be the Bank of Thailand's assistance measures during the COVID-19 pandemic²⁵. Likewise, stakeholders in family economics should consider working in collaboration with stakeholders in mental health to develop measures that can moderate the impact of economic distress on mental health, which in turn reduces workers' productivity¹.

Our study data did not include all components of the ABC-X family stress model proposed by Boss^{5,26}. Thus the association between economic distress and anxiety could also have been modified by the locus of control of each participant, i.e., the perception that the economic distress was within one's domain of control (internal locus) or outside of one's domain of control (external locus)^{5,26}. However, a previous study found no association between economic locus of control and prevalent anxiety, depression, stress and well-being among UK residents¹⁴.

Furthermore, the measurement of the availability of emergency cash reserves in our study could be subject to social desirability bias, if participants deemed financial liquidity to be a socially desirable trait, resulting in misclassification of those without emergency cash reserves as those with emergency cash reserves. Considering that those without emergency cash reserves had stronger association between economic distress and anxiety, if the misclassification indeed occurred, the difference in the association between economic distress and anxiety

would have been even more different than the observed values, making our study findings conservative. Thus, social desirability bias with regard to availability of emergency cash reserves was not a likely threat to the validity of our study findings.

The strengths of our study were: 1) the longitudinal study design, which helped to establish the temporal sequence of the measured variables, and; 2) the use of random digit dialing of mobile phone users, which helped to increase the potential generalizability of the study findings to the base population (general population of Thailand, aged 18 years and older). However, a number of limitations should be considered in the study findings. Firstly, we designed the study questionnaire to be brief in order to allow for phone-based general population surveys, thus we did not measure other predictors of anxiety, such as family history of anxiety, personality trait, coping ability, co-morbidities, and experience of other stressful life events. Future studies on the association between economic distress and anxiety should consider measurement of these additional factors to adjust for their influence. Lastly, our study was conducted during the second wave of the COVID-19 pandemic in Thailand in mid-2021, when social distancing measures were re-introduced after easing of restrictions in late 2020. The findings of this study may not be generalizable to other periods or other socioeconomic contexts.

CONCLUSION

Based on data from a longitudinal study with relatively short follow-up time, we tested the hypothesis that the association between economic distress and incident anxiety during the COVID-19 pandemic in the general population of Thailand was weaker among those with available emergency cash reserves than among those without available emergency cash reserves. Our study findings seemed to support the hypothesis, despite the lack of statistical significance. However, we did not adjust for a number of other predictors of anxiety in our analyses, and the findings of our study may not be generalizable

beyond the context of the second wave of the pandemic, when social distancing measures were re-introduced. These caveats should be considered in the interpretation of our study findings.

Data availability

The de-identified study data and analysis codes are available from the corresponding author upon reasonable request.

Disclosure statement

No potential conflict of interest was reported by the authors.

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CONFLICT OF INTEREST

No conflicts of interest declared.

REFERENCES

1. Newman MG, Llera SJ, Erickson TM, Przeworski A, Castonguay LG. Worry and generalized anxiety disorder: a review and theoretical synthesis of evidence on nature, etiology, mechanisms, and treatment. *Annu Rev Clin Psychol* 2013;9:275–97.

2. Zumbrun J. Coronavirus slump is worst since great depression. Will it be as painful? Wall Street J [serial on the Internet]. 2019 [cited 2022 Feb 9]. Available from: <https://www.wsj.com/articles/coronavirus-slump-is-worst-since-great-depression-will-it-be-as-painful-11589115601>
3. Santabábara J, Lasheras I, Lipnicki DM, Bueno-Notivol J, Pérez-Moreno M, López-Antón R, et al. Prevalence of anxiety in the COVID-19 pandemic: an updated meta-analysis of community-based studies. *Prog Neuropsychopharmacol Biol Psychiatry* 2021;109:110207.
4. Hertz-Palmor N, Moore TM, Gothelf D, DiDomenico GE, Dekel I, Greenberg DM, et al. Association among income loss, financial strain and depressive symptoms during COVID-19: Evidence from two longitudinal studies. *J Affect Disord* 2021;291:1-8.
5. Boss P. Family Stress Management: a contextual approach 2nd ed. California: Sage Publications, Inc; 2012.
6. Chen A. Why are so many households unable to cover a \$400 unexpected expense? [monograph on the Internet]. Newton: Center for Retirement Research at Boston College; 2019 [cited 2022 Feb 9]. Available from: https://crr.bc.edu/wp-content/uploads/2019/07/IB_19-11.pdf.
7. Bell MM, Nelson JS, Spann SM, Molloy CJ, Britt SL, Goff BSN. The impact of financial resources on soldiers' well-being. *J Financ Couns Plan* 2014;25:41-52.
8. Bridges S, Disney R. Debt and depression. *J Health Econ* 2010;29:388-403.
9. Ford MR, Ellis ÉM, Goetz J, Archuleta KL, Gale JE, Grossman B, et al. Depression and financial distress in a clinical population: The value of interdisciplinary services and training. *Contemp Fam Ther* 2020;42:5-14
10. Siahpush M, Carlin JB. Financial stress, smoking cessation and relapse: results from a prospective study of an Australian national sample. *Addiction* 2006;101:121-7.
11. Sweet E, Nandi A, Adam EK, McDade TW. The high price of debt: household financial debt and its impact on mental and physical health. *Soc Sci Med* 2013;91:94-100.
12. Wichaidit W, Prommanee C, Choocham S, Chotipanvithayakul R, Assanangkornchai S. Modification of the association between experience of economic distress during the COVID-19 pandemic and behavioral health outcomes by availability of emergency cash reserves: findings from a nationally-representative survey in Thailand. *PeerJ* 2022;10:e13307.
13. Richardson T, Elliott P, Waller G, Bell L. Longitudinal relationships between financial difficulties and eating attitudes in undergraduate students. *Int J Eat Disord* 2015;48:517-21.
14. Frankham C, Richardson T, Maguire N. Do locus of control, self-esteem, hope and shame mediate the relationship between financial hardship and mental health? *Community Ment Health J* 2020;56:404-15.
15. Richardson T, Elliott P, Roberts R, Jansen M. A longitudinal study of financial difficulties and mental health in a national sample of british undergraduate students. *Community Ment Health J* 2017;53:344-52.
16. Chongsuvivatwong V. Analysis of epidemiological data using r and epicalc. Songkhla: Epidemiology Unit, Prince of Songkla University; 2015;p.314
17. Faculty of Medicine Ramathibodi Hospital. General Anxiety Disorder (GAD-7) Questionnaire [homepage on the Internet]. Bangkok: Faculty of Medicine Ramathibodi Hospital Mahidol University; 2018 [cited 2021 May 21]. Available from: <https://med.mahidol.ac.th/ramamental/questionnaire>
18. Kroenke K, Spitzer RL, Williams JBW, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med* 2007;146:317-25.
19. Board of Governors of the Federal Reserve System. Report on the Economic Well-Being of U.S. Households in 2018 [homepage on the Internet]. Washington, DC: Federal Reserves; 2019 [cited 2021 May 21]. Available from: <https://www.federalreserve.gov/publications/files/2018-report-economic-well-being-us-households-201905.pdf>
20. World Bank. GDP per capita (current US\$) [homepage on the Internet]. Washington, DC: World Bank; 2021 [cited 2021 May 21]. Available from: https://data.worldbank.org/indicator/ny.gdp.pcap.cd?most_recent_value_desc=true
21. World Bank. GDP per capita, PPP (current international \$) [homepage on the Internet]. Washington, DC: World Bank; 2021 [cited 2021 May 21]. Available from: https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?most_recent_value_desc=true
22. Thailand National Statistical Office. Demographics, Population, and Household Statistics [homepage on the Internet]. Bangkok: National Statistical Office; 2020 [cited 2021 Oct 7]. Available from: <http://statbbi.nso.go.th/staticreport/page/sector/th/01.aspx>
23. Fallon B, Lefebvre R, Collin-Vézina D, Houston E, Joh-Carnella N, Malti T, et al. Screening for economic hardship for child welfare-involved families during the COVID-19 pandemic: a rapid partnership response. *Child Abuse Negl* 2020;104706.
24. Dour HJ, Wiley JF, Roy-Byrne P, Stein MB, Sullivan G, Sherbourne CD, et al. Perceived social support mediates anxiety and depressive symptom changes following primary care intervention. *Depress Anxiety* 2014;31:436-42.
25. Bank of Thailand. Bank of Thailand and Assistance Measures during the COVID-19 Pandemic Situation [homepage on the Internet]. Bangkok: Bank of Thailand; 2020 [cited 2022 Mar 27]. Available from: <https://www.bot.or.th/covid19/Pages/default.aspx>
26. Prawitz AD, Kalkowski JC, Cohart J. Responses to economic pressure by low-income families: Financial distress and hopefulness. *J Fam Econ* 2013;34:29-40.