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COVID-19: Coping Strategies Predicting Mental Health Outcomes

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Abstract

The rates of COVID-19 cases and deaths caused are increasing. Studies have been reporting the inclining rate of psychological distress during the pandemic, which calls for attention to how the pandemic has impacted mental health outcomes. Coping strategies are helpful when it comes to predicting mental health outcomes. However, limited studies looked at coping strategies predicting mental health outcomes longitudinally. The study hypothesized that psychological distress would decrease during mid-pandemic and adaptive coping strategies such as active coping, acceptance, positive reframing, instrumental support, emotional support, religion, humor, and planning decrease psychological distress while maladaptive included denial and venting, behavioral disengagements, substance use, self-blame, self-distraction. Current study collected participants from social media platform and university students since April to June 2020 via online survey. A series of linear mixed models expressed the relationship between coping strategies and psychological distress during the pandemic. Results found statistical significance in denial, substance use, behavioral disengagement, venting, humor, and self-blame as maladaptive ($p < .001$). No coping strategies that associated with decreased psychological distress was found. However, exploratory results showed that acceptance, active coping, and positive reframing had different positive predictions on depression, anxiety, and stress. The study implies that coping strategies during a pandemic, alternative to denial, substance use, behavioral disengagement, venting, humor, and self-blame, should be further explored. It also informs the need to appraise the situation before deploying certain coping strategies.

Introduction

On March 11th, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic (WHO, 2020). In the hope of controlling the spread and reducing further cases, social isolation and quarantine periods were implemented. As of December 10th, 2021, according to WHO, there have been a total of 267 million confirmed cases and 5.2 million deaths globally (WHO, 2021). Previous studies on past pandemics have shown that pandemics or disease outbreaks correlate with adverse mental health outcomes (Lee et al., 2007; Jeong et al., 2016; Brooks et al., 2020; Wang et al., 2020; Thompson et al., 2017). As revealed in previous studies, social isolation during COVID-19 is associated with increased depression, anxiety, and stress (Wang et al., 2020; Pietrabissa & Simpson, 2020; Rogers et al., 2020; Smith et al., 2020; Kumar & Nayar, 2021; Zhao et al., 2020). Dubé et al. (2021) found that the rate of suicidal ideation increased during the pandemic, especially for younger people, women, and those residing in democratic countries. Several studies found an increase in the rate of depression, anxiety, and a poor sleep quality during COVID-19 (Huang & Zhao, 2020; Zimmermann et al., 2021; Li et al., 2021). A meta-analysis found that within 89 studies of depression, anxiety, and sleep disturbance for college and university students, 34% reported depressive symptoms, 32% anxiety symptoms, and 33% sleep disturbances during the pandemic (Deng et al., 2021). In 2020, the rates of depressive and anxiety symptoms were progressively more prevalent during March and April than in January and February (Deng et al., 2021; Upton et al., 2021). Additionally, a study by Bareeqa et al. (2021) helped clarify the impact of COVID-19 on mental health status in China; the study found very high rates of stress and moderately high depression and anxiety reported across 19 studies during early periods of the pandemic. In the middle of 2021, the Delta variant emerged and have been circulating since (Centers for Disease Control and Prevention, 2021). As of the time of writing, another new variant, Omicron, accompanied by several mutations has emerged

(WHO, 2021). It is believed that the mutated virus has a higher transmission rate and spreads even faster than previous versions such as Delta (Centers for Disease Control and Prevention, 2021). However, more studies are underway to determine the severity of Omicron and the effectiveness of existing vaccines against it. The emergence of the new variant may worsen the psychological impacts of the pandemic due to more potential severity of psychological distress. Both of these variants were declared as “variant[s] of concern” (Centers for Disease Control and Prevention, 2021)

Coping strategies are behavioral and cognitive responses engaged to "minimize, avoid, tolerate, accept, and master" the internal or external psychological distress an individual experiences (Folkman & Lazarus, 1984). Many theories of coping strategies have been developed throughout the years; some of the widely applied theories include emotion-focused vs. problem-focused (Folkman & Lazarus, 1984; Carver et al., 1989) and task-oriented vs. emotion-oriented vs. avoidance-coping (Parker & Endler, 1992). According to Folkman and Lazarus (1984), the effectiveness of a coping strategy is dependent upon the match between the type of coping strategy and the appraised changeability of a stressor, also known as the goodness-of-fit hypothesis or the transactional model of stress and coping. The model can be useful to understand why individuals cope differently. Folkman and Lazarus’ (1984) model of “goodness of fit” was applied to individuals during the H1N1 epidemic in another study (Taha et al., 2014); it was found that individuals during H1N1 coped well with problem-focused strategies after making appraisals of stressfulness and control over the situation. In "uncontrollable situations," emotion-focused coping is more likely to be engaged than problem-focused coping. For example, Ben-Zur and Zeidner (1995) found that emotion-focused coping mechanisms were more likely to be engaged than problem-focused during war or in a situation beyond one's control. The current pandemic is, in many ways,

uncontrollable due to widespread outbreaks of the virus and the large number of deaths caused by it.

Developing from just problem-focused and emotion-focused coping, according to Carver et al. (1989), coping can be understood as comprising 13 dimensions in three categories: problem-focused coping, emotion-focused coping, and dysfunctional strategies. Carver and colleagues designed the Coping Orientation to Problems Experienced (COPE) Inventory (Carver et al., 1989) to measure different coping strategies. Problem-focused coping includes "active coping, planning, suppression of competing activities, restraint coping, and seeking instrumental social support" (Carver et al., 1989, p. 267). The suppression of competing activities involves putting away other activities to deal with the existing stressor. Restraint coping refers to not taking premature actions when dealing with a stressor, until a good opportunity emerges (Carver et al., 1989). Emotion-focused coping involves seeking social support for emotional causes, positive reframing and growth, acceptance, denial, and religion. Finally, Carver et al. (1989) deemed dysfunctional coping strategies refer to venting, behavioral disengagement, and mental disengagement. Humor and substance use were also included in the COPE inventory but were not categorized. The original COPE went through some modifications as it was too long and became Brief COPE. In the shortened version, suppression of competing activities and restraint coping were removed while items on self-blame were added into the shortened version of the COPE Inventory, the Brief COPE (Carver, 1997). Other modifications include changing “mental disengagement” to “self-distraction”, and “positive reinterpretation and growth” became “positive reframing”.

Several studies have shown that coping strategies affect symptoms of depression, stress, and anxiety. For example, according to Roohafza et al. (2014), positive reframing was negatively associated with depression and anxiety. On the other hand, seeking social support

and acceptance were not protective factors of depression. Coping styles like active coping and seeking social support have inversely influenced Chinese undergraduate students' suicidal ideation (Zhang et al., 2012). The study suggested that coping strategies can serve as a protective factor and mediator between the relationship of an individual's perceived stress and suicidal ideation (Zhang et al., 2012). Additionally, mental health nurses who engaged in active coping reported lower rates of anxiety. In contrast, nurses who engaged in emotion-focused coping like praying, denial, avoidance, and escape behavior had an increased symptoms of depression (Tsaras et al., 2018). Mahmoud et al. (2012) found that students who engaged in denial, self-blaming, and substance use were subjected to higher rates of depression, anxiety, and stress. Mahmoud et al. (2012) also found religiousness helpful for stress and depression. Langford et al. (2020) looked at coping and distress among patients receiving chemotherapy and found that patients who engaged in active coping, positive reframing, acceptance, emotional support predicted better mental health outcomes than those who engaged in denial, venting, behavioral disengagement, and self-blame. All these studies show how coping strategies have impacted mental health outcomes, but it is important to acknowledge the differential context within these studies.

Furthermore, a number of studies were conducted on coping strategies and how it impacts mental health during previous pandemics. During the H1N1 pandemic, emotion-focused strategies predicted higher anxiety while problem-focused strategies predicted lower anxiety (Taha et al., 2014). Avoidant coping was found to predict higher levels of life satisfaction for Chinese college students' during the SARS pandemic (Main et al., 2011), although it was suggested that this may be due to cultural differences in coping mechanisms between Eastern and Western culture. Additionally, a qualitative study found that Ebola survivors engaged in self-distraction and religion by immersing themselves in books and the Bible to cope with psychological distress (Rabelo et al., 2016). However, Rabelo et al. (2016)

emphasized the religious means were subjected to cultural connection and not generalizable outside of study. The limited number of studies on the relationship of coping mechanisms and psychological distress during previous pandemics highlight the need for more during the COVID-19 pandemic.

Fortunately, more studies investigating the relationship between coping strategies and psychological distress during the COVID-19 pandemic were found. Gurvich et al. (2020) found that self-blame and behavioral disengagement were associated with higher levels of depression; acceptance and humor were associated with lower stress levels. A study by Yu et al. (2020) suggested active coping and seeking social support are correlated with lower psychological distress. Akbar and Aisyawati (2021) found that problem-focused coping predicted lower psychological distress. Although extensive research has been conducted on coping strategies during the COVID-19 pandemic, most studies have been cross-sectional (Agha, 2020; Babore et al., 2020; Dawson & Golijani-Moghaddam, 2020; Gurvich et al., 2020; Yu et al., 2020; Taylor et al., 2020; Wu et al., 2020). The disadvantage of cross-sectional studies may not provide data on causal relationships. It also only examines a population during one snapshot of time, rather than multiple time-points, which would allow the study to examine trends and patterns over time. Therefore, there is a need for more longitudinal studies on how coping strategies affect psychological distress during COVID-19.

With these previous literatures taken into account, adaptive coping strategies are coping behaviors that seeks to define the stressor and directly taking actions that will lead to less psychological distress; maladaptive coping strategies are coping behaviors that escapes or avoids the stressor which will lead to failure to resolve the problem and more psychological distress (Carver et al., 1989; Meyer, 2001; Mahmoud et al., 2012). Henceforth, adaptive coping strategies would include active coping, acceptance, religion, positive

reframing, planning, humor, instrumental support, and emotional support and maladaptive would include denial, venting, behavioral disengagements, substance use, and self-blame.

The current study investigates how coping strategies predict mental health outcomes during the COVID-19 pandemic. Using a longitudinal research design, the study seeks to determine how different coping strategies implemented from April to June 2020 were related to individuals' depression, anxiety, and stress at three time points. The current study examined data collected from Depression, Anxiety and Stress Scales - 21 and the Brief COPE (Henry & Crawford, 2005; Carver, 1997). For the purpose of this study, adaptive coping strategies are defined as strategies adopted during the COVID-19 pandemic that bring positive mental health outcomes and maladaptive as strategies adopted that may lead to negative mental health outcomes. Current study hypothesized that engaging in adaptive coping strategies would predict lower psychological distress, while engaging in maladaptive coping would predict higher psychological distress during the pandemic. In order to address these hypotheses, we investigated the relationship between each coping strategy and psychological distress. We also investigated changes in psychological distress over time. Further exploratory analyses investigated the relationships between coping strategies and each subscale in the DASS-21 (depression, anxiety, and stress).

Findings from this study may help to clarify the most effective coping strategy to improve one’s mental health during the current pandemic and allow mental health professionals to help individuals better cope with their life stressors during such an event. In other words, results from this study may increase our awareness of the impact of various coping strategies on an individual level when distressed and allow mental health professionals to be better prepared for future pandemics, outbreaks, or disasters. Additionally, the current findings would highlight the need for research on developing adaptive strategies when safety protocols during a pandemic are implemented.

Methods

Participant characteristics

Table 1 shows the descriptive statistics for the demographic information throughout three-time points. In time point 1 (April), 277 participants responded; time point 2 (May) had 124 participants, while the third time point (June) had 88 participants. Most of the participants were females, White, and lived with other people during the pandemic between these time points. The number of participants varied at each time point due to missing data in COPE and DASS scores. The average age of participants for time point 1 was 40.7 years (*SD* = 24.0). The average age dropped to 39 years (*SD* = 15.2) in time point 2. In the last time point, participants were averagely 42.5 years old (*SD* = 14.9).

Sampling procedures

The study was approved by Western Michigan University's Institutional Review Board. Data from 349 participants were collected across three time points, one month apart, from April to June 2020. Participants consisted of Western Michigan University (WMU) psychology undergraduates and others who were recruited using a snowball method through social media platforms. All participants were offered to enter a drawing for $25 Visa Gift Card. WMU psychology undergraduates were also offered extra credit opportunities for participating. Inclusion criteria consisted of being 18 years of age or older and fluent in English.

Measures

Depression, Anxiety and Stress Scales (DASS-21) (Henry & Crawford, 2005) is a 21-item self-report instrument designed to measure three types of psychological distress which includes depression, anxiety, and stress over the past week. Seven items in each subscale measure depression, anxiety, and stress on a 4-point scale, ranging from 0 to 3 points for each item. The rating scale includes "Did not apply to me at all – 0"; "Applied to me to some

degree, or some of the time – 1"; "Applied to me to a considerable degree, or a good part of time – 2"; and "Applied to me very much, or most of the time – 3". Each subscale score ranges from 0 – 21, and the total score ranges from 0 – 63. In the current study, internal consistency found was $\alpha = .94$ for each subscale: depression, stress, and anxiety.

The Brief COPE (Coping Orientation to Problems Experienced) (Carver, 1997) is a 28-item questionnaire that assesses 14 coping strategies using 2 items for each subscale. The rating scale for each item includes four options: "I haven't been doing this at all – 1", "I've been doing this a little bit – 2", "I've been doing this a medium amount – 3", "I've been doing this a lot – 4". Coping strategies examined include (a) self-distraction, or engaging in activities to avoid thinking about difficult situations, (b) active coping, or initiating proactive efforts when faced with difficult situations, (c) denial, or selectively disbelieving the reality of the situation, (d) substance use, or consuming alcohol or other substances, (e) use of emotional support, or seeking comfort and relatability from others, (f) use of instrumental support, or seeking help from others, (g) behavioral disengagement, or engaging in helplessness where one has given up on coping, (h) venting, or verbally expressing negative emotions to others, (i) positive reframing, or reinterpreting a difficult situation positively, (j) planning, or strategizing how to cope, (k) humor, or engaging in a joking manner about difficult situations, (l) acceptance, or accepting the reality of a difficult situation, (m) religion, or engaging in spiritual actions consistent with one's religious beliefs to seek a sense of comfort and stability, and (n) self-blame, or attributing the cause of a stressful situation to oneself. The questionnaire has good construct validity (Carver, 1997; García et al., 2018) and has been utilized to assess coping during the SARS outbreak (Sim et al., 2010; Wong et al., 2005).

In the current study, we measured the internal consistency of each coping subscale in the COPE. Self-distraction had an unacceptable internal consistency of $\alpha < 0.50$. Hence, self-

distraction was not reported due to internal consistency being too low. Acceptance had poor internal consistency at $\alpha = 0.57$. Coping strategies that had questionable internal consistency included active coping ($\alpha = 0.67$), venting ($\alpha = 0.64$), planning ($\alpha = 0.67$), and self-blame ($\alpha = 0.63$). Coping strategies with poor and questionable internal consistency should be interpreted with caution. Coping strategies with good internal consistency included use of emotional support ($\alpha = 0.83$) and humor ($\alpha = 0.81$). Denial ($\alpha = 0.76$), use of instrumental support ($\alpha = 0.79$), behavioral disengagement ($\alpha = 0.76$), and positive reframing ($\alpha = 0.75$) had acceptable internal consistencies. Finally, coping strategies with excellent internal consistency were substance use ($\alpha = 0.97$) and religion ($\alpha = 0.90$).

Data from other measures were also collected but were not included in the current analyses. See Smith et al. (2020) for some of these measures.

Procedure

Once participants provided informed consent, they were invited to complete the surveys online via Qualtrics. The approximate time of completing the online surveys was about 20 minutes. Data were collected during the first wave of the pandemic, specifically at three separate time points: April, May, and June of 2020.

Results

Statistical Analyses

Statistical analyses were conducted in R (R Core Team, 2016). The following packages were used: lme4 (Bates et al., 2015), furniture (Barrett & Brignone, 2017), reghelper (Hughes, 2020), emmeans (Lenth et al., 2021), pbkrtest (Halekoh & Højsgaard, 2021), tidyverse (Wickham, 2021), performance (Lüdecke et al., 2021), psych (Revelle, 2021), jtools (Long, 2019), and car (Fox et al., 2021). A series of linear mixed models, with random intercepts for participants, were used to analyze the relationship between coping strategies and psychological distress over time. First, we entered time (treated as categorical)

as a fixed effect, controlling for age and gender. Participants were added as a random effect. Then, subscales corresponding to each coping strategy were added as fixed effects in separate models. DASS scores (total and subscales) were the dependent variable. *P*-values were calculated using Satterthwaite degrees of freedom (Satterthwaite, 1946), and we controlled for multiple comparisons using the Holm method (Holm, 1979). The current study used an alpha of .05 for the statistical testing. The Holm correction method was applied to control family-wise error rate (Holm, 1979).

Data were screened for careless responding with long string (Meade & Craig, 2012) and three responses were found but not omitted from the study. Two outliers were identified using mahalanobis distance. However, we decided to not to exclude these participants as results remained the same when we ran the analyses with and without the outliers. Additionally, the number of participants decreased throughout three time-points due to attrition, given the longitudinal nature of the study.

Coping Strategies Over Time

Descriptive statistics for coping can be found in Table 2. Acceptance as a coping strategy was more commonly engaged compared to the others throughout all time points. Coping with acceptance reported in time point 1 (M = 6.6, SD = 1.3) had a higher average than time point 2 (M = 6.5, SD = 1.2) and time point 3 (M = 6.5, SD = 1.3). On the contrary, denial was engaged the least compared to the other strategies throughout all time points. Coping with denial reported in time point 1 (M = 2.7, SD = 1.2) had a higher average than time point 2 (M = 2.6, SD = 1.2) and time point 3 (M = 2.5, SD = 1.2).

Psychological Distress Over Time

See Table 3 for the descriptive statistics of reported symptoms of depression, anxiety, and stress over time. A linear mixed model with time as a fixed effect was used to determine how distress changed over the three time points, controlling for age and gender. Time was

treated as categorical, with Time 1 as the reference category for Time points 2 and 3. There were significant effects of Time 2 (est. = -1.575, β= -0.060, t = -2.39, p = .020) and Time 3 (est. = -2.208, β = -0.074, t = - 2.93, p = .004) compared to Time 1. The full model accounted for 78.4% of the variance in total DASS score. Post-hoc comparisons were run and used the Kenward-Roger method (Kenward & Roger, 1997) to estimate degrees of freedom. The *p*-values were adjusted with the Tukey method (Haynes, 2013). There was a significant difference between Time 1 and Time 3 (est. = -2.208, β = -0.074, S.E. = 0.755, df = 234, t = 2.924, p = .01), with distress decreasing. The contrast between Time 1 and Time 2 (est. = -1.575, β = -0.060, S.E. = 0.659, df = 234, t = 2.390, p = .046) was also significant. However, the comparison between Time 2 and Time 3 (est. = -0.633, S.E. = 0.806, df = 220, t = 0.786, p = .712) was not significant. Figure 1 shows the decrease of psychological distress over time.

Coping Strategies predicting Overall Psychological Distress

Linear mixed effects models, controlling for time, age, and gender, were used to examine the associations between coping strategies and their relationship to overall psychological distress over time. Statistically significant coping strategies that are associated with higher rates of distress over time can be found in Table 4, with the adjusted *p*-values. Active coping, emotional support, instrumental support, positive reframing, planning, acceptance, and religion were not significant.

Exploratory Analyses

Coping Strategies and Depression

Lower rates of depression were predicted with active coping (est. = -0.437, S.E. = 0.114, t = 3.829, $p < .001$), positively reframing a situation (est. = -0.281, S.E.=0.117, t= -2.407, p = .016), and acceptance (est.= -0.308, S.E.= 0.138, t = -2.239, p = .026). Strategies significantly associated with higher rates of depression were denial (est.= 0.920, S.E =0.164, t

= 5.609, $p < .001$), substance use (est.= 0.674, S.E.= 0.123, t = 5.503, $p < .001$), behavioral disengagement (est.=1.428, S.E.= 0.117, t =12.158, $p < .001$), venting (est.=0.571, S.E.= 0.132, t = 4.318, $p < .001$), humor (est.=0.267, S.E.= 0.119, t = 2.237, $p = .026$), and self-blame (est. = 3.045, S.E. = 0.286, t =10.652, $p < .001$). As for emotional support, instrumental support, planning, and religion, these were not significantly related to depression.

Coping Strategies and Anxiety

Positive reframing was the only coping mechanism significantly predicted with lower levels of anxiety (est. = -0.620, S.E.= 0.271, t = -2.292, $p = .002$). Coping mechanisms that significantly predicted with higher rates of anxiety included denial (est.= 0.848, S.E. = 0.129, t = 6.586, $p < .001$), substance use (est.= 0.248, S.E.= 0.101, t =2.445, $p = 0.015$), behavioral disengagement (est.= 0.829, S.E.= 0.098, t=8.436, $p < .001$), venting (est. = 0.321, S.E. = 0.107, t =3.004, $p =.003$), humor (est. = 0.416, S.E. = 0.094, t = 4.415, $p < .001$), and self-blame (est. = 0.679, S.E.= 0.102, t = 6.660, $p < .001$). No statistical significance was found for active coping, emotional support, instrumental support, planning, acceptance, or religion.

Coping Strategies and Stress

Acceptance (est.= -0.276, S.E.= 0.133, t = -2.070, $p =.039$) significantly predicted with lower rates of stress. Denial (est.= 0.981, S.E. = 0.156, t = 6.277, $p < .001$), substance use (est.= 0.419, S.E.= 0.122, t =3.448, $p =.001$), behavioral disengagement (est.= 1.174, S.E. = 0.116, t =10.095, $p < .001$), venting (est. = 0.721, S.E. = 0.127, t = 5.679, $p < .001$), humor (est. = 0.317, S.E.= 0.116, t = 2.735, $p = .006$), and self-blame (est. = 0.983, S.E. = 0.123, t = 8.011, $p < .001$) predicted higher levels of stress. No significance was found for active coping, positive reframing, and religion, emotional support, instrumental support, or planning.

Discussion

The current study hypothesized that amidst the COVID-19 pandemic: (a) adaptive coping strategies such as active coping, acceptance, positive reframing, instrumental support, emotional support, planning, humor, and religion would predict lower psychological distress and (b) maladaptive strategies such as denial, venting, behavioral disengagements, substance use, and self-blame would predict higher psychological distress. Current findings seek to inform coping strategies that predicts better mental health outcomes. It is important to note that self-distraction was not reported due to low internal consistency. Controlling for time, age, and gender, coping strategies that predicted higher psychological distress include denial, substance use, behavioral disengagement, venting, humor, and self-blame. Coping strategies that were not significant included active coping, emotional support, instrumental support, positive reframing, planning, acceptance, and religion.

Current findings on coping strategies that significantly predicted higher distress were mainly maladaptive strategies. Consistent with previous studies, individuals who engage in denial, self-blame, behavioral disengagement, and venting reports more psychological distress (Gurvich et al., 2021; García et al., 2020; Mahmoud et al., 2012; Maunder et al., 2006). Surprisingly, current study found humor predicting higher distress, which was inconsistent with previous findings (Gurvich et al., 2021; Saxon et al., 2017) that found that humor decreased stress. Coping humor is referred to as humors that shift one's perspective of a stressful situation with positive reappraisal and usually has better mental health outcomes (Wyer & Collins, 1992). Hence, evidently, humor should have predicted lesser psychological distress. However, the inconsistency may be due to the type of humor understood by participants. It is worth noting that the Brief COPE items on humor were not specific to the severity of the current pandemic; the items include "I've been making jokes about it" and "I've been making fun of the situation." (Carver, 1997). Coping humor is referred to as

humors that shift one's perspective of a stressful situation with positive reappraisal and usually has better mental health outcomes (Wyer & Collins, 1992).

Denial was the least engaged throughout three time points. Current findings on denial as a predictor of higher psychological distress is consistent with past studies (Agha, 2021; Babore et al., 2020; Chew et al., 2020; García et al., 2020). Denial is also known as a style of avoidant coping that becomes dysfunctional over time (Nahleen Bose et al., 2015). Hence, denial is not recommended, instead, practice the opposite of it, acceptance.

Current study found no relation between religion and depression, anxiety, and stress. Hence, it would not be adaptive or maladaptive, similar to findings from Gurvich et al. (2021). We hypothesized that being religious would be adaptive, however, previous findings were mixed. A study showed that turning to religion were not associated with stress, but another found religiousness led to lower depression and stress (Babore et al., 2020; Mahmoud et al., 2012). To better understand the explanation behind the current findings and previous findings, it is crucial to address how people use religion as their coping mechanism (Ano & Vasconcelles, 2005). Positive religious coping is related to positive psychological adjustment, but negative religious coping is related to negative psychological adjustment (Ano & Vasconcelles, 2005). Therefore, based on current findings, turning to religion would not be recommended as an adaptive strategy for the pandemic.

Further exploratory analysis examined how each coping strategy was related to depression, anxiety, and stress respectively. For depression, active coping, positive reframing, and acceptance were helpful. For anxiety, positive reframing was helpful. For stress, acceptance was helpful. Findings indicated that coping strategies such as denial, substance use, behavioral disengagement, humor, venting, and self-blame seemed maladaptive for depression, anxiety, and stress.

Among all the measured coping strategies, acceptance was the most engaged coping strategy, which was consistent with previous study by Shamblaw et al. (2021). In the current findings, acceptance was not related to changes in overall psychological distress. However, findings from exploratory analyses found that acceptance predicted lower levels of stress and depression, but not anxiety. Before stating the implications of this finding, it is essential to state the slight distinction between acceptance defined by Carver and Hayes. Carver defined acceptance as learning how to live with the reality of a situation (Carver et al., 1989). For Hayes, acceptance is defined as being "open, receptive, and flexible" according to every experience in life (Hayes et al., 2013). Acceptance is a big part of Acceptance and Commitment Therapy (ACT), an evidence-based behavioral and cognitive therapy (Hayes et al., 2013). The distinction shows the evolution of what it means to practice acceptance. However, it is worth noting that the general population defines acceptance as Carver does, instead of Hayes' definition. This might explain why acceptance had no relation with anxiety. Therefore, current study would recommend educating public about ACT's interpretation of acceptance. In a pre-pandemic condition, a university found a decrease in the rate of depression amongst students when provided with a virtual acceptance-based service, "The Mindful Way Through the Semester" (Sagon et al., 2018). Another study found that Chinese international students had lower stress levels once an ACT intervention was performed (Xu et al., 2020). Additionally, with the low rate of internal consistency for the subscale of acceptance from the Brief COPE, study suggests future research to implement acceptance by Hayes et al. (2013) as better predictor for positive mental health.

Present data suggest that active coping may be more effective with depression than anxiety and stress. The data is in line with findings from Chou et al. (2011) where symptoms of depression were less reported when Chinese pre-undergraduate students engaged in active coping. These students were prone to use passive coping strategies as the depressive

symptoms become more severe and when encountering extreme stress (Chou et al., 2011; Zhang et al., 2012). Additionally, study suggest that active coping can help with depression as this coping strategy is identified as a behavioral activation system in which individuals with depression engage in healthy alternative behavior instead of problem behaviors. According to Hayes and colleagues (1999), the behavioral activation approach refers to learning ways to establish and accomplish goals without pushing away thoughts and emotions. In other words, active coping allows individuals with depressive symptoms to deal with the struggles of life actively, without engaging in unhelpful avoidant behavior.

Consistent with past studies, positive reframing acts as a protective factor against depression and anxiety, but not stress (Roohafza et al., 2014; Horwitz et al., 2017; Gurvich et al., 2021). Another study suggests that positive reframing was the most adaptive coping strategy during COVID-19 (Shamblaw et al., 2021). Positive reframing did not reduce stress levels as reframing may not resolve the stressful situation itself. However, a study found that individuals who practice mindfulness are also individuals who engage in proactive coping strategies such as positive reframing and planning, to cope with stress (Weinstein et al., 2009). In other words, people who cope with positive reframing may opt to practice mindfulness exercises to help reduce stress. People with chronic illness engaged in positive reframing were more self-compassionate and reported lower stress (Sirois et al., 2015). Based on the current findings of people experiencing stress the most and relationship between positive reframing and stress, this might be due to reframing is appropriately directed and connected with the present moment.

Current study also looked at changes of psychological distress over three time-points and found that distress had decreased over time. The finding is consistent with several longitudinal studies that measured psychological distress reported during COVID-19 (Robinson & Daly, 2021; Zhou et al., 2020; Bendau et al., 2021). As data examined was

collected during April to June 2020, distress might have declined due to summer break in universities. Hence, a break from academic stress might contribute to the decrease in distress. The declining trend of distress in our findings are also in line with changes of psychological distress during previous pandemics such as H1N1 and SARS, where a peak of symptoms can be seen during the early stages of an outbreak and significantly decrease as the outbreak progresses (Bults et al., 2011; Leung et al., 2005; Cheng & Cheung, 2005). The declining rate of distress can be due to the build-up psychological resiliency and adjusting to the new changes during the initial stages (Wu et al., 2020; Shamblaw et al., 2020). Moreover, coping flexibility, the engagement of coping styles to achieve specific outcomes in different environments can also play a role in decreasing distress (Cheng et al., 2021). Besides that, effective and more adaptive coping strategies differ in various context of stressful events (Wang et al., 2018).

Implications

Based on the current findings, engaging in maladaptive strategies have shown to predict adverse mental health outcomes. The finding suggests looking for alternative method of coping, instead of denying, giving up to cope (behavioral disengagement), venting, blaming oneself, use of substances, and humoring about the current pandemic. To increase the effectiveness of alternative method, it is suggested to appraise the difficult situation and deploy coping strategies accordingly to the controllability and context of the situation (Baker & Berenbaum, 2008; Cheng et al., 2021). The alignment of current findings with previous studies, on the decrease in the rate of psychological distress subsequently in later periods of a pandemic outbreak, imply that distress experienced in the initial stages of pandemics is considered normal and we need to allow space for adjustment. In addition to room to adjust, the current findings highlight the need for government to introduce and educate the public on more effective coping strategies such as acceptance and positive reframing when

encountering global outbreaks. Government authorities can turn to mental health professionals for such ideas; for instance, implementing ACT-centered self-help books to higher education students (Levin et al., 2020).

Limitations and Future Directions

Several limitations should be addressed in the present study. Another limitation is the use of survey as a method of data collection. Self-reported data is the nature of a survey study. Self-reported data may not accurately reflect actual coping behavior that the individual used. Another limitation of self-report is that it is retrospective and may be subject to memory processes. Moreover, the survey did not collect information on participants' history of mental health. Research suggests that pre-existing psychological distress may act as a risk factor and moderates coping strategies (Zimmermann et al., 2021; Orzechowska et al., 2013; Pan et al., 2020; Favreau et al., 2021). Oppenauer et al. (2021) found that individuals with psychological disorders are strongly affected by the COVID-19 pandemic. Baker and Berenbaum (2008) suggested that the efficacy of coping strategies, problem-focused or emotion-focused, are determined by one's style of processing emotions. In other words, individuals who were more attentive to their emotions had higher rates of depression when engaged in emotion-focused coping skills than problem-focused strategies. Therefore, more details on pre-existing mental health conditions and how they impact the effectiveness of coping strategies is an area of future research.

One of the limitations includes several subscales that had poor and questionable internal consistency (i.e., acceptance, venting, active coping, planning, self-blame) in the Brief COPE. Some of the subscales with the low reliability would recommend readers to be more cautious when interpreting these subscales. However, it is essential to acknowledge that some subscales had good and excellent reliability. Psychological measures like COPE are essential when measuring effective coping strategies. Thus, the current study points to the

importance of further development of inventories measuring coping strategies. Future researchers may choose to use alternative measures with higher internal consistency such as the Coping Inventory for Stressful Situations (CISS) (Endler & Parker, 1999) which has good reliability (McWilliams et al., 2003).

Additionally, it is also crucial to address the representativeness of the demographics in the current study. Most participants of the sample were White. Future studies should expand the racial diversity of their samples. Moreover, future studies should investigate further on humor as a coping behavior during the pandemic and diving deep into the types of humor. The same goes for religion due to its mixed findings. Besides that, future research should compare coping strategies during pandemics or outbreaks with other stressful situations.

Conclusion

Pandemics and virus outbreaks are associated psychological distress and appropriate coping strategies are crucial to mitigate the impact of these events. Results of the current show that psychological distress decreased over the three time-points that we measured. Individuals who engaged in denial, substance use, behavioral disengagement, venting, humor, and self-blame to cope with the COVID-19 crisis had higher levels of distress. When explored further, current findings suggest the use of specific coping strategies to manage symptoms of depression, anxiety, and stress. For depression, active coping, acceptance, and positive reframing predicts better mental health. For anxiety, positive reframing is the most effective. For stress, acceptance is more effective than the rest. Taken all together, the appropriate coping strategy is dependent upon the context of the situation. It is important to acknowledge that coping strategies are deployed according to one’s cultural and environmental context. However, coping strategies such as denial, venting, behavioral disengagement, self-blame, and substance use are generally considered maladaptive and

should be avoided for better mental health outcome. Humor is on the fence, depending upon its usage in different context (i.e., pandemic). The longitudinal nature of this study helped establish connections in an extended period with the same subjects. The current findings suggest the importance of appropriate tools for coping with the pandemic. Future research should focus on other types of appropriate coping strategies that can improve one's psychological well-being, especially throughout a pandemic. Additionally, future research could examine how to develop coping strategies alternative to maladaptive strategy found in the study so that individuals can omit engaging in unhelpful strategies.

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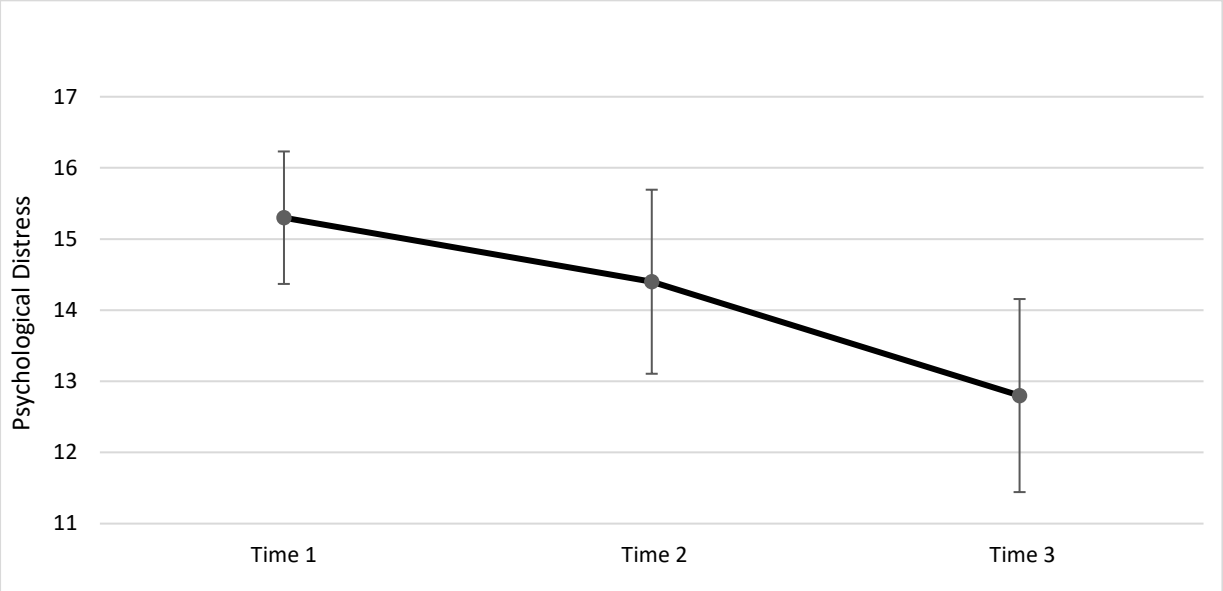
Figure 1

Changes in Psychological Distress Time



Note. Psychological distress measured through the total score of the Depression, Anxiety, Stress Scale (DASS) throughout three time points. Error bars shows standard error of the mean.

Table 1

Demographic Variables and Living Situations Over Three Time Points

Variables	Time point 1 n = 277		Time point 2 n = 124		Time point 3 n = 88	
	M/count	*SD/%*	*M/count*	*SD/%*	*M/count*	*SD/%*
Age	40.7	24.0	39	15.2	42.5	14.9
Gender						
Male	50	18.1	26	21	19	21.6
Female	223	80.5	98	79	69	78.4
Another gender	4	1.4	0	0	0	0
Race						
White	248	89.5	114	91.9	83	94.3
Mixed	8	2.9	5	4	2	2.3
Asian	7	2.5	2	1.6	2	2.3
Hispanic	4	1.4	2	1.6	0	0
Black	6	2.2	0	0	0	0
Middle Eastern	2	0.7	0	0	0	0
Pacific Islander	0	0	0	0	0	0
Living Situation						
Alone	47	17	25	20.2	17	19.3
With other people [a]	226	81.6	89	71.8	62	70.5
Other	4	1.4	10	8.1	9	10.2

Note. [a] Living situation with other people included partner, children, multigenerational, parents, and roommates.

Table 2

Coping Strategies Over Three Time Points

Coping strategies	Time point 1 n = 267		Time point 2 n = 122		Time point 3 n = 88	
	M	*SD*	*M*	*SD*	*M*	*SD*
Active coping	5.1	1.6	5.3	1.5	5.4	1.7
Denial	2.7	1.2	2.6	1.2	2.5	1.2
Substance use	3.3	1.8	3.2	1.5	2.9	1.4
Use of emotional support	5.3	1.8	5.5	1.5	5.5	1.7
Use of instrumental support	4.5	1.7	4.8	1.5	4.9	1.7
Behavioral disengagement	3.1	1.5	3.0	1.4	2.8	1.2
Venting	4.3	1.4	4.6	1.5	4.5	1.5
Positive reframing	5.3	1.6	5.1	1.7	5.2	1.7
Planning	5.1	1.6	5.3	1.5	5.1	1.6
Humor	4.6	1.8	4.5	1.5	4.3	1.8
Acceptance	6.6	1.3	6.5	1.2	6.5	1.3
Religion	4.3	2.1	4.0	2.2	4.1	2.1
Self-blame	3.4	1.5	3.3	1.5	3.3	1.4

Note. Means and standard deviations were generated from using the R software.

Table 3

Psychological Distress Over Time

DASS	Time point 1 n = 270		Time point 2 n = 124		Time point 3 n = 89	
	M	*SD*	*M*	*SD*	*M*	*SD*
Total	15.3	11.7	14.4	10.8	12.8	11.6
Depression	5.3	4.6	4.8	4.5	4.5	4.6
Anxiety	3.3	3.8	2.9	3.6	2.5	3.8
Stress	6.7	4.7	6.7	4.3	5.8	4.8

Note. Psychological distress measured with DASS-21.

Table 4

Significant Relationships Between Coping Strategies and Psychological Distress

Predictor Variables	Est.	*β*	S.E.	*t*	*d.f.*	*p*
Denial	2.595	0.262	0.377	6.876	435.269	0.000
Intercept	13.167	-0.018	2.044	6.44	341.623	0.000
Substance use	1.259	0.180	0.295	4.264	463.927	0.000
Intercept	15.701	-0.015	2.114	7.427	327.982	0.000
Behavioral disengagement	3.22	0.395	0.272	11.846	419.995	0.000
Intercept	8.489	-0.025	1.869	4.541	352.929	0.000
Venting	1.529	0.196	0.306	5.001	423.18	0.000
Intercept	13.31	-0.007	2.283	5.831	383.534	0.000
Humor	0.922	0.136	0.279	3.305	451.091	0.008
Intercept	15.539	-0.013	2.335	6.656	373.218	0.000
Self-blame	3.045	0.387	0.286	10.652	452.315	0.000
Intercept	8.754	-0.020	1.901	4.606	348.859	0.000

Note. *p* values were corrected for multiple comparisons with Holm correction method. Coping strategies presented were positively relates to increased psychological distress.