Adherence Behaviors to Prevent COVID: The Role of Anxiety and Prosocial Behaviors

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Abstract

Objective: In situations of acute stress, individuals may engage in prosocial behaviors or alternatively, individuals may engage in risk taking self-oriented behaviors. The COVID-19 pandemic created large stress-promoting conditions that impacted individuals' decisions to adhere to COVID-19 preventative behaviors. The aim of this study is to examine the relationship between anxiety during the pandemic and adherence behaviors to prevent the spread of COVID-19, and the moderating influence prosocial behaviors. **Method:** 54 undergraduate students completed online questionnaires during the second wave of the pandemic: prosocial behaviors, anxiety, and COVID-19 preventive behaviors. Moderation analyses were conducted using Process in SPSS. **Results:** Results demonstrated a statistically significant interaction of public prosocial behavior with state anxiety (β = -.17, p=.01) predicting engagement in COVID-19 preventative behaviors. At low levels of anxiety, low levels of prosocial public behaviors were associated with higher engagement in COVID-19 preventative behaviors. In contrast, high levels of public prosocial behavior were associated with lower engagement in COVID-19 preventative behaviors at low levels of anxiety. **Conclusion:** Results provide information that can aid at in the creation of anxiety reducing interventions that could increase adherence to COVID-19 preventative behaviors.

 Keywords: Prosocial behavior, Covid, anxiety, covid prevention

Introduction

The understanding of human behavior under stress and in situations of anxiety has been an extensive topic of research (Starcke & Brand, 2012; Nowacki et al., 2018). Ample evidence suggests that acute stress affects general cognition, executive functioning, working memory (Shields et al., 2016; Wolf et al., 2015; Duesenberg et al., 2016); social-emotional information processing and social and prosocial behavior (Frisch et al., 2015; von Dawans et al., 2021; Gonzalez-Liencres et al. 2016). Stress also affects decision-making skills (Starcke & Brand, 2012, 2016; Nowacki et al., 2018, de Visser et al., 2010; Soshi et al., 2019); however, this relationship depends on several factors, such as the type of decision-making situations (Starcke & Brand et al., 2016), time pressure (Soshi et al., 2019) and the individual characteristics of the participants, such as gender (van de Bos, 2009; Nowacki et al., 2018).

Evidence has also shown that social behavior and social decision making can be influenced by stress, however, studies are conflicted in this area. Some studies have shown that in situations of acute stress individuals might engage in more pro-social and empathetic behaviors such as pro-social trustworthiness and sharing (von Dawans, 2012, 2019, 2021; Wolf et al., 2015); however, on the other hand, other studies suggest that in situations of stress, individuals might engage in unfavorable and risk taking self-oriented behaviors and distrust (Bendahan et al., 2017; Steinbeis et al., 2015). Most of the research on the effects of stress in decision-making has been conducted in laboratory studies using stress-inducing paradigms, in which the stress induced was either physical (e.g., cold pressure test in which participants immerse their hand in a bucket of cold water) or psychosocial (e.g., Trier Social Stress Test (TSST) in which participants perform a mock job interview). However, to our knowledge, just

one study has investigated decision-making in in the context of the COVID-19 pandemic as the stressor (Romero-Rivas & Rodriguez-Cuadrado, 2021). Romero-Rivas and Rodriguez-Cuadrado, 2021, examined whether the psychological impact generated by the COVID-19 pandemic influenced decision-making processes by presenting participants with four decision-making tasks (the dictator game, framing problems, utilitarian/deontological moral dilemmas and altruistic/egoistic moral dilemmas). This study showed that higher levels of psychological impact were related with safer responses in framing problems and with more deontological/altruistic responses to moral dilemmas (Romero-Rivas & Rodriguez-Cuadrado, 2021). Therefore, suggesting that the psychological impact of COVID-19 affected decision-making processes by participants showing safer and more altruistic responses using laboratory decision-making tasks. Given the influence of stress in decision-making process (Starcke & Brand, 2012; Nowacki et al., 2018) it is imperative to understand this relationship further, especially during the COVID-19 pandemic as it can aid understanding the factors that influence compliance and adherence to behaviors to prevent the spread of COVID-19 and its variants.

The worldwide COVID-19 pandemic placed humanity in a devastating global health challenge that required the population that adapt to a rapid changing situation. Gruber and colleagues (2021) conceptualized the COVID-19 pandemic as a multidimensional complex stressor that affected both the individual and family and multiple societal layers, with toxic social stressors, such as social isolation and financial loss (Gruber et al., 2021). Stress research has shown, that situations that are uncontrollable, uncertain, and with social evaluative threat elicit high stress responses (Dickerson et al., 2004). The COVID-19 pandemic created large stress-promoting conditions, such as uncertainty, life-threat, loss, and long exposure to anxiety-inducing information (Gruber et al., 2021) generating extensive detrimental psychological and

mental health consequences (Gruber et al., 2021; Luo et al., 2020). A recent meta-analysis by

Luo and colleagues (2020) reported a prevalence of anxiety of 33% and depression of 28% of the

population during the COVID-19 pandemic and a study by Ebrahimi and colleagues (2021)

reported that the prevalence of clinical anxiety to increase 2 to 3 times during the COVID-19

pandemic in comparison to estimations with other similar samples before the pandemic. In

addition, the COVID-19 pandemic has increased the prevalence of anxiety amongst

undergraduate college students (Rudenstine et al., 2020; Lee et al., 2021) specially amongst the

lower socio-economic groups (Rudenstine et al., 2020).

To prevent the spread of the coronavirus, public health measures were introduced that

involved the engagement in new behaviors and the population was expected to adhere to these

preventive behaviors (e.g., limiting social distance; the use of masks). Decisions made under

different levels of risk and ambiguity can be affected differently by stress (Starcke & Brand et

al., 2016; Brand et al.,2006) and during the stress-promoting conditions inherent in the COVID-

19 pandemic, the population was confronted with making high-risk decisions about their

behaviors, especially on decisions related to preventing the spread of COVID-19.

A few studies have examined the predictors of adherence to preventive behaviors to

spread the coronavirus (Pollak et al., 2020; Ebrahimi et al., 2021; Pfattheicher et al., 2020;

Syropoulos & Markowit, 2020). Recent research by Pollak and colleagues (2020) showed that

predictors for non-adherence were high levels of current distress, and by risk factors such as

male gender, not having children, ADHD symptoms, smoking and high levels of risk-taking

behavior. Similarly, Ebrahimi and colleagues (2021) reported that female gender, older age,

worry about significant others, mandatory adherence and altruistic attitude were associated with

higher adherence and current employment was associated with lower adherence. Besides

altruistic attitudes, empathy, fairness and gratitude have also been associated with higher levels of adherence to COVID-19 preventative behaviors (Ebrahimi et al., 2021; Pfattheicher et al., 2020; Syropoulos & Markowit, 2020).

To our knowledge no studies have examined the relationship between anxiety and adherence to behaviors to prevent the spread of COVID-19 with the moderating role of prosocial tendencies. Therefore, the present study aimed to investigate 1) the relationship between anxiety during the COVID-19 pandemic and adherence behaviors to prevent the spread of COVID-19, and 2) the moderating influence of prosocial tendencies on this association.

It is hypothesized that individuals with a high anxiety during COVID-19 pandemic are more likely to adhere to the behaviors to prevent the spread of COVID, than individuals with low anxiety and this relationship will be stronger for individuals with high prosocial behavior tendencies than those with low prosocial behavior tendencies.

Methods

This study was IRB approved and online passive consent was obtained from participants. Participants were undergraduate students recruited at a university in the Northeastern United States through the Psychology Department online subject pool that is managed by SONA. Students from all different majors taking psychology courses were eligible to sign-up to participate in this study and received credit in their courses for participation. Participants were granted 1 SONA credit for 15-30 minutes of their time to complete the questionnaire administered online via Select Survey. Data was collected during the Spring 2021 semester of the COVID-19 pandemic from February 2021 to May 2021. The data reported in this study is a subset of the measures collected in this larger study conducted during those months. In addition

to the measures described below, basic demographics of age, race/ethnicity, class standing, gender, and employment status were also collected

Measures

Prosocial Behaviors. The 23-item Prosocial Tendencies Measure (Carlo & Randall, 2002; Carlo et al., 2002) was used to measure six types of prosocial behaviors: compliant (2-items), dire (3-items), altruistic (5-items) public (4-items), emotional (4-items) and anonymous (5-items). Compliant is when prosocial behaviors are done because others asked for help (e.g., "I never hesitate to help others when they ask for it."). Dire is when prosocial are done to help others under emergency or crisis situations (e.g., "I tend to help people who hurt themselves badly"). Altruistic is helping others and expecting little to nothing in return (e.g., "I often help even if I don't think I will get anything out of helping."). Public is when prosocial behaviors are completed because others are watching with the motivation to receive external approval (e.g., "Helping others when I am in the spotlight is when I work best). Emotional is when individuals help other because they are under a highly emotional state (e.g., It is most fulfilling to me when I can comfort someone who is very distressed). Anonymous is when prosocial social behaviors are enacted intentionally without other people's knowledge (e.g., I tend to help needy others most when they do not know who helped them). Items were answered on a 5-point Likert Scale from 1-*does not describe me at all* to 5-*describes me greatly.* Six total sum subscales were calculated and used in analysis. Higher scores indicate greater prosocial behavior for each subscale.

Anxiety. The State-Trait Anxiety Inventory (STAI) was used to measure both trait and state anxiety (Spielberger et al.,1983). The 40-item inventory uses 20 items for trait anxiety (e.g., "I am a steady person") and 20 for state anxiety (e.g., "I feel at ease""). From the 40 items, 19 are reversed scored. All items in this study were rated on a 4-point Likert from *not at all* to *very*

much so. Two total sum subscales were calculated, and higher scores indicate greater anxiety for both subscales.

COVID-19 Preventative Behaviors. The COVID-19 International Survey (CIS) from the PhenX Toolkit (2020) was used to collect data on what preventative COVID-19 behaviors participants were engaging in. The 23-items within the survey specific to what frequency individuals are engaging in COVID-19 preventative behaviors were used for this study (e.g., hand washing, mask wearing physical distancing, avoiding social gatherings, self-quarantining after travel, self-quarantining if infected or likely infected were used). These items are answered on a 4-point Likert scale from *never* to *most of the time*, with the additional option of "don't know/I prefer not to answer/Not applicable." One total sum score was calculated, and higher scores indicated higher engagement in COVID-19 preventative behaviors.

Analysis

Bivariate correlations between the main variables of interest were first examined. Then moderation analyses were conducted using Process version 3.5 within SPSS Version 27. Bootstrapping was set to 5,000 and confidence interval to 95%. Mean deviated predictor variables (i.e., prosocial behaviors and anxiety types) were created and used for all moderation analyses. A total of 12 separate models were tested. One for each type of prosocial behavior (6) interacting with the two subtypes of anxiety measured predicting engagement in COVID related preventative behaviors. All significant interactions were plotted, using 1 standard deviation and above the mean for prosocial behaviors, for interpretation reasons.

Results

Participants were (n=54) college students (M=20.74, SD=5.16) and mostly enrolled full-time at the university (n=43), employed (n= 43), and living at home with their parent, relative or

guardian (n=40). Most of the sample self-identified as women (n=43; men =9; Transgender=1), and white (n=34; Hispanic/Latino/a=11, Black/African American=7, and Asian =2).

Participants on average reported high levels of anxiety symptoms on both the trait (M= 51.05; SD=10.37) and state subscales (M= 50.63; SD=11.11). Using the recommended cut-off of 40 to determine clinically meaningful anxiety symptomology, most of the sample either met or exceeded the criteria (state anxiety 87% and trait anxiety 86%). On average, participants highly adhered to engage in COVID preventative actions and behaviors (M =60.28;13.29). Over fifty percent of the sample engaged in the following behaviors "most of the time": wearing a face (90.7%), using hand sanitizer (83.3%), handwashing with soap and water (81.5%), coughing/sneezing into elbow (81.5%), self-quarantining if they have or believe they have the virus (77.8%), self- quarantining if they are returning from a trip (63%), coughing/sneezing into a tissue and throwing it away and washing hands (68.5%), staying 6 feet apart from other people (53.7%), avoiding large social gatherings (53.7%), and avoiding any non-essential travel (53.7%). See Table 1.

None of the prosocial behavior types or anxiety types were associated with the engagement in COVID preventative behaviors. See Table 2 descriptive and correlations of study variables. However, in the one model tested with public prosocial behavior, the interaction of public prosocial behavior with state anxiety predicting engagement in COVID preventative behaviors was statistically significant (β = -.17, p=.01), which suggested a cross over effect (See Figure 1). At low levels of prosocial public behaviors, as anxiety increases engagement in COVID preventative behavior increases, in contrast at high levels of prosocial public behaviors as anxiety decreases engagement in COVID preventative behavior increases. In the other 11

models tested none of the interaction effects with prosocial behaviors and anxiety predicting

adherence to COVID preventative behavior were statistically significant. (See Tables 3 and 4).

Discussion

The present study aimed to examine the association between state and trait anxiety during

the COVID-19 pandemic and the adherence behaviors to prevent the spread of COVID-19 (e.g.,

handwashing, mask wearing), and to investigate the moderating role of prosocial behaviors on

this association. Based on previous literature on decision-making under stress promoting

conditions (von Dawans, 2012, 2019, 2021; Wolf et al., 2015), we hypothesized that participants

with high state and trait anxiety would be more likely to adhere to the behaviors to spread

COVID-19 than those with low state and trait anxiety, and that this relationship would be

stronger for individuals with high prosocial behavior tendencies, than those with low prosocial

tendencies. Because of the exceptional situation created by the COVID-19 pandemic we did not

specifically predict that any type of prosocial behavior would show a stronger relationship versus

another. Our results revealed that: 1) There were no associations between state and trait anxiety

and any of the prosocial behaviors (emotional, altruism, dire, anonymous, public, compliant); 2)

Only public prosocial tendencies showed a significant interaction with state anxiety, predicting

engagement in COVID-19 preventative behaviors, and suggesting a cross over effect.

Concerning the lack of association between state and trait anxiety and any of the

prosocial behaviors, these results were not surprising as we expected that differential levels of

prosocial tendencies would relate differently with anxiety when predicting adherence behaviors

and therefore that they would operate as a moderator. On the other hand, the interaction that

illustrated that public prosocial behaviors moderated the relationship between state anxiety and

adherence behaviors to prevent COVID-19 did not support our hypothesis, as the resulting cross-over effect reflected that increased state anxiety related with an increase in adherence behaviors but in individuals with low public prosocial behaviors. However, as shown by the validation study of the PTM of Carlo & Randall (2002), individuals who engage in public prosocial tendencies showed approval seeking behaviors and were oriented towards their own needs (as opposed to other people's needs). Additionally, public prosocial behaviors were significantly negatively correlated with altruistic prosocial behaviors, which are other-oriented and with sympathy (Carlo & Randall, 2002).

Because our results showed that increased state anxiety, increased adherence behaviors in individuals with low public prosocial behaviors, they illustrated that individual with lower self-oriented tendencies and with less approval seeking tendencies (low public prosocial behavior), with higher state anxiety would show more engagement in adherence behaviors. The opposite pattern was found with individuals with high public prosocial tendencies, in which the increase of state anxiety would decrease their engagement with adherence behaviors. In addition, given the inverse relationship between public and altruistic prosocial behaviors (Carlo & Randall, 2002), these results suggest that individuals low on public prosocial behaviors would show more other oriented behaviors. On the other hand, our study did not find any differential relationship with individuals with altruistic prosocial behaviors and state anxiety and adherence behaviors, and therefore, more research is needed in this area. Our results are in partial agreement with the study of Romero-Rivas and Rodriguez-Cuadrado (2021), which found that high states of psychological impact from the COVID-19 pandemic was related to individuals being more risk-aversed and more altruistic in decision making. Our results showed higher state anxiety was related to more engagement in adherence behaviors to prevent COVID-19 in only the individuals

with lower public prosocial behaviors (more other-oriented and less approval seeking behaviors).

Therefore, we propose that higher anxiety relates with prosocial decision-making differently

depending on the individual characteristics, in which the individuals with more other-

oriented/less-approval seeking prosocial tendencies with higher state anxiety would be more

likely to adhere more in COVID-19 preventive behaviors. On the other hand, individuals with

higher levels of self-oriented/approval seeking behaviors (public prosocial), show less adherence

to COVID-19 preventive behaviors with the increase of state anxiety. As the group with high

public prosocial tendencies has been reported to be motivated by self-oriented and approval

seeking tendencies (Carlo & Randall, 2002), we speculate that situations with high state anxiety

would prevent these individuals from engaging in behaviors that would necessitate of other-

oriented prosocial behaviors and therefore, would prevent them from engaging in prosocial

decision making and in other-oriented behaviors.

Finally, we wanted to highlight that our study sample showed high levels of both state

and trait anxiety (87% sample in state anxiety and 86% sample in trait anxiety above 40 cutoff).

but only state anxiety related with adherence to behaviors to prevent COVID-19. Given that the

study was conducted in the Spring of 2021 of the COVID-19 pandemic, in a college-sample, in

such an unprecedented time, it was not surprising that the levels of anxiety were high.

We suggest that more studies are needed to explore the role of each type of prosocial

behavior tendencies in addition to a global measure of prosocial tendencies, in the engagement of

adherence behaviors to prevent COVID-19. Our results further the current knowledge on the

factors that predict the engagement to adherence behaviors to prevent COVID-19 and provide

insights on the cultivation and creation of interventions to promote other-oriented vs self-

oriented motivations and tendencies and in the creation of anxiety reducing interventions that could increase adherence to COVID-19 preventative behaviors.

Limitations

Our study has several limitations. First the sampling method used was convenience sampling with undergraduate college population, which could have led to collect data from participants that were more motivated and self-selected. Secondly, the study was conducted online and therefore it was not possible to control for attention and effort in the participants responses. Additionally, the measures were self-report questionnaires that are prone to biases, such as social desirability. Finally, this study was cross-sectional and limits the interpretation of the data.

Conclusion

To sum up, our results revealed that anxiety affected differently the prosocial-decision making process, as at low levels of prosocial public behaviors, as state anxiety increased, also increased the engagement in adherence in behaviors to prevent the spread of COVID-19. On the other hand, at high levels of prosocial public behaviors, as state anxiety increased, the engagement in adherence in behaviors to prevent the spread of COVID-19 decreased. These results provide valuable information that can aid in the creation of interventions to promote other-oriented motivations and in the reduction of anxiety that could increase adherence to COVID-19 preventative behaviors.

References

Bendahan, S., Goette, L., Thoresen, J., Loued-Khenissi, L., Hollis, F., & Sandi, C. (2017). Acute

stress alters individual risk taking in a time-dependent manner and leads to anti-social risk.

European Journal of Neuroscience, *45*(7), 877–885. https://doi.org/10.1111/ejn.13395

Brand, M., Labudda, K., & Markowitsch, H. J. (2006). Neuropsychological correlates of

decision-making in ambiguous and risky situations. *Neural Networks*, *19*(8), 1266–1276.

https://doi.org/10.1016/j.neunet.2006.03.001

Carlo, G., & Randall, B. A. (2002). The Development of a Measure of Prosocial Behaviors for

Late Adolescents. In *Journal of Youth and Adolescence* (Vol. 31, Issue 1).

de Visser, L., van der Knaap, L. J., van de Loo, A. J. A. E., van der Weerd, C. M. M., Ohl, F., &

van den Bos, R. (2010). Trait anxiety affects decision-making differently in healthy men

and women: Towards gender-specific endophenotypes of anxiety. *Neuropsychologia*, *48*(6),

1598–1606. https://doi.org/10.1016/j.neuropsychologia.2010.01.027

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical

integration and synthesis of laboratory research. In *Psychological Bulletin* (Vol. 130, Issue

3, pp. 355–391). https://doi.org/10.1037/0033-2909.130.3.355

Ebrahimi, O. v., Hoffart, A., & Johnson, S. U. (2021). Physical Distancing and Mental Health

During the COVID-19 Pandemic: Factors Associated with Psychological Symptoms and

Adherence to Pandemic Mitigation Strategies. *Clinical Psychological Science*, *9*(3), 489–

506. https://doi.org/10.1177/2167702621994545

Frisch, J. U., Häusser, J. A., & Mojzisch, A. (2015). The Trier Social Stress Test as a paradigm to study how people respond to threat in social interactions. In *Frontiers in Psychology* (Vol. 6, Issue FEB). Frontiers Media S.A. https://doi.org/10.3389/fpsyg.2015.00014

Gonzalez-Liencres, C., Breidenstein, A., Wolf, O. T., & Brüne, M. (2016). Sex-dependent effects of stress on brain correlates to empathy for pain. *International Journal of Psychophysiology*, *105*. https://doi.org/10.1016/j.ijpsycho.2016.04.011

Gruber, J., Prinstein, M. J., Clark, L. A., Rottenberg, J., Abramowitz, J. S., Albano, A. M., Aldao, A., Borelli, J. L., Chung, T., Davila, J., Forbes, E. E., Gee, D. G., Hall, G. C. N., Hallion, L. S., Hinshaw, S. P., Hofmann, S. G., Hollon, S. D., Joormann, J., Kazdin, A. E., … Weinstock, L. M. (2021). Mental health and clinical psychological science in the time of COVID-19: Challenges, opportunities, and a call to action. *American Psychologist*, *76*(3), 409–426. https://doi.org/10.1037/amp0000707

Lee, J., Solomon, M., Stead, T., Kwon, B., & Ganti, L. (2021). Impact of COVID-19 on the mental health of US college students. *BMC Psychology*, *9*(1). https://doi.org/10.1186/s40359-021-00598-3

Luo, M., Guo, L., Yu, M., & Wang, H. (2020). The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public – A systematic review and meta-analysis. In *Psychiatry Research* (Vol. 291). Elsevier Ireland Ltd. https://doi.org/10.1016/j.psychres.2020.113190

Nowacki, J., Heekeren, H. R., Deuter, C. E., Joerißen, J. D., Schröder, A., Otte, C., & Wingenfeld, K. (2019). Decision making in response to physiological and combined physiological and psychosocial stress. *Behavioral Neuroscience*, *133*(1), 59–67. https://doi.org/10.1037/bne0000288

Phenx (2020).https://www.phenxtoolkit.org/toolkit_content/PDF/MBMC_CIS.pdf

Pfattheicher, S., Nockur, L., Böhm, R., Sassenrath, C., & Petersen, M. B. (2020). The Emotional

    Path to Action: Empathy Promotes Physical Distancing and Wearing of Face Masks During

    the COVID-19 Pandemic. *Psychological Science*, *31*(11), 1363–1373.

    https://doi.org/10.1177/0956797620964422

Pollak, Y., Dayan, H., Shoham, R., & Berger, I. (2020). Predictors of non-adherence to public

    health instructions during the COVID-19 pandemic. In *Psychiatry and Clinical*

    Neurosciences (Vol. 74, Issue 11, pp. 602–604). Blackwell Publishing.

    https://doi.org/10.1111/pcn.13122

Romero-Rivas, C., & Rodriguez-Cuadrado, S. (2021). The Psychological Impact of the COVID-

    19 Pandemic Affected Decision-Making Processes. *Spanish Journal of Psychology*.

    https://doi.org/10.1017/SJP.2021.14

Rudenstine, S., McNeal, K., Schulder, T., Ettman, C. K., Hernandez, M., Gvozdieva, K., &

    Galea, S. (2021). Depression and Anxiety During the COVID-19 Pandemic in an Urban,

    Low-Income Public University Sample. *Journal of Traumatic Stress*, *34*(1), 12–22.

    https://doi.org/10.1002/jts.22600

Shields, G. S., Sazma, M. A., & Yonelinas, A. P. (2016). The effects of acute stress on core

    executive functions: A meta-analysis and comparison with cortisol. In *Neuroscience and*

    Biobehavioral Reviews (Vol. 68). https://doi.org/10.1016/j.neubiorev.2016.06.038

Soshi, T., Nagamine, M., Fukuda, E., & Takeuchi, A. (2019). Pre-specified anxiety predicts

    future decision-making performances under different temporally constrained conditions.

    Frontiers in Psychology, *10*(JULY). https://doi.org/10.3389/fpsyg.2019.01544

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press. Copyright © 1968, 1977 by Charles D. Spielberger. All rights reserved in all media. Published by Mind Garden, Inc. www.mindgarden.com

Starcke, K., & Brand, M. (2012). Decision making under stress: A selective review. In *Neuroscience and Biobehavioral Reviews* (Vol. 36, Issue 4, pp. 1228–1248). https://doi.org/10.1016/j.neubiorev.2012.02.003

Starcke, K., & Brand, M. (2016). Effects of stress on decisions under uncertainty: A meta-analysis. *Psychological Bulletin*, *142*(9), 909–933. https://doi.org/10.1037/bul0000060

Steinbeis, N., Engert, V., Linz, R., & Singer, T. (2015). The effects of stress and affiliation on social decision-making: Investigating the tend-and-befriend pattern. *Psychoneuroendocrinology*, *62*, 138–148. https://doi.org/10.1016/j.psyneuen.2015.08.003

Syropoulos, S., & Markowitz, E. M. (2021). Prosocial responses to COVID-19: Examining the role of gratitude, fairness and legacy motives. *Personality and Individual Differences*, *171*. https://doi.org/10.1016/j.paid.2020.110488

van den Bos, R., Harteveld, M., & Stoop, H. (2009). Stress and decision-making in humans: Performance is related to cortisol reactivity, albeit differently in men and women. *Psychoneuroendocrinology*, *34*(10), 1449–1458. https://doi.org/10.1016/j.psyneuen.2009.04.016

von Dawans, B., Ditzen, B., Trueg, A., Fischbacher, U., & Heinrichs, M. (2019). Effects of acute stress on social behavior in women. *Psychoneuroendocrinology*, *99*, 137–144. https://doi.org/10.1016/j.psyneuen.2018.08.031

von Dawans, B., Fischbacher, U., Kirschbaum, C., Fehr, E., & Heinrichs, M. (2012). The Social

Dimension of Stress Reactivity: Acute Stress Increases Prosocial Behavior in Humans.

Psychological Science, *23*(6), 651–660. https://doi.org/10.1177/0956797611431576

von Dawans, B., Strojny, J., & Domes, G. (2021). The effects of acute stress and stress hormones

on social cognition and behavior: Current state of research and future directions. In

Neuroscience and Biobehavioral Reviews (Vol. 121, pp. 75–88). Elsevier Ltd.

https://doi.org/10.1016/j.neubiorev.2020.11.026

Wingenfeld, K., Duesenberg, M., Fleischer, J., Roepke, S., Dziobek, I., Otte, C., & Wolf, O. T.

(2018). Psychosocial stress differentially affects emotional empathy in women with

borderline personality disorder and healthy controls. *Acta Psychiatrica Scandinavica*,

137(3), 206–215. https://doi.org/10.1111/acps.12856

Wolf, O. T., Schulte, J. M., Drimalla, H., Hamacher-Dang, T. C., Knoch, D., & Dziobek, I.

(2015). Enhanced emotional empathy after psychosocial stress in young healthy men.

Stress, *18*(6), 631–637. https://doi.org/10.3109/10253890.2015.1078787

Table 1

Engagement in COVID-19 Preventative Behaviors in the Past Seven Days (n=54)

Action or Behavior	% "Most of the Time"
1. Wearing a face mask	90.7%
2. Use Hand Sanitizer	83.3%
3. Handwashing with soap and water	81.5%
4. Coughing/sneezing into your elbow	81.5%
5. Self-quarantining if you have or believe you have the virus	77.8%
6. Coughing/sneezing into a tissue throwing it away and wash hands	68.5%
7. Self-quarantining if you are returning from a trip	63.0%
8. Staying 6 feet apart from other people	53.7%
9. Avoid large social gatherings	53.7%
10. Avoiding any non-essential travel	53.7%
11. Avoiding going out to bars/pubs	48.1%
12. Avoiding using public transportation	44.4%
13. Staying/working at home	38.9%
14. Avoiding playdates	29.6%
15. Exercise outside alone or with people you live with only	29.6%
16. Avoiding going to restaurants	22.2%
17. Avoiding taking your children to the park	20.4%
18. Avoiding all social gatherings (large and small)	18.5%
19. Wearing gloves every time you go out of your home	11.1%
20. Avoiding going to the grocery store or pharmacy	11.1%
21. Avoiding opening the mail or delivered goods	11.1%
22. Avoiding getting take-out food or delivery	9.3%
23. Avoiding going for walks	2.0%

Table 2

Descriptive Statistics and Correlations for Study Variables

Variable	n	M	SD	1	2	3	4	5	6	7	8	9
1. COVID PB	54	60.28	13.29	-	.06	.01	-.16	.04	-.03	.16	-.03	-.01
2. Public PT	54	8.26	3.48	-	-	-.11	-.78**	-.05	-.26	.26	-.03	.05
3. Emotional PT	54	13.93	3.33	-	-	-	.09	.64**	.64**	.49**	-.16	-.21
4. Altruistic PT	54	19.83	4.15	-	-	-	-	.02	.31*	-.20	-.06	-.09
5. Dire PT	54	10.35	2.63	-	-	-	-	-	.64**	.55**	.03	.11
6. Compliant PT	54	7.89	1.76	-	-	-	-	-	-	.38**	-.23	-.20
7. Anonymous PT	54	14.74	4.34	-	-	-	-	-	-	-	-.13	-.18
8. Trait Anxiety	44	51.05	10.37	-	-	-	-	-	-	-	-	.84
9. State Anxiety	54	50.63	11.11	-	-	-	-	-	-	-	-	-

Note. PB= Preventative Behaviors, PT=Prosocial Tendency, **$p \leq .01$,*p $\leq .05$.

Figure 1

Public Prosocial Behavior Moderating the Association between State Anxiety and Engagement
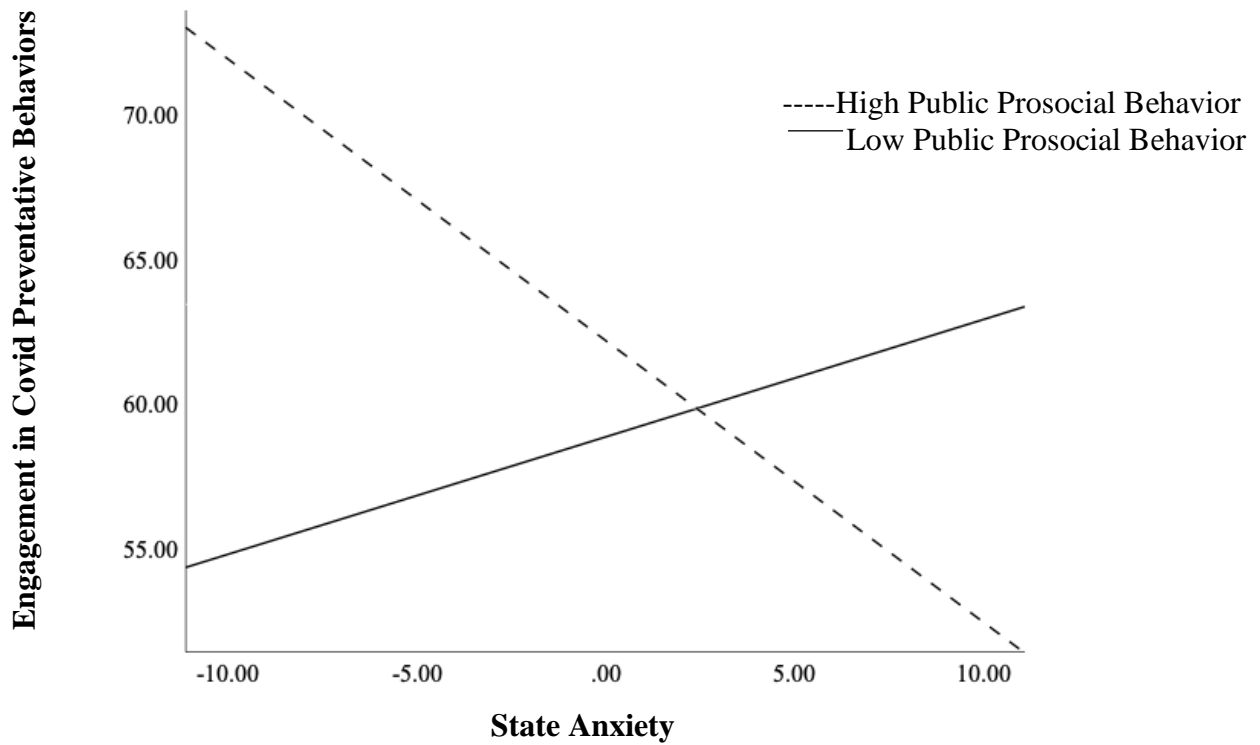
in COVID Preventative Behaviors

Table 3

Association between State Anxiety and Covid Preventative Behaviors Moderated by Six Types of

Prosocial Behaviors (n=54)

Model	Estimate	SE	t	*p*
1. Complaint	-.58	1.12	-.52	.61
State Anxiety	-.88	.75	-1.18	.25
Complaint X SA	.13	.11	1.19	.24
2. Emotional	-.25	.60	-.42	.68
State Anxiety	-.78	.55	-1.42	.16
Emotional X SA	.07	.05	1.49	.14
3. Public	.41	.51	.80	.43
State Anxiety	-.33	.20	-1.65	.10
Public X SA	.17	.06	-2.60	.01
4. Altruistic	-.60	.44	-1.38	.17
State Anxiety	-1.76	.94	-1.88	..07
Altruistic X SA	-.10	.05	1.88	.07
5. Dire	.31	.73	.42	.68
State Anxiety	-.33	..48	-.69	..49
Dire X SA	.04	.06	.71	..50
6. Anonymous	.51	.44	1.16	.25
State Anxiety	-.16	.42	-.37	.71
Anonymous X SA	-.02	.04	-.48	.63

Note. DV= Covid preventative behaviors All variables were mean deviated, expect the DV.

SA=State Anxiety

Table 4

Association between Trait Anxiety and Covid Preventative Behaviors Moderated by Six Types

Prosocial Behaviors (n=44)

Model	Estimate	SE	t	*p*
1. Complaint	-.78	1.24	-.63	.53
Trait Anxiety	-.75	.86	-.88	.39
Complaint X TA	.11	.13	.83	.42
2. Emotional	-.25	.69	-.37	.72
Trait Anxiety	-.16	.66	-.24	.81
Emotional X TA	.01	.06	.18	.86
3. Public	.35	.63	.55	.58
Trait Anxiety	-.27	.24	-1.13	.26
Public X TA	-14	.07	-1.88	.07
4. Altruistic	-.56	.53	-1.06	.30
Trait Anxiety	-1.15	1.11	-1.04	.30
Altruistic X TA	.06	.06	1.02	.31
5. Dire	-.31	.87	-.36	.72
Trait Anxiety	-.62	.78	-.79	.43
Dire X TA	07	.08	.78	44
6. Anonymous	.33	.54	.61	.55
Trait Anxiety	.18	.49	.36	.72
Anonymous X TA	-.02	.04	-.44	.66

Note. DV= Covid preventative behaviors All variables were mean deviated, expect the DV.

TA=Trait Anxiety