Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Short communication

Influence of suicidality on adult perceptions of COVID-19 risk and guideline adherence

Mariany A. Gainza Perez, Claudia J. Woloshchuk, Andrea Rodríguez-Crespo, Jennifer Eno Louden, Theodore V. Cooper

Prevention and Treatment of Clinical Health Laboratory, Department of Psychology, The University of Texas at El Paso, 500 West University Ave, El Paso, TX 79968, USA

ARTICLE INFO

Keywords:
Suicidality
Suicidal ideation
COVID-19
Adherence
Risk perception

ABSTRACT

Background: Suicide rates have been increasing for decades, and the challenges of a global pandemic seem to have worsened suicide risk factors. The relationship between suicidality, COVID-19 risk perceptions, and guideline adherence was examined to inform potential barriers to the implementation of behavioral interventions aimed at preventing future pandemics.

Methods: A national sample of 159 MTurk participants (Mage = 37.64 years, SD = 11.92; 48.4% female) completed an online survey containing the following: demographics, Suicidal Ideation Attributes Scale, Broadly Applicable Measure of Risk Perception of COVID-19, and Adherence to COVID-19 Guidelines and Perceived Risk Scale.

Results: Multiple linear regressions assessed how suicidality related to perceived risk subscales and each adherence indicator while controlling for biological sex, age, and essential worker status. Over 25% of participants reported suicidality over the past month, and 19% were at high risk of suicidal behavior. Greater suicidality was associated with lower general COVID-19 risk perceptions (β = −0.326, p < .001), decreased handwashing (β = −0.423, p < .001), lower likelihood of planning to self-quarantine if infected with COVID-19 (β = −0.400, p < .001), less social distancing (β = −0.457, p < .001), and increased attendance of large gatherings (β = 0.405, p < .001).

Limitations: Temporal relationships were unable to be assessed due to the cross-sectional nature of the data used. The low internal reliability of the risk probability subscale precluded its inclusion in analyses.

Conclusion: Given suicidality's associations with decreased risk perceptions and low adherence, it may present as a barrier to the sustained behavior change that will be necessary in preventing the occurrence of future pandemics.

1. Introduction

Prior to the COVID-19 pandemic, suicide was one of the leading causes of death among U.S. adults (National Institute of Mental Health, 2020). This pandemic has since generated and exacerbated stressors associated with increased suicidality (Aquila et al., 2020). Estimates of suicidal ideation rates throughout the pandemic were more than double (Czeisler et al., 2021) the rate in 2019 (NIMH, 2020).

Of all the COVID-19 preventive measures, quarantining was particularly related to increased suicidal ideation (Sher, 2020). Encouragingly, those vaccinated against COVID-19 are now able to safely interact with other vaccinated people without engaging in preventive behaviors (Centers for Disease Control and Prevention, 2021). However, the lack of adherence to preventive behaviors by some individuals before vaccine accessibility suggests a need for improved behavioral interventions in preparation for future pandemics (Michie and West, 2020).

Increased risk perception (Xin et al., 2020) and feelings of social disconnection (Gratz et al., 2020) have been found to mediate the positive relationship between quarantine and suicidality, yet it remains unclear whether people experiencing these thoughts may have eschewed public health guidelines to reduce their social isolation. Moreover, the relationship between suicidal ideation and different aspects of risk perception (e.g., concern related to COVID-19, severity of COVID-19-related consequences) remains to be examined. No studies...
appear to have directly investigated how suicidality relates to adherence, but Klosky and May (2010) found that young adults at greater risk of attempting suicide were more likely to report a diminished ability to assess potential consequences of their actions than those at lower risk.

Given the importance of identifying barriers to public health guideline adherence to prevent and prepare for future pandemics, the primary aim of the current study was to examine the relationship of suicidality with risk perceptions and adherence cross-sectionally within an adult U.S. sample. It was hypothesized that greater suicidality would relate to increased risk perceptions and decreased guideline adherence. Elevated suicidality rates have also been reported among men, young adults, and essential workers (Czeisler et al., 2021); consequently, analyses controlled for these expected associations.

2. Methods

2.1. Participants

Amazon's Mechanical Turk (MTurk) was used to recruit 180 participants, although 21 were eliminated from analyses for failing attention checks or not providing data recognizable by survey software. The sample included in analyses was comprised of 159 participants (Mage = 37.64 years, SD = 11.92; 48.4% female; 75.5% White, 9.4% African American, 8.8% Asian or Pacific Islander, 4.4% Hispanic, 1.3% Native American; Table 1). Inclusion criteria included being over the age of 18, currently living in the U.S., and having an approval rating of 95% on prior MTurk tasks. Buhrmester et al. (2018) recommend the latter to minimize effects of inattention on data quality.

2.2. Measures

2.2.1. Demographics

This questionnaire collected typical demographic information (e.g., age, SES) and information related to the COVID-19 pandemic (e.g., essential worker status).

2.2.2. Suicidal ideation attributes scale (SIDAS)

The 5-item SIDAS screens for suicidal ideation and assesses frequency, controllability, closeness to acting, distress, and interference with daily activities within the past month (α = 0.91; Van Spijker et al., 2014). Items are rated on a 10-point scale specific to each item (e.g., “0 = not close at all to 10 = made an attempt”). Total scores range from 0 to 50. Scores above 0 indicate suicidality and scores above 21 indicate high risk for engaging in suicidal behavior. This measure demonstrated adequate internal consistency in the present study (α = 0.83).

2.2.3. Broadly applicable measure of risk perception

This 11-item instrument measures components of risk perception that can be applied to any hazard (Wilson et al., 2018). The measure is composed of 4 subscales: general risk perceptions, affect (α = 0.93–0.94), probability (α = 0.76–0.84), and consequences (α = 0.77–0.83). Each item is rated on a 5-point scale specific to the item. Higher subscale scores indicate greater anticipated risk, hazard-related concern and emotion, exposure and/or likelihood that the hazard will occur, and hazard-related severity of consequences, respectively. General risk perceptions were measured using one item. The affect (α = 0.93) and consequences (α = 0.85) subscales demonstrated adequate internal reliability in the present study. The probability subscale was excluded from analyses due to low internal consistency (α = 0.35).

2.2.4. Adherence to COVID-19 guidelines and perceived risk scale (ACGPRS)

This measure was developed to assess COVID-19 guideline adherence. Items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Adherence was based on the following five single items: handwashing for at least 20 s, wearing a face mask outside the house, attending social gatherings of 10+ people, planning to self-quarantine for the recommended time period if infected with COVID-19, and six feet social distancing. The item for attending large social gatherings was reverse coded such that higher scores indicated greater COVID-19 guideline adherence.

2.3. Procedure

Upon obtaining approval from the Institutional Review Board at the University of Texas at El Paso, participants were recruited through MTurk using self-selection sampling. The present study assessed data collected from April 14th to April 22nd, 2020, although participants were recruited at two subsequent time points for a larger prospective study (Cooper, 2020). Eligible participants provided electronic consent before being directed to the study measures on Qualtrics, an online survey platform. Upon completion, participants received suicide prevention resources and were compensated with $1.00.

2.4. Approach to analysis

Descriptive analyses assessed participant characteristics. Bivariate single-sample t-tests were used to assess potential consequences of their actions than those at lower risk. Given the importance of identifying barriers to public health guideline adherence to prevent and prepare for future pandemics, the primary aim of the current study was to examine the relationship of suicidality with risk perceptions and adherence cross-sectionally within an adult U.S. sample. It was hypothesized that greater suicidality would relate to increased risk perceptions and decreased guideline adherence. Elevated suicidality rates have also been reported among men, young adults, and essential workers (Czeisler et al., 2021); consequently, analyses controlled for these expected associations.

2. Methods

2.1. Participants

Amazon’s Mechanical Turk (MTurk) was used to recruit 180 participants, although 21 were eliminated from analyses for failing attention checks or not providing data recognizable by survey software. The sample included in analyses was comprised of 159 participants (Mage = 37.64 years, SD = 11.92; 48.4% female; 75.5% White, 9.4% African American, 8.8% Asian or Pacific Islander, 4.4% Hispanic, 1.3% Native American; Table 1). Inclusion criteria included being over the age of 18, currently living in the U.S., and having an approval rating of 95% on prior MTurk tasks. Buhrmester et al. (2018) recommend the latter to minimize effects of inattention on data quality.

2.2. Measures

2.2.1. Demographics

This questionnaire collected typical demographic information (e.g., age, SES) and information related to the COVID-19 pandemic (e.g., essential worker status).

2.2.2. Suicidal ideation attributes scale (SIDAS)

The 5-item SIDAS screens for suicidal ideation and assesses frequency, controllability, closeness to acting, distress, and interference with daily activities within the past month (α = 0.91; Van Spijker et al., 2014). Items are rated on a 10-point scale specific to each item (e.g., “0 = not close at all to 10 = made an attempt”). Total scores range from 0 to 50. Scores above 0 indicate suicidality and scores above 21 indicate high risk for engaging in suicidal behavior. This measure demonstrated adequate internal consistency in the present study (α = 0.83).

2.2.3. Broadly applicable measure of risk perception

This 11-item instrument measures components of risk perception that can be applied to any hazard (Wilson et al., 2018). The measure is composed of 4 subscales: general risk perceptions, affect (α = 0.93–0.94), probability (α = 0.76–0.84), and consequences (α = 0.77–0.83). Each item is rated on a 5-point scale specific to the item (e.g., “1 = not risky at all to 5 = highly risky”). Higher subscale scores indicate greater anticipated risk, hazard-related concern and emotion, exposure and/or likelihood that the hazard will occur, and hazard-related severity of consequences, respectively. General risk perceptions were measured using one item. The affect (α = 0.93) and consequences (α = 0.85) subscales demonstrated adequate internal reliability in the present study. The probability subscale was excluded from analyses due to low internal consistency (α = 0.35).

2.2.4. Adherence to COVID-19 guidelines and perceived risk scale (ACGPRS)

This measure was developed to assess COVID-19 guideline adherence. Items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Adherence was based on the following five
correlations and two-tailed Independent Samples t-tests examined relationships between sex, age, essential worker status, suicidality, perceived risk subcales, and adherence indicators. Eight multiple linear regression models were conducted for each of the perceived risk subcales and adherence indicators as the dependent variables with suicidality as the independent variable. All regression analyses controlled for sex, age, and essential worker status.

3. Results

Younger participants were less likely to follow handwashing guidelines ($r = 0.172, p = .030$) and more likely to attend large social gatherings ($r = -0.203, p = .010$; Table 1). The negative association between age and suicidality scores approached statistical significance ($r = -0.153, p = .055$). Essential workers were more likely to report greater suicidal ideation (Cohen’s $d = 0.808, p < .001$), attend large social gatherings (Cohen’s $d = 0.570, p < .001$), and less likely to self-quarantine if they contracted COVID-19 (Cohen’s $d = -0.373, p = .022$).

3.1. Perceived risk

The linear regression model assessing general perceived risk was statistically significant, $F(6) = 3.885, R^2 = 0.133, p = .001$ (Table 2). Suicidality scores were inversely related to perceived risk ($β = -0.309, p < .001$); those reporting higher suicidality perceived COVID-19 as less risky. The linear regressions for the affect and consequences subcales were not statistically significant.

3.2. Adherence indicators

The linear regression models assessing handwashing ($F(6) = 7.665, R^2 = 0.200, p < .001$), attending large gatherings ($F(6) = 12.237, R^2 = 0.241, p < .001$), hypothetical self-quarantine ($F(6) = 8.768, R^2 = 0.185, p < .001$), and social distancing ($F(6) = 9.019, R^2 = 0.191, p < .001$) were statistically significant. Less handwashing was associated with greater suicidality ($β = -0.423, p < .001$). Greater attendance of large gatherings was associated with increased suicidality ($β = 0.405, p < .001$). Being less likely to plan self-quarantining was associated with higher suicidality scores ($β = -0.400, p < .001$). Lastly, decreased adherence to social distancing guidelines was associated with greater suicidality ($β = -0.457, p < .001$) and being an essential worker ($β = -0.205, p = .011$). The linear regression model assessing face mask wearing was not statistically significant.

4. Discussion

The observed rate of suicidality (27.7%) in the present study was elevated relative to other rates collected during the pandemic (e.g., 17.5%; Ammerman et al., 2020), potentially due to the proportion of essential workers in the present study. Conversely, the number of participants reporting high suicidality risk in the present study (18.9%) was similar to that of a recent study (15%; Fitzpatrick et al., 2020). Consistent with the literature (Czeisler et al., 2021), essential workers also reported higher levels of suicidality than non-essential workers. These joint findings suggest that the rate of suicidality and the risk of acting on these impulses were higher during the pandemic, particularly for those with greater exposure to COVID-19.

Contrary to hypotheses, participants reporting greater suicidality perceived COVID-19 as less dangerous. Additionally, higher suicidality levels were not associated with greater concern of COVID-19 or more severe perceptions of COVID-19 consequences. Participants with greater suicidality may have perceived the virus to be less dangerous, but they may have been equally as concerned about the repercussions (e.g., financial) of preventive guidelines as non-suicidal participants. Alternatively, given the higher suicidality prevalence rate reported in the present study compared to prior studies (e.g., Xin et al., 2020), the findings may be due to greater preoccupation with their psychological distress than with the potential physical impacts of COVID-19, which may be far more future-focused and less salient.

As expected, greater suicidality predicted decreased guideline adherence – greater attendance of large social gatherings, lower likelihood of planning to self-quarantine if infected with COVID-19, and decreased social distancing. These findings may be partially explained by the propensity for people at greater risk of attempting suicide to demonstrate reduced ability to assess the consequences of their actions (Klonsky and May, 2010), although the cross-sectional nature of the data preclude establishing directionality. Together with the risk perception findings above, these data also indicate that participants’ need for social interaction to combat their suicidality may have contributed to their reduced risk perceptions of COVID-19 as a justification for decreased public health guideline adherence. Gratz et al. (2020) found that when people felt socially isolated, the presence of stay-at-home orders were associated with increased suicide risk. Rather than adhering to recommendations and finding creative ways to reduce social isolation, people struggling with suicidal ideation may have downplayed the risk of COVID-19 and thereby placed themselves and others at greater risk of contracting it. Decreased guideline adherence was also reported by essential workers and younger participants, yet findings did not suggest

### Table 2

| Variable          | General risk subscale | Handwashing | Attending large gatherings |
|-------------------|-----------------------|-------------|---------------------------|
|                   | $B$       | $SE$  | $β$     | $SE$  | $B$     | $SE$  | $β$     | $SE$  |
| Sex               | 0.262    | 0.131 | 0.154  | 0.111 | 0.038  | 0.213 | -0.264 | -0.064 | 0.295 |
| Age               | 0.004    | 0.042 | 0.007  | 0.015 | 0.120  | 0.009 | -0.020 | -0.114 | 0.013 |
| Essential worker* | -0.234   | -0.116 | 0.168  | -0.430 | -0.148 | 0.232 | -0.422 | -0.101 | 0.321 |
| Suicidality       | -0.027   | -0.326 | 0.007  | -0.050 | -0.423 | 0.009 | 0.069  | 0.405  | 0.013 |
| $R^2$ (adjusted $R^2$) | 0.110 (0.087) | 0.200 (0.174) | 0.241 (0.221) |

| Variable          | Hypothetical self-quarantine | Social distancing |
|-------------------|-----------------------------|------------------|
|                   | $B$     | $SE$  | $β$     | $SE$  | $B$     | $SE$  | $β$     | $SE$  |
| Sex               | 0.281   | 0.099 | 0.209  | 0.209 | 0.0267  | 0.100  | 0.196  | 0.0196 |
| Age               | 0.007   | 0.061 | 0.009  | 0.009 | 0.005   | 0.043  | 0.008  | 0.008 |
| Essential worker* | 0.056   | 0.018 | 0.227  | 0.227 | -0.850 | -0.205 | 0.213  | 0.213 |
| Suicidality       | -0.047  | -0.400 | 0.009  | 0.009 | -0.050  | -0.457 | 0.009  | 0.009 |
| $R^2$ (adjusted $R^2$) | 0.185 (0.164) | 0.191 (0.170) |

Note. $N = 159$. Bold text indicates $p < .05$ and overall model significance.  
* Essential worker = 0, non-essential worker = 1.
that this was related to reduced perceptions of consequences if infected with COVID-19. More nuanced measures of perceived severity of COVID-19 in future studies may better elucidate these seemingly complex relationships.

Of the two preventive health behaviors assessed that did not directly relate to decreased socialization (i.e., handwashing, face mask use), greater suicidality was associated with less frequent handwashing. As suggested earlier, people with greater suicidality may be less likely to frequently wash their hands due to their decreased risk perceptions of COVID-19. However, essential worker status was also associated with fewer instances of this behavior. Given the myriad roles of essential workers and potential burnout experienced due to both the jobs themselves and repetitive behaviors such as handwashing, these findings may reflect job variability or participants’ inability to track this behavior accurately. However, given this observed relationship, future studies should include measures of essential work categories and burnout. Although face mask use has not been directly examined with suicidality in previous studies, that suicidality was unrelated to face mask use appears consistent with previous findings of no relationship between face mask use and depression (Bresnington et al., 2020).

Sustained behavior change has been identified as one of the key methods for preventing and addressing future pandemics (Michie and West, 2020). Particularly important targets for sustained behavior change include greater competency, opportunity to engage in behaviors, and motivation (Michie and West, 2020). The role of suicidality in decreased risk perceptions and adherence presented in the current study may indicate its function as a potential barrier to sustained behavior change. This suggests the need for those reporting suicidal ideation to be provided risk-based education and coping and mindfulness-based strategies (e.g., use of social networking, focus on the present) while in isolation or during social distancing to facilitate adherence to public health guidelines. Future studies should examine the efficacy of suggested interventions and what aspects of suicidality, such as frequency, intensity, duration, and motives, may be risk or protective factors for low perceived risk and resistance to adherence.

4.1. Study limitations & strengths

Limitations of this study include use of a cross-sectional design limiting temporal assessment and use of a convenience, self-selected sample through M Turk with an overrepresentation of White participants which may limit generalizability to other ethnocultural groups. The study also did not specify which job types were considered “essential.” Lastly, the internal reliability of the risk probability subscale was extremely low and unable to be included in analyses.

4.2. Conclusions

The COVID-19 pandemic and subsequent restrictions have manifested significant and disconcerting impacts on mental health. The present study suggests that people with suicidal ideation may deny the risk of COVID-19 and engage in unsafe public health behaviors to limit their isolation. Given the ongoing nature of the pandemic, future studies should prospectively examine what aspects of suicidality contribute most to low risk perceptions and resistance to guideline adherence, include categories of essential worker status, include diverse samples, and assess the efficacy of interventions designed to reduce suicidality to promote public health.

Contributors

MGP assisted in project administration, conducted the formal analyses, wrote the original draft and edited subsequent drafts. CIW wrote the study protocol, assisted with writing the original draft, and reviewed subsequent drafts. AR-C assisted in writing the original draft and reviewed subsequent drafts. JEL was involved in study conceptualization, conducted the study, and edited manuscript drafts. TVC also was involved in study conceptualization, supervision of project administration, and manuscript editing.

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

All authors declare that they have no conflicts of interest.

Acknowledgements

The authors would like to acknowledge all past and current members of the Prevention and Treatment in Clinical Health laboratory for their assistance with this study.

References

Ammerman, B.A., Burke, T.A., Jaconbucci, R., McClure, K., 2020. Preliminary investigation of the association between COVID-19 and suicidal thoughts and behaviors in the U.S. J. Psychiatry Res. 134, 32–38. https://doi.org/10.1016/j.psychres.2020.12.037.

Aquila, J., Sacco, A.M., Risti, C., Gratteri, S., Abenavoli, M.L., Oliva, A., 2020. The role of the COVID-19 pandemic as a risk factor for suicide: what is its impact on the public mental health state today? Trauma Psychol 12 (1), 120–122. https://doi.org/10.1037/trap0000616.

Bresnington, D.T., Cheung, T.C.C., Lam, S.C., Suen, L.K.P., Fong, T.K.H., Ho, H.S.W., Xiang, Y., 2020. Association between depression, health beliefs, and face mask use during the COVID-19 pandemic. Front. Psychiatry. 11. https://doi.org/10.3389/fpsyg.2020.571179.

Buhmester, M.D., Talaifar, S., Gosling, S.D., 2018. An evaluation of Amazon’s mechanical Turk, its rapid rise, and its effective use. Perspect. Psychol. Sci. 13, 149–154. https://doi.org/10.1177/1745691617765516.

Centers for Disease Control and Prevention. 2021. When You’ve Been Fully Vaccinated: How to Protect Yourself and Others. May 16. https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html.

Dataset Cooper, T.V., 2020. Deidentified COVID 19 MTurk 3 Wave Data [Dataset]. IGShare. https://doi.org/10.6084/m9.figshare.12871286.

Creider, M.E., Lane, R.L., Wiley, J.F., Creider, C.A., Howard, M.E., Rajaratnam, S.M.W., 2021. Follow-up survey of US adult reports of mental health, substance use, and suicidal ideation during the COVID-19 pandemic, September 2020. JAMA Netw Open 4 (2), e2037665. https://doi.org/10.1001/jamanetworkopen.2020.37665.

Fitzpatrick, K.M., Harris, C., Drawve, G., 2020. How bad is it? Suicide prevalence in the middle of the COVID-19 pandemic. Suicide Life-Threat 50 (6), 1–9. https://doi.org/10.1111/sltb.12655.

Gratz, K.L., Tall, M.T., Richmond, J.R., Edmonds, K.A., Scamardlo, K.M., Rose, J.P., 2020. Threatened belongingness and perceived burdensomeness explain the associations of COVID-19 social and economic consequences to suicide risk. Suicide Life-Threat 50, 1140–1148. https://doi.org/10.1111/sltb.12654.

Krhovj, E.D., May, A., 2010. Rethinking impulsivity in suicide. Suicide Life-Threat 40 (6), 612–619. https://doi.org/10.1521/slt2.2010.40.6.612.

Michie, S., West, R., 2020. Sustained behavior change is key to preventing and tackling future pandemics. Nat. Med. 27, 749–752. https://doi.org/10.1038/s41591-021-01345-2.

National Institute of Mental Health, 2020. Suicide – Figure 6: Past Year Prevalence of Suicidal Thoughts Among U.S. Adults, 2019. https://www.nimh.nih.gov/health/statistics/suicide-shnl#part_154968.

Scher, L., 2020. The impact of the COVID-19 pandemic on suicide rates. QJM Int. Med. 113 (10), 707–712. https://doi.org/10.1093/qjmed/cca202.

Van Spijker, B.A.J., Batterham, P.J., Calere, A.L., Farrer, L., Christensen, H., Reynolds, J., Kerkhof, A., 2014. The suicidal ideation attributes scale (SIDAS): community-based validation study of a new scale for the measurement of suicidal ideation. Suicide Life-Threat 44 (4), 408–419. https://doi.org/10.1111/sltb.12084.

Wilson, R.S., Zwizzle, A., Walpole, H., 2018. Developing a broadly applicable measure of risk perception. Risk Anal. 39 (4), 777–791. https://doi.org/10.1111/risa.13207.

Van der Weele, J., Van der Ploeg, T.S., Van der Heijden, G.J., 2015. Suicide prevention guidelines. Cochrane Database Syst. Rev. 10. https://doi.org/10.1002/14651858.CD009863.pub2.

Xiang, Y., 2020. Association between depression, health beliefs, and face mask use during the COVID-19 pandemic. Front. Psychiatry. 11. https://doi.org/10.3389/fpsyg.2020.571179.

Buhmester, M.D., Talaifar, S., Gosling, S.D., 2018. An evaluation of Amazon’s mechanical Turk, its rapid rise, and its effective use. Perspect. Psychol. Sci. 13, 149–154. https://doi.org/10.1177/1745691617765516.