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Construct validation of the COVID-19 Cavalier Scale: Analysis of indirect effects with optimism on likelihood to travel

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ABSTRACT

COVID-19 is a highly contagious disease that killed hundreds of thousands of people and crippled the tourism industry. Despite potential death, many people resumed life as if there was no pandemic. The obscure nature of diseases and overly optimistic beliefs about personal health fostered a unique COVID-19 cavalier phenomenon. These people professed, “It’s just like the flu.” Many engaged in passive (e.g., ignoring mask policies) and active (e.g., COVID parties) behaviors that risked exposure, believing it will generate safe immunity. The COVID-19 cavalier believe they are invulnerable to major adverse complications and communal exposure results in immunity. Identifying and understanding caviler individuals will help control the spread of diseases and reopen society for tourism. The design and validation of the 9-item COVID-19 cavalier scale (CCS) provided a tool for researchers to study these individuals. The economical measure demonstrated discriminant validity with practical public health traveling implications.

Introduction

Humans are motivated by innate instincts to venture in the world for reproductive and somatic survival needs (Gat, 2000). Hunter-gatherer archeological and evolutionary theory explains humans are predisposed to dominate for material wealth (Bettinger et al., 2015, p. 3). Complex hunter-gatherer evolutionists extend human adaptation to organized societies (Arnold, 1996; Fitzhugh, 2003; Sassaman, 2004; Winterhalder, 2001). Complex societies are groups of people with vertical or horizontal political economic organizational structure (Fitzhugh, 2003, p. 3). Socialization and joint foraging produced advantageous wealthy economies (Kaplan, 2000; Winterhalder, 2001). For example, cooperative sedentism in deserts significantly reduced individual effort needed for survival (Arnold, 1996). Despite threats, foraging (e.g., venturing in the woods), was necessary to accumulate materials and food (Sassaman, 2004). Instinctually, people venture in the COVID-19 pandemic world risking infection.

Literature review

Hunter-gatherer venturing during COVID-19 pandemic

Hunter-gatherer cultural transmission theory explains presence and participation relays information to individuals about society (Eerkens et al., 2014). The communal and societal rejection of COVID-19 as a serious threat laid the foundation for a false sense of security that promoted venturing. Additionally, societal changes can intensify foraging harvesting time based on individual needs (Freeman and Anderies, 2012). Foraging can act as a coping mechanism to uncertainty (Aharonov-Majar and Suleiman, 2019; Alquist and Baumeister, 2019). Uniform environmental uncertainty can stimulate exploration to forage for food (Chmait et al., 2019). For example, the panicked purchase of COVID-19 pandemic goods (e.g., toilet paper and cleared store shelves) was fueled by perceived resource depletion requiring immediate grocery store foraging (Hamilton, 2020; Paul and Chowdhury, 2020). There is both a survival and instinctual component to venturing outside.

Innate hunter-gatherer adventurism can lack purpose (Gat, 2000). Gat (2000) provides the example of gang violence as needless acts

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reinforced by societal and domination motives. Human nature to socialize, mixed with disregard for serious complications associated to COVID-19 outbreaks (Imhoff and Lamberty, 2020). Nonessential and essential travel both contributed to transmission of COVID-19 worldwide (Chinazzi et al., 2020). Governments restricted travel abroad to reduce spread across nations (Nakamura and Managi, 2020; Wells et al., 2020). During March 2020 when it was announced by the World Health Organization COVID-19 was a pandemic, many people tried to travel as planned for leisure (Hsu et al., 2020). Weeks and months later, people resumed traveling despite risks and restrictions, highlighting this hunter-gatherer instinct to explore. This study proposes a COVID-19 cavalier scale to identify those willing to risk exposure to explore.

### Optimistic bias and personal health

Optimistic bias to personal health risks occurs when people believe harm is less likely to happen to them prior to an actual experience (Weinstein and Lyon, 1999). Optimistic bias is a mental self-defense mechanism from believing actual harm will occur (Weinstein, 1989a, b). Third-person perspective was studied as an underlying mechanism (Chapin, 2000). Despite watching a video about the risk of HIV infection, Chapin (2000) found 89% of participants to demonstrate a degree of optimistic bias in avoiding future contraction. Further, Cho et al. (2012) found this phenomenon to endure H1N1 risk communication. General public health risk communication was not sufficient to convince these individuals. This unrealistic optimism contributes to underestimating risks and not taking actions to prevent personal harm (Weinstein, 1989a, b).

Optimistic bias during the COVID-19 pandemic was profound. Raude et al. (2020) surveyed 4,348 Europeans from the United Kingdom, France, Switzerland, and Italy February 2020. They found approximately half of participants overly optimistic that COVID-19 infection was “less likely to happen to them than to other people” (Raude et al., 2020, p. 4). Further, 414 participants surveyed March and April 2020 with dispositional optimism (i.e., expectation positive outcomes will happen despite challenges) (Carver et al., 2010) associated with greater optimistic bias (i.e., less likely to get COVID-19 than others) (Monzani et al., 2020). Dispelling optimistic bias was an important step missed by public health officials to change public behaviors. Indeed, Weinstein and Lyon (1999) expressed personal vulnerability acceptance precedes adopting precautionary behaviors. In the COVID-19 pandemic era, traveling risks exposure to COVID-19 infection. Therefore, the researchers define COVID-19 cavalier as the irrational belief someone is invulnerable to major adverse complications and communal exposure results in immunity (like the common flu). Fig. 1 illustrates the hypothesized models for predictive analysis after the development of the COVID-19 cavalier belief measure. It was hypothesized greater optimism will associate with greater likelihood to travel.

**H1a:** Optimism positively relates to likelihood to travel somewhere new.

**H1b:** Optimism positively relates to likelihood to cruise.

With low perceived personal risk, sustained overwhelming public cooperation to unenforced recommended preventative measures (e.g., social distancing and mask wearing in public) has been failing. This was apparent in countries with high COVID-19 cases per capital (e.g., Switzerland and U.S.) with guidelines (versus strong legislation and mandates) and inconsistent communication (Habib, 2020; Kim and Kreps, 2020). Disproportionate COVID-19 death rates among vulnerable populations verified existing United States structural inequities among older, minorities, immigrant, and those without health insurance (Bowleg, 2020a; Solis et al., 2020). However, early medical reports informed the public, it was highly contagious disease and more susceptible for contraction was unknown (Desjardins et al., 2020; Jernigan, 2020; Sanville et al., 2020). News of positive COVID-19 world leaders should have illustrated risk of infection was high and it did not discriminate based on country of origin, but much of the public remained unpersuaded (Aiyewumi and Okeke, 2020; Monzani et al., 2020). A method for identifying the COVID-19 cavalier will help researchers study ways to influence these individuals to participate in the global effort to curb the pandemic. It was postulated greater COVID-19 cavalier beliefs will mediate optimism on likelihood to travel.

**H2:** Optimism positively relates to COVID-19 cavalier beliefs.

**H3a:** COVID-19 cavalier beliefs positively relate to likelihood to travel somewhere new.

**H3b:** COVID-19 cavalier beliefs positively relate to likelihood to cruise.

Prior COVID-19 infection does not mean immunity for life (Huang et al., 2020; Seow et al., 2020). These studies found an antibody immune system response to COVID-19 lasts approximately two months to a one year. Therefore, people who activity exposed themselves to the disease risk reinfection and unknowingly spreading the disease. Some may even refuse to become vaccinated, falsely claiming immunity. It is paramount to effectively communicate with the COVID-19 cavalier, so they are educated about these health risks. While many health officials are legitimately focused on the immediate dangers, other researchers can help combat the next challenges. These include activities such as debunking myths and creating persuasive health messaging. Studying the COVID-19 cavalier with this new measure can circumvent the next wave of misinformation and incorrect narratives that can undermine reopening society.

### Data and methods

#### Overview of studies

Given the absence of measures for COVID-19 cavalier beliefs, this scale was designed to identify these attitudes. Standard practices for developing new construct measures was conducted over three studies (Carpenter, 2018; Hinkin, 1995). Multiple studies intended to establish construct validity, reliability, replicate findings, and analyze predictive validity. Factor analysis, descriptive statistics, and consensus of myth beliefs was assessed across all three studies. Long surveys can cause fatigue and testing errors (Schmidt et al., 2003; Ward et al., 2017). Hence, multiple studies were conducted to collect a wide range of variables to analyze convergent and discriminant validity. The studies collected different variables. The multiple studies followed psychometric development steps to validate the measure across large samples. In surveys, participants completed COVID-19 cavalier items followed by an array of latent measures (e.g., optimism and conservatism). Items for each measure was randomly presented to participants to counterbalance. Then participants completed demographic variables such as gender and age. Household income data was collected in ranges (e.g., “less than $10,000”,

![Fig. 1. Study two and three hypothesized model of effects.](image-url)
“$10,000–19,999”, etc.). Political affiliation was asked last, so it would not impact responses, “Please indicate your political party affiliation” with options Democrat, Republican, Independent, and other (with fill in the blank option to explain).

Study one collected primarily results to review construct validity, analyze relationships with different variables and reliability. Study two and three extended results by additionally collecting data to analyze predictive validity results. Study two analyzed a model with CCS on likelihood to travel. Study three analyzed a model with CCS on likelihood to cruise (a transportation service heavily impacted by the pandemic).

**Measure development**

The researchers reviewed online posts (e.g., Twitter), conversed with medical/health care providers, studied debunked myths/conspiracies (Centers for Disease Control and Prevention, 2020; World Health Organization, 2020), and discussed with grounded travelers because of the pandemic. Creation of the items reflected common beliefs and statements associated with activities in public during the pandemic. For example, vacation cruising risks exposing someone to COVID-19 (Chiannazzi et al., 2020), yet many voiced traveling regardless because they believed exposure was inevitable. The researchers refined statements so wording and concepts succinctly articulated one idea. Evaluation of thirty-four statements to the COVID-19 cavalier definition consolidated the list, removing thirteen items as related to other COVID-19 beliefs (Mowen and Voss, 2008).

The twenty-one items initially assessed irrational cavalier beliefs of invulnerability to COVID-19, randomly presented in surveys. The items were on a 7-point scale from (Strongly disagree – 1 to Strongly agree – 7). Many of the expressed views downplayed COVID-19 risks and believe society should resume normal operations because the disease is non-life threatening (e.g., “People get COVID-19 and they soon get better.”). While many recovered from COVID-19 and did not develop serious complications from the disease, there was no clear evidence any particular group was naturally immune (Carbone et al., 2020; Desjardins et al., 2020). Everyone was susceptible to contracting COVID-19 and serious illness was possible across most demographic groups (Ali et al., 2020; Bowleg, 2020b). Prevalent in society was irrational COVID-19 invulnerability beliefs (e.g., “COVID-19 only infects those with pre-existing conditions.”).

**Item reduction**

Across the three studies with 1,206 total participants, evaluation of the 21 items for inter-item correlations were acceptable for 12 items. Those with feeble inter-item correlations were excluded (|r’s < 0.3) (Tabachnick et al., 2007). Kaiser-Meyer-Olkin (KMO) results indicated acceptable sampling adequacy (see Table 1). Bartlett’s test of sphericity results supported the items are suitable for factor analysis.

Scree plot and parallel analysis of twelve items with principal axis factoring indicated one factor appropriately measured the COVID-19 cavalier construct. The first item explained 59.44% of the common variance. Minimum recommended factor loadings are above 0.40 (Hulland, 1999; Peterson, 2000). More stringent factor loadings exceed 0.70 (Chyung et al., 2017; Hair Jr Joseph et al., 2010, p. 125). Nine items exceeded 0.70 factor loading scores (see Table 2). Further analysis was conducted with these 9 remaining items. These 9-items represented the refined CCS.

Two principle component factor loadings (varimax and direct oblimin rotated) analysis produced scores beneath 0.20 for the second factor. This supported one factor as an appropriate design for these items and construct.

**Results**

**Study 1**

After agreeing to consent, 421 participants responded to the survey. Fourteen did not complete the survey (N = 407). The U.S. national sample had 135 male participants. 69% completed a college degree or vocational training program. The average household income was $40,000–49,000 and 90% read/news at least one hour per week. 68 worked in a science, medical, or healthcare profession (e.g., nurse or biologist) while 57 were not employed/never employed. There were 199 self-identified Democrats, 103 Republicans, and 88 Independents and 17 others. Table 3 depicts demographic characteristics of participants.

**Internal consistency**

There was high internal consistency with the 9-item CCS in study 1 (alpha = 0.931) (Taber, 2016).

**Construct validity**

Distinguishing the measure from other constructs was established through convergent and discriminant validity. The researchers collected responses to state optimism scale (seven-items) (alpha = 0.94) (Millstein et al., 2019). The items measure respondents’ relative current state of optimism (e.g., “I am feeling optimistic about life’s challenges.”). The researchers also collected responses for the Generic Conspiracy Belief Scale (GCBS) (i.e., credence to unproven government conspiracies) (e.g., “The power held by heads of state is second to that of small unknown groups who really control world politics.”) (alpha = 0.93) (Brotherton et al., 2013), mistrust (i.e., distrust in others) (e.g., “Suspect hidden motives in others.”) (alpha = 0.88) (Simms et al., 2011), conservatism (i.e., belief in right-wing ideology) (e.g., “Believe in one true religion.”) (alpha = 0.71) (Cloninger et al., 1994), conscientious (i.e., follow rules/norms) (e.g., “Pay attention to details.”) (alpha = 0.81) (Goldberg, 1992), and (general) fear (alpha = 0.84) (Ashton and Lee, 2009; Lee and Ashton, 2004).

Correlations of the 9-item CCS with various constructs illustrated discriminant validity (see Table 4). Higher scores on the CCS correlated with higher scores on generic conspiracy belief (r = 0.618, p < .001), optimism (r = 0.146, p < .001), mistrust, (r = 0.257, p < .001), and conservatism (r = 0.337, p < .001). Meanwhile, higher scores on the CCS correlated with lower scores on conscientiousness (r = −0.261, p < .001) and (general) fear (r = −0.201, p < .001).

**Demographic correlations**

Bivariate correlations of the 9-item COVID-19 Cavalier Scale demonstrated females (compared to males) negatively correlated (r = −0.211, p < .001). Compared to Republicans, Democrats (r = −0.125, p < .01) and Independents/other (r = −0.138, p < .01) negatively correlated with the CCS. Older participants (r = −0.111, p < .05) also demonstrated a significant negative correlation with the CCS.

Religiosity exhibited significant positive correlations with the CCS (r = 0.324, p < .001). Average weekly news (hours) (r = 0.132, p < .01)
Table 2
Item-level descriptive statistics and item-factor loadings for COVID-19 Cavalier Scale (CCS).

| Item                                                                 | Study 1 (N = 407)          | Study 2 (N = 398)          | Study 3 (N = 401)          |
|----------------------------------------------------------------------|---------------------------|---------------------------|---------------------------|
|                                                                       | alpha = 0.928             | alpha = 0.936             | alpha = 0.931             |
|                                                                       | M (SD) Factor             | M (SD) Factor             | M (SD) Factor             |
|                                                                       | loading                   | loading                   | loading                   |
| 1) People get COVID-19 and they soon get better.                     | 3.57 (1.71) 0.763         | 3.63 (1.71) 0.767         | 3.82 (1.74) 0.755         |
| 2) People no longer die from COVID-19                               | 2.15 (1.73) 0.849         | 2.43 (1.83) 0.852         | 2.29 (1.76) 0.831         |
| 3) There are no long-term health effects if someone catches COVID-19.| 2.58 (1.73) 0.856         | 2.90 (1.79) 0.840         | 2.85 (1.84) 0.864         |
| 4) Once someone gets COVID-19 they are immune.                      | 3.25 (1.73) 0.745         | 3.42 (1.80) 0.815         | 3.35 (1.77) 0.756         |
| 5) Contracting COVID-19 will make someone stronger.                 | 2.64 (1.76) 0.866         | 2.95 (1.84) 0.866         | 2.82 (1.80) 0.848         |
| 6) A healthy immune system means full protection from COVID-19.     | 2.78 (1.85) 0.812         | 2.93 (1.89) 0.839         | 2.96 (2.01) 0.825         |
| 7) COVID-19 only infects those with pre-existing conditions.        | 2.27 (1.75) 0.845         | 2.50 (1.81) 0.865         | 2.52 (1.83) 0.857         |
| 8) If world leaders can get COVID-19 a face covering will not save us.| 3.15 (1.94) 0.735         | 3.45 (1.98) 0.733         | 3.31 (2.00) 0.754         |
| 9) Herd immunity is the cure to COVID-19.                           | 3.31 (1.97) 0.725         | 3.54 (1.90) 0.753         | 3.43 (2.00) 0.742         |

also exhibited a significant positive correlation with the CCS.

Study 2

Study two retested the 9-item CCS for reliability, construct validity, and discriminant validity (Hinkin, 2005). Further, the researchers performed mediation analysis to investigate predictive validity. Does COVID-19 cavalier beliefs mediate the relationship of optimism and likelihood to travel somewhere new?

After agreeing to consent, 409 participants responded to the survey. Eleven did not complete the survey (N = 398). The U.S. national sample had 128 male participants. 73% completed a college degree or vocational training program. The average household income was $40,000-49,000 and 82% watch/read news at least one hour per week. 70 worked in a science, medical, or healthcare profession (e.g., nurse, biologist) while 54 were not employed/never employed. There were 197 self-identified Democrats, 116 Republicans, and 74 Independents and 11 others.

Internal consistency

There was high internal consistency with the 9-item CCS in study 2 (alpha = 0.936).

Construct validity

Correlations of the 9-item scale with other constructs illustrated discriminant validity. Latent variables social networking (i.e., participation in online forums) (e.g., “Participated in an online discussion group.”) (alpha = 0.69) (Goldberg, 2010) and education (interest) (e.g., “Have a rich vocabulary.”) (alpha = 0.79) (Hogan, 1995) was additionally collected in study two.

Higher scores on the CCS correlated with higher scores on generic conspiracy belief (r = 0.632, p < .001), optimism (r = 0.213, p < .001), conservatism (r = 0.341, p < .001), and social networking (r = 0.161, p < .001). Meanwhile, higher scores on the CCS correlated with lower scores on conscientiousness (r = −0.360, p < .001), (general) fear (r = −0.173, p < .001), and education (interest) (r = −0.277, p < .001).

Demographic correlations

Bivariate correlations of the 9-item COVID-19 Cavalier Scale demonstrated females (compared to males) negatively correlated (r = −0.350, p < .001). Compared to Republicans, Democrats (r = −0.185, p < .001) and Independents/other (r = −0.127, p < .001) negatively correlated with the CCS.

Religiosity exhibited significant positive correlations with the CCS (r = 0.368, p < .001). Average weekly news (hours) (r = 0.154, p < .01) also exhibited a significant positive correlation with the CCS.

Table 3
Demographic characteristics of participants.

| Demographic Characteristics | Study 1 (N = 407) | Study 2 (N = 398) | Study 3 (N = 401) |
|----------------------------|------------------|------------------|------------------|
| Gender                     | Frequency         | Percentage       | Frequency         | Percentage       | Frequency         | Percentage       |
| Male                       | 135              | 33.2             | 128              | 32.2             | 150              | 37.4             |
| Female                     | 272              | 66.8             | 270              | 67.8             | 251              | 62.6             |
| Age range (years)          |                   |                  |                  |                  |                  |                  |
| 18–29                      | 80               | 19.7             | 62               | 15.6             | 81               | 20.2             |
| 30–39                      | 124              | 30.4             | 152              | 38.2             | 108              | 26.9             |
| 40–49                      | 84               | 20.6             | 83               | 20.8             | 89               | 22.2             |
| 50–59                      | 78               | 19.2             | 58               | 14.6             | 63               | 15.7             |
| 60 and over                | 41               | 10.1             | 43               | 10.8             | 60               | 15.0             |
| Household Income           |                   |                  |                  |                  |                  |                  |
| Less than $10,000          | 18               | 4.4              | 17               | 4.3              | 25               | 6.3              |
| $10,000–19,999             | 31               | 7.6              | 29               | 7.3              | 29               | 7.3              |
| $20,000–29,999             | 39               | 9.6              | 34               | 8.5              | 39               | 9.8              |
| $30,000–39,999             | 43               | 10.6             | 57               | 14.3             | 57               | 14.2             |
| $40,000–49,999             | 49               | 12.0             | 35               | 8.8              | 43               | 10.7             |
| $50,000–59,999             | 50               | 12.3             | 62               | 15.6             | 55               | 13.7             |
| $60,000–69,999             | 39               | 9.6              | 24               | 6.0              | 36               | 9.0              |
| $70,000–79,999             | 27               | 6.6              | 40               | 10.0             | 24               | 6.0              |
| $80,000–89,999             | 29               | 7.1              | 27               | 6.8              | 28               | 7.0              |
| $90,000–99,999             | 25               | 6.2              | 15               | 3.8              | 20               | 5.0              |
| $100,000 and over          | 57               | 14.0             | 58               | 14.6             | 45               | 11.0             |
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indirect effect with optimism on likelihood to travel somewhere new \(0.330\) (H1a). COVID-19 cavalier beliefs demonstrated a significant mediation model between optimism, likelihood to travel somewhere new, and COVID-19 cavalier beliefs. The researchers utilized the 10,000 bootstrapped sampling procedure for estimations (Hayes, 2018). Statistical significance was considered at the 0.05 level and the 95% confidence interval when the confidence interval did not encompass zero.

The pattern, direction, and statistical significance of the paths corresponded with and without the control variables in the model. SPSS AMOS V25 modeling demonstrated satisfactory fit based on recommended thresholds \(\chi^2/df = 2.630, p < .0001, R^2 = 0.066, SRMR = 0.050\) (Hu and Bentler, 1999).

Study 3

Study three retested the 9-item CCS for reliability, construct validity, and discriminant validity to provide supporting evidence with a third sample. Further, while traveling somewhere new can entail somewhere safe and open like a national park, what about traveling associated with perceived high risk of COVID-19 exposure? In study three, the researchers investigated COVID-19 cavalier beliefs towards likelihood to travel by boat. The cruise line industry virtually halted operations after multiple outbreaks in 2020 standing passengers and crew members on boats with limited medical care available (Moriarty et al., 2020; Rocklov et al., 2020).

After agreeing to consent, 413 participants responded to the survey. Twelve did not complete the survey (N = 401). The U.S. national sample had 150 male participants. 69% completed a college degree or higher optimism associated with a higher likelihood to travel somewhere new (M = 4.99, SD = 1.45) (H1a). COVID-19 cavalier beliefs demonstrated a significant indirect effect with optimism on likelihood to travel somewhere new (β = 0.029, SE = 0.016 (LLCI 0.002 ULCI 0.062)) (H1a). COVID-19 cavalier beliefs demonstrated a significant indirect effect with optimistic on likelihood to travel somewhere new (β = 0.029, SE = 0.016 (LLCI 0.002 ULCI 0.062)) (H1a). Higher optimism associated with higher COVID-19 cavalier beliefs (t(389) = 2.010, SE = 0.055, p < .05 (LLCI 0.002 ULCI 0.219)) (H2a). Higher COVID-19 cavalier beliefs associated with a higher likelihood to travel somewhere new (t(388) = 5.764, SE = 0.069, p < .001 (LLCI 0.124 ULCI 0.395)) (H3a). This model controlled for age, gender, household income, average weekly hours of news, religiosity, and political affiliation.

Table 4

Bivariate correlations of 9-item COVID-19 Cavalier Scale (CCS) with discriminate measures, outcome variables, and demographics.

| Variable | Study 1 | Study 2 | Study 3 |
|----------|---------|---------|---------|
|          | M (SD)  | r       | M (SD)  | r       | M (SD)  | r       |
| Optimism | 4.99 (1.37) | 0.146 *** | 5.08 (1.21) | 0.213 *** | 5.17 (1.33) | 0.202 *** |
| Generic Conspiracy Belief Scale (GCBS) | 2.81 (1.00) | 0.618 *** | 2.89 (0.97) | 0.632 *** | – – – | – – – |
| Mistrust | 3.63 (1.24) | 0.257 *** | – – – | – – – | 3.55 (1.27) | 0.362 *** |
| Conscientious | 4.99 (1.03) | –0.261 *** | 4.98 (0.93) | –0.360 *** | 5.12 (1.05) | –0.264 *** |
| Fear | 4.32 (1.01) | –0.201 *** | 4.25 (0.98) | –0.173 *** | 4.36 (1.00) | –0.253 *** |
| Conservatism | 4.30 (0.93) | 0.337 *** | 4.43 (0.85) | 0.341 *** | 4.49 (0.99) | 0.309 *** |
| Education (interest) | – – – | – – – | 5.22 (0.91) | –0.277 *** | 5.24 (0.92) | –0.176 *** |
| Social networking | – – – | – – – | 4.93 (1.32) | 0.161 *** | 4.77 (1.41) | 0.145 *** |
| Likelihood to travel somewhere new | – – – | – – – | 4.91 (1.78) | 0.231 *** | – – – | – – – |
| Likelihood to cruise | – – – | – – – | 3.46 (2.08) | 0.533 *** | – – – | – – – |

Demographic characteristics

| Variable | M (SD)  | r       | M (SD)  | r       | M (SD)  | r       |
|----------|---------|---------|---------|---------|---------|---------|
| Gender (female) | 1.67 (0.47) | –0.211 *** | 1.68 (0.47) | –0.350 *** | 1.63 (0.48) | –0.172 *** |
| Age | 41.27 (13.00) | –0.111 * | 41.47 (12.80) | –0.081 | 42.57 (13.82) | –0.187 *** |
| Household income | 6.24 (3.03) | –0.041 | 6.22 (3.00) | –0.104 * | 5.90 (2.97) | –0.063 |
| Average weekly news (hours) | 3.60 (2.66) | 0.132 ** | 3.96 (2.64) | 0.154 ** | 4.10 (2.64) | 0.073 |
| Religiosity | 4.17 (1.94) | 0.324 *** | 4.57 (1.80) | 0.368 *** | 4.52 (2.00) | 0.325 *** |
| Democrat (political affiliation) | 0.49 (0.50) | –0.125 ** | 0.49 (0.50) | –0.185 *** | 0.49 (0.50) | –0.135 ** |
| Independent/other (political affiliation) | 0.26 (0.44) | –0.138 ** | 0.21 (0.41) | –0.127 ** | 0.21 (0.41) | –0.080 |

Notes: * p < .05, ** p < .01, *** p < .001.

Correlations with the refined 9-item CCS measure. Religiosity was measured averaging two items (Religion/spirituality was an important part of my upbringing, and “I currently consider myself to be a member of a religious or spiritual organization.”) on a 7-point scale (Strongly disagree - 1 to Strongly agree - 7). Political affiliations Democrat and Independent/other were dummy coded with Republican (political affiliation) as the reference group.

Table 5

Study 2 test of mediation of optimism and likelihood to Travel somewhere new 9-item COVID-19 Cavalier as mediator.

| Antecedent | Outcome |
|------------|---------|
|            | COVID-19 Cavalier | Likelihood to Travel Somewhere New |
| Coeff. | SE | t | p | Coeff. | SE | t | p |
| Optimism | 0.111 | 0.055 | 2.010 | <0.05 | 0.182 | 0.075 | 2.415 | <0.05 |
| COVID-19 cavalier covariates | – – – | – – – | – – – | – – – | – – – | – – – | – – – |
| Gender (female) | –0.868 | 0.138 | –6.283 | <0.0001 | 0.032 | 0.197 | 0.163 | 0.871 |
| Age | –0.015 | 0.005 | –3.061 | <0.05 | –0.014 | 0.007 | –2.021 | <0.05 |
| Household income | –0.052 | 0.021 | –2.463 | <0.05 | 0.083 | 0.029 | 2.862 | <0.05 |
| Average weekly news (hours) | 0.045 | 0.025 | 1.777 | 0.076 | 0.055 | 0.034 | 1.600 | 0.110 |
| Religiosity | 0.209 | 0.038 | 5.496 | <0.001 | –0.019 | 0.054 | –0.351 | 0.726 |
| Democrat (political affiliation) | –0.829 | 0.151 | –5.490 | <0.001 | –0.024 | 0.213 | –0.111 | 0.911 |
| Independent/other (political affiliation) | –0.720 | 0.187 | –3.852 | <0.001 | 0.364 | 0.259 | 1.405 | 0.161 |
| Model summary | \(R^2 = 0.317\) | \(F(8, 389) = 22.527, p < .0001\) | \(R^2 = 0.109\) | \(F(9, 388) = 5.282, p < .0001\) |

Notes: Variables were mean centered. Political affiliations Democrat and Independent/other were dummy coded with Republican as the reference group.
vocational training program. The average household income was $30,000–39,000 and 86% watch/read news at least one hour per week. 64 worked in a science, medical, or healthcare profession (e.g., nurse or biologist) while 49 were not employed/never employed. There were 197 self-identified Democrats, 118 Republicans, and 73 Independents and 13 others.

**Internal consistency**
There was high internal consistency with the 9-item CCS in study 3 (alpha = 0.928). Across three studies the items demonstrated high reliability.

**Construct validity**
Correlations of the 9-item scale with other constructs illustrated discriminant validity. Higher scores on the CCS correlated with higher scores on optimism (r = 0.202, p < .001), mistrust (r = 0.362, p < .001), conservatism (r = 0.309, p < .001), and social networking (r = 0.145, p < .001). Meanwhile, higher scores on the CCS correlated with lower scores on conscientiousness (r = −0.264, p < .001), (general) fear (r = −0.253, p < .001), and education (interest) (r = −0.176, p < .001).

**Demographic correlations**
Bivariate correlations of the 9-item COVID-19 Cavalier Scale demonstrated females (compared to males) negatively correlated (r = −0.172, p < .001). Compared to Republicans, Democrats (r = −0.135, p < .01) negatively correlated with the CCS. Older participants (r = −0.187, p < .001) demonstrated a significant negative correlation with the CCS. Meanwhile, religiosity exhibited a significant positive correlation with the CCS (r = 0.325, p < .001).

**Predictive validity mediation analysis**
Optimism, likelihood to cruise, and COVID-19 cavalier beliefs demonstrated statistically significant bivariate correlations with each other (see Table 4). Mediation analysis used PROCESS Macro V3.5 in SPSS (Hayes, 2017, 2012) (see Table 6). The researchers utilized the same 10,000 bootstrapped sampling procedure for estimations and statistical significance criteria as in the previous study. Higher optimism associated with a higher likelihood to cruise (β (391) = 3.119, SE = 0.067, p < .05 (LLCI 0.078 ULCI 0.343)) (H1b). COVID-19 cavalier beliefs demonstrated a significant indirect effect with optimism on likelihood to cruise (β (391) = 0.079, SE = 0.032 (LLCI 0.010 ULCI 0.133)). Higher optimism associated with higher COVID-19 cavalier beliefs (β (392) = 2.304, SE = 0.052, p < .05 (LLCI 0.018 ULCI 0.222)) (H2b). Higher COVID-19 cavalier beliefs associated with a higher likelihood to cruise (β (391) = 8.881, SE = 0.065, p < .0001 (LLCI 0.450 ULCI 0.705)) (H3b). This model controlled for age, gender, household income, average weekly hours of news, religiosity, and political affiliation. The pattern, direction, and statistical significance of the paths corresponded with and

**Table 6**
| Antecedent                          | COVID-19 Cavalier Coeff. | SE   | t     | p       | Likelihood to Cruise Coeff. | SE   | t     | p       |
|-------------------------------------|-------------------------|------|-------|---------|-----------------------------|------|-------|---------|
| Optimism                            | 0.120                   | 0.052| 2.304 | <0.05   | 0.210                       | 0.067| 3.119 | <0.05   |
| COVID-19 cavalier                   | —                       | —    | —     | —       | 0.578                       | 0.065| 8.881 | <0.0001 |
| Covariates                          |                         |      |       |         |                             |      |       |         |
| Gender (female)                     | −0.583                  | 0.137| −4.251| <0.0001 | −0.341                      | 0.181| −1.891| 0.059   |
| Age                                 | −0.027                  | 0.005| −5.295| <0.0001 | −0.025                      | 0.007| −3.704| <0.001  |
| Household income                    | −0.046                  | 0.023| −2.018| <0.05   | 0.043                       | 0.029| 1.463 | 0.144   |
| Weekly hours of news (average)      | 0.034                   | 0.027| 1.280 | 0.201   | −0.004                      | 0.034| −0.123| 0.903   |
| Religiosity                         | 0.235                   | 0.036| 6.503 | <0.0001 | 0.164                       | 0.049| 3.340 | <0.001  |
| Democrat                            | −0.574                  | 0.160| −3.594| <0.001  | 0.089                       | 0.209| 0.427 | 0.670   |
| Independent/other                   | −0.396                  | 0.198| −2.004| <0.05   | −0.177                      | 0.256| −0.692| 0.489   |
| Model summary                       |                         |      |       |         |                             |      |       |         |
| R²                                  | 0.498                   |      |       |         |                             |      |       |         |
| F(8, 392)                           | 16.122                  |      |       |         |                             |      |       |         |

Notes: Variables were mean centered. Political affiliations Democrat and Independent/other were dummy coded with Republican as the reference group.
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General discussion

Results evinced the 9-item CCS as a measure with high internal reliability and discriminant validity across three samples. Different variables significantly correlated with the CCS in expected ways. For example, (general) fear negatively correlated with COVID-19 cavalier beliefs. Meanwhile, conservatism positively correlated with COVID-19 cavalier beliefs. Political affiliation results provided additional support for correlational differences in political ideology and COVID-19 cavalier beliefs. Researchers explained rhetoric from United States conservative media outlets and leaders as a source of COVID-19 related misinformation (Calvillo et al., 2020; Miller, 2020; Uscinski et al., 2020). Calvillo et al. (2020) found conservatism to associate with lower perceived vulnerability to COVID-19. Results from this project indicate CCS to differ at a unique measure while aligning with previous research findings.

Further, mediation analyses in study 2 and 3 supported the hypotheses. Optimism and COVID-19 cavalier beliefs related to likelihood to travel somewhere new and cruise. This buttressed predictive validity and usefulness for studying traveling behaviors in the COVID-19 era. While it is important as a society to remain optimistic about the future, cavalier traveling that disregards health risks undermines the sacrifices and efforts made to combat the pandemic. It is important to reach COVID-19 cavalier individuals with effective and accurate messaging. It was theorized the cavalier instinctually and imperatively want to venture. At a minimum, preventative measures like mask wearing and vaccines can help reduce spread of the disease. However, it requires marketing messages that resonates with these individuals.

Further, results indicated a significant model effect of COVID-19 cavalier beliefs on likelihood to travel somewhere new (R² = 0.109, F(9, 388) = 5.282, p < .0001). Accounted variance was even greater with a significant model effect of COVID-19 cavalier beliefs on likelihood to cruise (study 3: R² = 0.359, F(9, 391) = 24.348, p < .0001). Social science research with r-squared values above 0.100 are considered acceptable (Falk and Miller, 1992). While traveling somewhere new can be risky, cruising during the pandemic was well-known to have outbreaks that stranded travelers at sea for long periods of time (Rocklov et al., 2020). COVID-19 cavalier beliefs accounted for a greater portion of variance for this perceived risker form of travel. This suggests the CCS can be an effective measure to study individuals more likely to travel in risker and enclosed spaces such as long-distance airline travel and overnight railway travel. Predictive findings demonstrated utility of the CCS.

Implications

If the COVID-19 cavalier believe it is just like the flu and know an enumerative number of people die from the flu each year, why do they care so little about catching the common flu? The belief someone needs to get sick, recover, and thereby are stronger afterwards could explain this phenomenon. Few imagine later at the end of their life; they will die by the flu. However, the folklore of children growing up playing in the mud not getting sick older unlike 21st Century children raised to become germaphobes feeds into this misbelief. In other words, it falsely takes getting dirty to become stronger. Unfortunately, this folklore is far from the truth. The COVID-19 virus was not in the mud these adults played in as children. Diseases are evolving faster than modern scientific discoveries to combat them. Unpacking the cavaliers’ beliefs about disease and infections can help understand narratives that shaped their lifestyles. With COVID-19 and infectious diseases likely to continue to impact the globe, researchers need to know common misconceptions so public health messaging can reach these individuals. The CCS provides a useful tool for researchers to investigate underlying reasons for these venturing behaviors despite health risks.

Researchers estimated at least 50% of the new COVID-19 cases was spread from asymptomatic carriers in 2020 (Johansson et al., 2021). It is important for businesses and governments to cater policies to the cavalier who will be the early travelers. For example, 14-day quarantines to arriving travelers should be equally and strongly enforced to all travelers. The cavalier dared to travel despite risks. An unenforced quarantine could appear frivolous interfering with travel plans. If the cavalier are willing to travel during a pandemic, it is likely they are willing to place others are risk; underestimating the consequences of their behaviors. The CCS gives researchers a way to identify these individuals to study effective messaging and motives. The future of safe transportation depends on a cooperative public to follow safety guidelines to reduce transmission of diseases.

Marketing ads to reopen travel with society’s cooperation to health guidelines could resonate with COVID-19 cavalier individuals. For example, an ad stating, “wearing a mask reduces COVID-19 cases, so we can reduce travel restrictions,” speaks to an actionable behavior and benefit for likely travelers.

Results from this study indicated optimism to associate with greater likelihood to travel. Positive framing of health guidelines, paired with traveling can closely align the two concepts (e.g., wear a mask, society reopens for travel). The brave pandemic traveler may view travel restrictions (e.g., negative test results before traveling) and preventative policies (e.g., masks on an airplane) as a hindrance. However, these policies reduce transmission, allowing businesses and society to open safely (Wilson and Chen, 2020). Without such policies, it is not possible to travel without substantial risks to contracting COVID-19. While perceived as a personal burden, it should be marketed as a global health symbol of wellness to combat the pandemic. For example, it is patriotic to be pro-mask, so elderly do not contract COVID-19. It is patriotic to self-quarantine, so family members do not get sick and die. Missing are the viral and influential positive public health advertisements highlighting reasons to follow public health guidelines. For example, an oversized mask on a sport mascot at sanctioned events could market “patriotism”. Public health officials can utilize marketing science techniques to encourage containment behaviors.

Limitations

COVID-19 cavalier beliefs can change overtime. With society reopening and the COVID-19 cavalier traveling, mutation of COVID-19 poses potential ongoing global health risks (Grubaugh et al., 2020; Klimczak et al., 2020). At the time of this study, researchers can only speculate if herd immunity from widespread vaccination will eventually eradicate COVID-19. However, it is more likely mutations of COVID-19 will continue to impact human life. Stories, personal experiences, and knowing people who die from the disease can change perspectives (e.g., cancer awareness) (Weinstein, 1989a,b). With more tragedies and families impacted, the cavalier may adopt a different mindset. In the future, researchers can revisit cavalier beliefs to analyze if attitudes remain consistent with varying mutations. Degree of contagion and severity of illness are two factors that could alter the invulnerability complex. Acceptance of public messaging by the cavalier can be studied to support an open society and operating transportation services.

The proliferation and cyclical circus of misinformation with each mutation could increase overall mistrust in COVID-19 related news. Correlation results indicated mistrust positively related to the CCS (study one and three). This could calcify cavalier beliefs and acquisition of new information. For instance, whether it mutates and is called COVID-20 or COVID-23, the cavalier will learn indifference through desensitization. This happened during the COVID-19 pandemic when governments required shelter-in-place orders. Overtime, the public fatigued, started ignoring orders, and started protesting to reopen the

without the control variables in the model. SPSS AMOS V25 modeling demonstrated satisfactory fit based on recommended thresholds (χ²/df = 2.222, p < .0001, RMSEA = 0.055, CFI = 0.974, SRMR = 0.040) (Hu and Bentler, 1999).
economy (Brennan, 2020).

Furthermore, ongoing spread of misinformation can influence COVID-19 cavalier beliefs overtime. Social networking interest correlated in studies two and three with higher CCS scores. The internet incentivizes sensationalized media because they garner more views tied to advertisement dollars (Chen et al., 2015; Shu et al., 2017). Public health officials can combat this unfounded misinformation with testimonials and real-life accounts of COVID-19 infections. For example, reports of high-profile individuals contracting the disease or dying from COVID-19 could alter their false sense of invulnerability. Accurate media information can influence the public and educate the cavalier that they are not uniquely immune. This can increase adoption of COVID-19 public health guidelines among the cavalier traveling.

Future research

Politicians try to enact polices that are popular to help with reelection (König and Wenzelburger, 2014). Why do people think the government wants to take away freedoms (e.g., enforcing curfews and only essential businesses to remain open)? Humans tend to place themselves at the center of the universe before developing awareness of their effect on others and their environment (Freud, 2018, p. 133). Someone’s ego is important for one’s survival and reproduction. If we did not place ourselves first in most decisions, it could be to the detriment of our line of genes. When immediate closures and inconveniences interrupt someone’s life, victimizing is a way to cope with changes. What better scapegoat than politicians already generally distrusted? Correlation results indicated generic conspiracy beliefs (unfounded government plots) to positively relate to the CCS. Many people have a need for individualism and rebelling against public policies to express uniqueness. It is proposed individualism and COVID-19 cavalier beliefs precede engagement in COVID-19 containment behaviors. Future studies can investigate the relationship of these variables on prosocial preventative health behaviors.

Essential workers, many considered minorities, risked greater COVID-19 exposure and infection because of substantial in-person contact (Bowleg, 2020a; Chilimuri et al., 2020). Cavalier beliefs could negatively influence their likelihood to engage in containment behaviors. It is proposed those high on the CCS in essential work positions will spend less time washing their hands, disinfecting equipment, and wearing a mask properly. Such behaviors are viewable in camera footage of business establishments like studies of consumer shopping behaviors (Underhill, 2009). It is noninvasive and important oversight to encourage containment behaviors for those in greater contact with the public. Observations of previously recorded transportation can reveal public behaviors that can reduce transmission and thereby public health.

Conclusion

The COVID-19 Cavalier Scale provides an important validated tool for researchers to investigate those with perceived invulnerability to COVID-19 severe complications. Human need to venture will pose to be COVID-19 cavalier and travel. Effective marketing promoting risk mitigation practices (e.g., mask wearing) are vital to public health and safety.

CRediT authorship contribution statement

Stephen Bok: Conceptualization, Software, Data curation, Writing – original draft, Supervision. Daniel E. Martin: Conceptualization, Methodology, Validation, Writing – review & editing. Erik Acosta: Conceptualization, Writing – original draft. Maria Lee: Conceptualization, Visualization, Writing – review & editing. James Shum: Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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