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ABSTRACT

Objective: The Theory of Planned Behavior has been applied to COVID-19 protective behaviors, but evidence suggests this theory may be less predictive over time and less valid in individualistic societies. The current study applied this theory among American college students as vaccines became available and added perceived risk. **Participants:** 242 undergraduate students at two universities. **Methods:** Participants completed an online survey and analyses were conducted using PROCESS. **Results:** Perceived risk was indirectly related to protective behavior via intentions which were significantly impacted by positive attitudes, descriptive norms, and perceived behavioral control. **Conclusions:** Even within an individualistic culture and when vaccines were becoming available, the Theory of Planned Behavior predicts protective behaviors. Including risk perception also furthers understanding of this theory by identifying one factor related to norms and perceived behavioral control. These results may inform the design of interventions designed to increase compliance with pandemic-related policies and other positive behaviors.

During the ongoing COVID-19 pandemic, individual behaviors (ie, masking and social distancing) have been essential in efforts to reduce the spread of the virus.[1] Further, national and global changes in individual behaviors may also make a difference in the face of other global emergencies (such as protecting the environment by eating less meat).[2] However, individuals remain resistant to making individual changes for the public good.[3,4] In the current study, we examine an extended version of the Theory of Planned Behavior[5] with perceived risk included as an antecedent to test whether this theory would explain reported protective behaviors among American undergraduate students over one year into the COVID-19 pandemic.

The Theory of Planned Behavior posits that behavior is best predicted by specific behavioral intentions which are determined by attitudes toward the behavior, perceived norms (ie, beliefs about what behavior is considered normative), and perceived behavioral control (ie, beliefs about one's ability to perform the behavior).[5] According to this theory, behaviors that are under volitional control should be more likely to occur if an individual has the intention of performing that action. However, perceived behavioral control is expected to influence not only an individual's actions (via effort and actual control), but also their intentions. Thus, an individual is expected to have stronger behavioral intentions when they have a more favorable evaluation of the behavior (ie, positive attitude), perceive social pressure to perform the behavior (ie, perceived norms), and view the behavior as easy to perform (ie, perceived behavioral control). This theory has been used in many domains including health sciences, environmental science, business

and management, educational research, and hospitality and tourism.[6] For example, it has been used to predict alcohol-related behaviors,[6] parental health-promoting behaviors,[7] and consumption of organic food.[8]

During the COVID-19 pandemic, researchers have tested the Theory of Planned Behavior as a means of predicting social distancing,[9] intentions to wear a mask,[10] and even intentions to use food delivery apps.[11] A recent meta-analysis suggests that this theory is useful in understanding individuals' use of protective behaviors during the COVID-19 pandemic with perceived behavioral control showing the strongest association with both intentions and behaviors.[12] However, there was a temporal effect in this meta-analysis suggesting that the associations between perceived behavioral control and intentions became weaker in data collected in later months during the pandemic. Thus, it is important to test whether the Theory of Planned Behavior remains a valid model for understanding the usage of protective behavior further in the pandemic at a time when individuals may be weary of restrictions and less willing to continue enacting protective measures. Other than the association between perceived behavioral control and behavioral intentions, the associations of attitudes, subjective norms, and perceived behavioral control with behavioral intentions and behaviors were also weaker in societies that were more individualistic and economically advanced.[12] Given that American college students are both particularly individualistic[13] and more likely to come from advantaged backgrounds,[14] it is important to test whether this model is valid among a population of American college students and examine the appropriateness of including additional factors (ie, risk perception) in the model.

In the current work, we wanted to examine the role that perceptions of risk play in the Theory of Planned Behavior and the endorsement of engaging in protective COVID-19 behaviors. College students, as emerging adults, may be particularly likely to view preventive behaviors as unnecessary due to their lower risk of hospitalization or death from COVID-19[15] and their greater likelihood of engaging in risky behaviors.[16] This increases the risk of emerging adults spreading the virus.[17,18] To reach herd immunity levels in the current pandemic, increase the effectiveness of efforts to protect the environment, or prevent the spread of a future pandemic, it is important to develop interventions to increase compliance among college students. It is also important to understand the best predictors of protective behaviors among college students in order for colleges to remain open for face-to-face learning. The current study helps in this effort by examining whether risk perception is an antecedent to attitudes, norms, and perceived behavioral control as well as intentions and engagement in protective behaviors. Understanding these associations can help inform the development of interventions to increase compliance among this risk-taking population.

Current study

In the current study, we measured perceived risk of COVID-19 in addition to standard Theory of Planned Behavior measures related to engagement in protective behaviors (ie, social distancing/masking) at two universities. We expected all associations to be positive except for the association between perceived risk and perceived behavioral control.

Method

Participants

Participants included 242 undergraduate students at two universities ($n = 101, 141$) who self-identified as single (ie, not involved in a committed, monogamous relationship). One small university, located in the Northeast, was holding classes in person and students were living mostly on campus. At the other university, a medium-sized university located in the Midwest, students were taking classes online and students lived either on campus or at home. Most participants identified as European American or Caucasian (63%) and girl/woman (71%). Participants' ages ranged from 18 to over 40 ($M = 19.23$, $SD = 1.71$) and their political beliefs leaned left ($M = 2.92$, $SD = 1.41$). Most participants (59%) reported that there was no reason why they would be unlikely to contract COVID-19 if exposed (ie, previously had COVID-19 or vaccinated).

Procedure

All procedures were approved by the Institutional Review Board (IRB) at both universities. At both institutions, participants were recruited via the psychology department participant pool for an online survey. In April 2021, college students completed measures related to the current study and measures of individual differences and dating attitudes and behaviors not included in the current study.

Measures

Protection

Participants were asked to respond yes (coded 1) or no (coded 2) to the question "If you were exposed to coronavirus (COVID-19), is there any reason why you would be unlikely to contract it (eg, have already had COVID, received a vaccination, etc)?"

Perceived risk

Participants responded to six questions assessing perceived risk of COVID-19 (eg, "How worried are you that you will get sick with COVID-19?" "If you were to get sick with COVID-19, how bad would it be for you?") on a 7-point scale ($1 = not\ at\ all$, $7 = extremely$). One question ("If you wanted to, how easy would it be for you to get tested for COVID-19?" reverse-scored) was removed to increase scale reliability. All other items were averaged to form a composite measure of perceived risk with higher values representing greater perceived risk ($\alpha = .75$).

Attitudes

Participants rated the extent to which they perceived engaging in behaviors that protect against COVID-19 as beneficial, stressful, and uncomfortable on a 7-point scale ($1 = strongly\ agree$, $7 = strongly\ disagree$; adapted from Lac et al[19]). Even after reverse scoring the negative items, the beneficial item reduced scale reliability. We therefore included the beneficial item in analyses as a positive attitude score and averaged the stressful and uncomfortable items to calculate a negative attitudes score (r_s [242] = .63).

Subjective norms

Participants rated the extent to which they believed five types of people (ie, typical students, friends, closest friends, people with whom they podded, family members) adhered to protective guidelines (7-point scale; $1 = not\ at\ all$, $7 = all\ the\ time$) and approved of protective guidelines (7-point scale; $1 = strongly\ disapprove$, $7 = strongly\ approve$) during COVID-19 (adapted from Lac et al[19]). Adherence items were averaged to form a composite measure of descriptive norms ($\alpha = .82$) and approval items were averaged to form a composite measure of injunctive norms ($\alpha = .85$).

Perceived behavioral control

Participants rated four behavioral control items (eg, "It is easy for me to follow protective guidelines during COVID-19" "It is hard for me to request that others follow protective guidelines during COVID-19.") on a 7-point scale ($1 = strongly\ agree$, $7 = strongly\ disagree$; adapted from Lac et al[19]). After reverse scoring items measuring difficulty, these items were averaged to form a composite perceived behavioral control

measure with higher scores representing more perceived control (α = .71).

Intentions

Participants indicated their intentions to follow social distancing/masking guidelines in the next 30 days overall and specifically when interacting with people outside of their bubble/pod on a 7-point scale (1 = never, 7 = daily). These two items were averaged to form a composite intentions measure (r_s [241] = .61).

Protective behavior

Participants indicated the number of days that they followed social distancing/masking guidelines and the number of days that they ignored social distancing/masking guidelines in the past 30 days. After reverse scoring ignoring guidelines, these two items were averaged to form a composite behavior measure with higher scores representing greater protective behavior (r_s [163] = .78).

Results

Table 1 includes means, standard deviations, and correlations between variables of interest. Participants were around the midpoint on most measures but reported high positive attitudes toward protective behaviors, high intentions to engage in protective behaviors, and that they had engaged in protective behaviors on most days in the past 30 days. Men reported lower perceived risk. Political beliefs were correlated with all variables such that more liberal participants reported higher levels of all other variables except lower negative attitudes. Perceived risk was positively related to all Theory of Planned Behavior measures except negative attitudes (ie, positive attitudes, descriptive norms, injunctive norms, perceived behavioral control, and behavioral intentions) and all Theory of Planned Behavior measures were positively correlated with one another except negative attitudes which were negatively correlated with all other variables.

We tested our hypotheses using PROCESS version 3 model 80.[20] The X variable was perceived risk; the M variables were positive attitudes, negative attitudes, descriptive norms, injunctive norms, perceived behavioral control, and intentions (Mk); and the Y variable was protective behavior.

We also controlled for age, gender (1 = boy/man; 2 = girl/woman; 3 = gender non-conforming or nonbinary; 4 = prefer to self-describe/other), ethnicity (1 = African American, Black, or African, 2 = Asian American, Asian, or Pacific Islander, 3 = European American or Caucasian, 4 = Hispanic American, Latino/a/x, or Chicano/a, 5 = Native American or American Indian, 6 = bi-racial or multi-racial), political orientation (1 = very liberal; 7 = very conservative), protection (1 = unlikely to contract COVID, 2 = unprotected), and data collection site. This analysis revealed significant positive associations between perceived risk and positive attitudes, descriptive norms, injunctive norms, perceived behavioral control, and intentions (see Figure 1, Table 2). Only perceived risk, positive attitudes, descriptive norms (perceptions of others' adherence to protective guidelines), and perceived behavioral control were related to intentions and only intentions were related to reported protective behavior. Although the direct effect of perceived risk on protective behaviors was nonsignificant (see Table 2), there was a significant positive indirect effect (see Table 3). Specifically, perceived risk was related to greater protective behavior via intentions; via positive attitudes then intentions; via descriptive norms then intentions; and by perceived behavioral control then intentions. This suggests that behavioral intentions are the most proximal predictor of protective behaviors during COVID-19 and that these intentions are formed based on perceived risk, positive attitudes toward protective behaviors, perceptions of others' adherence to protective guidelines, and perceived behavioral control.

Discussion

Although previous research has found that individuals are resistant to making changes for the public good,[3,4] reported use of individual behaviors (ie, masking and social distancing) that are protective against the spread of COVID-19 was high among college students in the current study. This is especially important given concerns that emerging adults may be particularly likely to spread the virus due to their greater propensity to engage in risky behaviors.[16] In contrast to these concerns, the current study suggests that college students typically viewed protective behaviors as beneficial and reported high compliance with protective behaviors. This may be in part due to the college environment itself

Table 1. Means, standard deviations, and correlations.

Measure	M (SD)	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Ethnicity		–											
2. Gender		−.001	–										
3. Age	19.23 (1.71)	−.13	.04	–									
4. Political beliefs	2.92 (1.41)	.15*	.08	−.02	–								
5. Perceived risk	4.55 (1.15)	.02	−.17**	−.07	−.25**	–							
6. Positive attitudes	6.33 (1.25)	.06	−.03	.01	−.39**	.32**							
7. Negative attitudes	4.05 (1.62)	.16*	.11	.04	.19**	.03	−.10	–					
8. Descriptive norms	4.78 (1.28)	−.12	−.004	.07	−.36**	.25**	.23**	−.15*	–				
9. Injunctive norms	5.36 (1.15)	−.08	−.05	−.01	−.36**	.27**	.37**	−.13*	.53**	–			
10. Perceived behavioral control	5.10 (1.14)	−.02	−.07	.08	−.19**	.20**	.26**	−.31**	.22**	.42**	–		
11. Intentions	6.44 (1.62)	−.03	−.12	−.02	−.38**	.42**	.52**	−.14	.43**	.39**	.40**	–	
12. Protective behavior	26.72 (4.69)	.04	−.03	−.01	−.22**	.29**	.28**	−.15*	.31*	.30**	.29**	.51**	–

Note: Ethnicity coded 1 = White, 0 = other. Gender coded 1 = male, 0 = female/non-binary/self-described. Higher values on political beliefs indicate more conservative leaning.
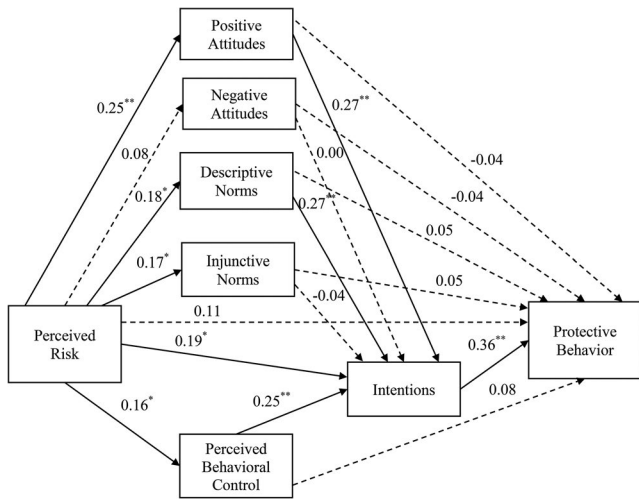*p < .05; ** p < .01.

Figure 1. Standardized results of mediation analyses with perceived risk, attitudes, norms, and perceived behavioral control predicting intentions and protective behavior. *Note.* Dotted lines signify non-significant associations. *$p <$ .05; ** $p <$ .01.

behaviors. This is good news given the importance of keeping universities open due to the associations between school closures and mental health and wellness[21] and between educational status and wealth.[22]

The current study also tested an extended Theory of Planned Behavior model in predicting engagement in COVID-19 protective behaviors. Results suggest that, although perceived risk was not directly related to engagement in protective behaviors, it is an important factor due to its relations to positive attitudes toward protective behaviors, descriptive norms, perceived behavioral control, and intentions to engage in protective behaviors. Although a recent meta-analysis found that perceived behavioral control was most strongly linked to both intentions and behaviors,[12] only intentions were directly related to protective behaviors in the current study. Perceived behavioral control, like perceived risk and descriptive norms influenced behavior indirectly via intentions. This is interesting given the results in the meta-analysis suggesting that the association between perceived behavioral control and intentions weakened over time. The current study, conducted more than a year into the pandemic and at a time when vaccines were beginning to be available (although not completely available to all undergraduates during this study), suggests that this link remains an important factor. This is good news given the current spread of new COVID-19 strains, affecting even

where students are required to comply with these behaviors in order to live on campus and attend in-person classes. In addition, descriptive and injunctive norms were high in the current study, suggesting that participants thought their peers were engaging in, approved of engaging in, protective

Table 2. Regression coefficients, standard errors, and model summary for mediation analysis.

	Positive attitudes			Negative attitudes			Descriptive norms		
	b	SE	p	b	SE	p	b	SE	p
Constant	5.93	1.00	<.001	3.57	1.51	.02	3.42	1.12	.003
Perceived risk	0.25	0.06	<.001	0.12	0.10	.23	0.20	0.07	.01
Positive attitudes	——	——	——	——	——	——	——	——	——
Negative attitudes	——	——	——	——	——	——	——	——	——
Descriptive norms	——	——	——	——	——	——	——	——	——
Injunctive norms	——	——	——	——	——	——	——	——	——
Perceived behavioral control	——	——	——	——	——	——	——	——	——
Intentions	——	——	——	——	——	——	——	——	——
	$R^2 = 0.47$			$R^2 = .12$			$R^2 = .19$		
	$F(7, 211) = 8.63, p < .001$			$F(7, 211) = 4.09, p < .001$			$F(7, 211) = 7.14, p < .001$		

	Injunctive norms			Perceived behavioral control			Intentions		
	b	SE	p	b	SE	p	b	SE	p
Constant	5.25	1.02	<.001	3.20	1.08	.003	1.04	1.33	.44
Perceived risk	0.17	0.07	.01	0.16	0.07	.03	0.26	0.08	.001
Positive attitudes	——	——	——	——	——	——	0.37	0.08	<.001
Negative attitudes	——	——	——	——	——	——	0.00	0.06	.98
Descriptive norms	——	——	——	——	——	——	0.34	0.08	<.001
Injunctive norms	——	——	——	——	——	——	−0.05	0.09	.58
Perceived behavioral control	——	——	——	——	——	——	0.34	0.05	<.001
Intentions	——	——	——	——	——	——	——	——	——
	$R^2 = .17$			$R^2 = 0.09$			$R^2 = .46$		
	$F(7, 211) = 6.16, p < .001$			$F(7, 211) = 3.14, p = .004$			$F(12, 206) = 14.40, p < .001$		

	Protective behavior		
	b	SE	p
Constant	17.50	4.59	<.001
Perceived risk	0.43	0.28	.13
Positive attitudes	−0.17	0.30	.58
Negative attitudes	−0.11	0.19	.56
Descriptive norms	0.19	0.28	.49
Injunctive norms	0.18	0.32	.57
Perceived behavioral control	0.33	0.30	.28
Intentions	1.04	0.24	<.001
	$R^2 = .24$		
	$F(13, 205) = 5.02, p < .001$		

Table 3. Indirect effects for mediation analysis.

	b	SE	95% CI
Total	0.54	0.19	0.20, 0.96
Perceived risk → Positive attitudes → Protective behavior	−0.04	0.11	−0.25, 0.19
Perceived risk → Negative attitudes → Protective behavior	−0.01	0.03	−0.10, 0.04
Perceived risk → Descriptive norms → Protective behavior	0.04	0.08	−0.10, 0.21
Perceived risk → Injunctive norms → Protective behavior	0.03	0.07	−0.11, 0.19
Perceived risk → Perceived behavioral control → Protective behavior	0.05	0.06	−0.06, 0.20
Perceived risk → Intentions → Protective behavior	0.27	0.11	0.07, 0.49
Perceived risk → Positive attitudes → Intentions → Protective behavior	0.10	0.05	0.02, 0.22
Perceived risk → Negative attitudes → Intentions → Protective behavior	0.00	0.01	−0.02, 0.02
Perceived risk → Descriptive norms → Intentions → Protective behavior	0.07	0.04	0.02, 0.16
Perceived risk → Injunctive norms → Intentions → Protective behavior	−0.01	0.02	−0.06, 0.03
Perceived risk → Perceived behavioral control → Intentions → Protective behavior	0.06	0.03	0.01, 0.13

those who are vaccinated. However, future research is needed to determine how COVID-19 burnout[23] and social distancing fatigue[24] moderate these findings.

In addition to examining factors related to protective behaviors over a year into the pandemic, the current study also adds to the literature by suggesting that the Theory of Planned Behavior remains a valid model for predicting protective behaviors even among a sample of American college students despite evidence suggesting that these effects were weaker in societies that were more individualistic and economically advanced.[12] The inclusion of perceived risk in this model also adds to understanding of the processes involved in forming behavioral intentions. With the COVID-19 pandemic ongoing, the spread of new variants even among vaccinated individuals, and the potential for additional pandemics in the future, researchers may want to consider including perceived risk in this model in further studies. It is possible that spikes in infection rates will lead to increased use of protective behaviors due to increased risk perceptions, although future research is needed to better understand the specific role of changing infection rates in this model. The importance of perceived risk in predicting protective behaviors also increases the importance of research examining factors that influence level of perceived risk. For example, in a US sample, conservativism was negatively related to both perceived vulnerability and severity.[25] In addition, international research has found personal experience with COVID-19 and receiving information about COVID-19 from family and friends is related to increased risk perception whereas individualism is related to lower levels of risk perception.[26] Results of the current study suggest that understanding factors related to risk perception may provide important insights for future interventions. In addition, although previous research suggests that interventions targeted at each of the Theory of Planned Behavior components are typically successful,[27] the current research suggests that interventions should target descriptive, rather than injunctive, norms. Normative interventions such as this have been successful in promoting green behavior among adults,[28] as well as encouraging healthy eating[29] and reducing problem drinking[30] among college students.

However, this study did have some limitations. One major limitation is the use of mediational analyses in examining cross-sectional data. Although the current analyses cannot support causal conclusions, Hayes[20] presents an argument for the use of mediational data for cross-sectional data as the best means for interpreting data. Thus, it is important to clarify that the analyses presented here consist of atemporal mediation and are not meant to imply a causal model. In addition, our measure of attitudes had low internal reliability. It is possible that this contributed to its lack of statistical significance within the model. Further research is needed to determine if the current findings will replicate and how this pattern of results changes over the course of the pandemic. In addition, perceived knowledge about the spread of COVID-19 or the availability of treatment may affect both perceived risk and its role within the Theory of Planned Behavior. Finally, previous research suggests that the perceived efficacy of mask use is related to both social distancing and mask usage.[31] Although perceived efficacy was not measured in the current study, the current results do suggest that viewing protective behaviors as more beneficial was positively related to greater intentions. Future researchers may want to consider whether perceived efficacy is related to attitudes and perceived behavioral control.

In conclusion, the current study suggests that college students are willing to engage in protective behaviors during the COVID-19 pandemic and that intentions were the best predictor of these behaviors. Further, perceiving greater risk from COVID-19 increased intentions to engage in protective behaviors. This may be helpful in designing interventions to increase compliance with pandemic-related policies and changing individual behaviors in the face of other global emergencies, such as global warming.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States of America and received approval from the Institutional Review Board of Loyola University Chicago and the University of New England.

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Preregistration

Hypotheses and planned analyses were preregistered at: https://osf.io/5zv2e/?view_only=ddd89636ccd544b9837c165d105c31e0.

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References

1. CDC. Protect yourself. Published 2021. Accessed September 27, 2021. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html

2. Chai BC, van der Voort JR, Grofelnik K, Eliasdottir HG, Klöss I, Perez-Cueto FJA. Which diet has the least environmental impact on our planet? A systematic review of vegan, vegetarian and omnivorous diets. *Sustainability* 2019;11(15):4110. doi:10.3390/su11154110.

3. Biddlestone M, Green R, Douglas KM. Cultural orientation, power, belief in conspiracy theories, and intentions to reduce the spread of COVID-19. *Br J Soc Psychol*. 2020;59(3):663–673. doi:10.1111/bjso.12397.

4. Bryant CJ. We can't keep meating like this: Attitudes towards vegetarian and vegan diets in the United Kingdom. *Sustainability* 2019;11(23):6844. doi:10.3390/su11236844.

5. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 1991;50(2):179–211. doi:10.1016/0749-5978(91)90020-T.

6. Bhochhibhoya A, Branscum P. The application of the Theory of Planned Behavior and the integrative behavioral model towards predicting and understanding alcohol-related behaviors: A systematic review. *J Alcohol Drug Educ*. 2018;62(2):39–63.

7. Hamilton K, Dongen AV, Hagger MS. An extended Theory of Planned Behavior for parent-for-child health behaviors: a meta-analysis. *Health Psychol*. 2020;39(10):863–878. doi:10.1037/hea0000940.supp

8. Scalco A, Noventa S, Sartori R, Ceschi A. Predicting organic food consumption: a meta-analytic structural equation model based on the Theory of Planned Behavior. *Appetite* 2017;112:235–248. doi:10.1016/j.appet.2017.02.007.

9. Yu Y, Lau JTF, Lau MMC. Levels and factors of social and physical distancing based on the Theory of Planned Behavior during the COVID-19 pandemic among Chinese adults. *Transl Behav Med*. 2021;11(5):1179–1186. doi:10.1093/tbm/ibaa146.

10. Sun Y, Qin B, Hu Z, et al. Predicting mask-wearing behavior intention among international students during COVID-19 based on the Theory of Planned Behavior. *Ann Palliat Med*. 2021;10(4):3633–3647. doi:10.21037/apm-20-2242.

11. Al Amin M, Arefin MS, Alam MR, Ahammad T, Hoque MR. Using mobile food delivery applications during COVID-19 pandemic: An extended model of planned behavior. *J Food Prod Mark*. 2021;27(2):105–126. doi:10.1080/10454446.2021.1906817.

12. Fischer R, Karl JA. Predicting behavioral intentions to prevent or mitigate COVID-19: A cross-cultural meta-analysis of attitudes, norms, and perceived behavioral control effects. *Soc Psychol Personal Sci*. 2021;13(1):264–276. doi:10.1177/19485506211019844.

13. Diener E, Diener M. Cross-cultural correlates of life satisfaction and self-esteem. *J Pers Soc Psychol*. 1995;68(4):653–663. doi:10.1037//0022-3514.68.4.653.

14. Fry R, Cilluffo A. *A rising share of undergraduates are from poor families, especially at less selective colleges*. 2019. https://www.pewresearch.org/social-trends/2019/05/22/a-rising-share-of-under graduates-are-from-poor-families-especially-at-less-selective-colleges/

15. CDC. Hospitalization and death by age. Published 2021. Accessed September 27, 2021. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-age.html

16. Arnett JJ. Emerging adulthood: a theory of development from the late teens through the twenties. *Am Psychol*. 2000;55(5):469–480. doi:10.1037/0003-066X.55.5.469

17. Monod M, Blenkinsop A, Xi X, on behalf of the Imperial College COVID-19 Response Team, et al. Age groups that sustain resurging COVID-19 epidemics in the United States. *Science*. 2021;371(6536):eabe8372. doi:10.1126/science.abe8372.

18. Walke HT, Honein MA, Redfield RR. Preventing and responding to COVID-19 on college campuses. *J Am Med Assoc*. 2020;324(17):1727–1728. doi:10.1001/jama.2020.20027.

19. Lac A, Crano WD, Berger DE, Alvaro EM. Attachment Theory and Theory of Planned Behavior: an integrative model predicting underage drinking. *Dev Psychol*. 2013;49(8):1579–1590. doi:10.1037/a0030728.

20. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. 2nd ed. New York: Guilford Press; 2018.

21. Copeland WE, McGinnis E, Bai Y, et al. Impact of COVID-19 pandemic on college student mental health and wellness. *J Am Acad Child Adolesc Psychiatry*. 2021;60(1):134–141.e2. doi:10.1016/j.jaac.2020.08.466.

22. Boshara R, Emmons WR, Noeth BJ. Education and wealth. The demographics of wealth – how age, education and race separate thrivers from strugglers in today's economy. 2015 (Essay No. 2). https://www.stlouisfed.org/household-financial-stability/the-demographics-of-wealth/essay-2-the-role-of-education

23. Yıldırım M, Solmaz F. COVID-19 burnout, COVID-19 stress and resilience: Initial psychometric properties of COVID-19 Burnout Scale. *Death Stud*. 2020;46(3):524–532. doi:10.1080/07481187.2020.1818885.

24. Shearston JA, Martinez ME, Nunez Y, Hilpert M. Social-distancing fatigue: Evidence from real-time crowd-sourced traffic data. *Sci Total Environ*. 2021;792:148336. doi:10.1016/j.scitotenv.2021.148336.

25. Calvillo DP, Ross BJ, Garcia RJB, Smelter TJ, Rutchick AM. Political ideology predicts perceptions of the threat of COVID-19 (and susceptibility to fake news about it). *Soc Psychol Personal Sci*. 2020;11(8):1119–1128. doi:10.1177/1948550620940539.

26. Dryhurst S, Schneider CR, Kerr J, et al. Risk perceptions of COVID-19 around the world. *J Risk Res*. 2020;23(7-8):994–1006. doi:10.1080/13669877.2020.1758193.

27. Steinmetz H, Knappstein M, Ajzen I, Schmidt P, Kabst R. How effective are behavior change interventions based on the Theory of Planned Behavior? A three-level meta analysis. *Z Psychol*. 2016;224(3):216–233. doi:10.1027/2151-2604/a000255.

28. Elgaaied-Gambier L, Monnot E, Reniou F. Using descriptive norm appeals effectively to promote green behavior. *J Bus Res*. 2018;82:179–191. doi:10.1016/j.jbusres.2017.09.032.

29. Burger JM, Bell H, Harvey K, et al. Nutritious or delicious? The effect of descriptive norm information on food choice. *J Soc Clin Psychol*. 2010;29(2):228–242. doi:10.1521/jscp.2010.29.2.228.

30. Ridout B, Campbell A, Ellis L . 'Off your Face(book)': alcohol in online social identity construction and its relation to problem drinking in university students)". *Drug Alcohol Rev*. 2012;31(1):20–26. doi:10.1111/j.1465-3362.2010.00277.x.

31. Gette JA, Stevens AK, Littlefield AK, Hayes KL, White HR, Jackson KM. Individual and covid-19-specific indicators of compliance with mask use and social distancing: The importance of norms, perceived effectiveness, and state response. *IJERPH*. 2021;18(16):8715. doi:10.3390/ijerph18168715.