Original article

Young Adults' COVID-19 Testing Intentions: The Role of Health Beliefs and Anticipated Regret

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A B S T R A C T

Purpose: Young adults are at high risk for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and transmission due to their social behaviors. The purpose of this study was to determine their attitudes toward coronavirus disease 2019 (COVID-19) testing, an important approach for minimizing infection and transmission.
Methods: One hundred seventy eight US individuals aged 19—25 years completed an online survey measuring COVID-19 health beliefs and testing intentions. Multivariable logistic regression evaluated the association of heath belief measures (perceived COVID-19 susceptibility, COVID-19 severity, barriers and benefits to testing, and social concerns) with testing intentions.
Results: Most respondents (86.0%) intended to accept a COVID-19 test if recommended by a health professional. High social concern and low perceived obstacles were associated with intent to get tested.
Conclusions: In this sample, most young adults intended to accept COVID-19 testing. Health beliefs predicted testing intention and point to possible intervention approaches to increase willingness to accept COVID-19 testing.

IMPLICATIONS AND CONTRIBUTION

In this survey of 178 US 19- to 25-year-old participants, intent to accept a COVID-19 test if recommended by a health professional was associated with high social cues to get tested for COVID-19 and anticipated regret if not tested, as well as low perceived barriers to COVID-19 testing.

COVID-19 testing is crucial to limit spread of the virus and may continue to be needed if a vaccine has limited uptake or duration of protection. Although young adults tend to be at low risk for COVID-19—associated morbidity and mortality relative to older adults, they are a population at particular risk for contracting and spreading infection and tend to have low influenza immunization rates [1,2]. Recent research has examined COVID-19 risk reduction behaviors and vaccine attitudes [3,4]; however, less is known regarding COVID-19 testing. Because it is crucial for young people with COVID-19 symptoms or recent contact with an infected person to be willing to follow COVID-19 testing advice from health professionals, a better understanding of factors associated with intent to test is important for successful COVID-19 prevention and education efforts.

The Health Belief Model proposes that likelihood of engagement in a preventative health behavior can be predicted by a combination of (1) perceived degree of personal *susceptibility* to a health threat, (2) perceived *severity* of that threat, (3) perceived *benefits* of protective behaviors, (4) perceived *barriers* to undertaking preventative behaviors, and (5) *cues* to action (factors that provide motivation to take action) [5]. *Anticipated regret* has been identified as an additional influence on preventive behaviors including young adult vaccine acceptance [6,7]. The present study assessed the extent to which these constructs were associated with willingness to accept COVID-19 testing among U.S. young adults.

Conflicts of interest: The authors have no conflicts of interest to disclose.
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Methods

This study was approved by the University of Missouri Institutional Review Board.

Sample

Participants were recruited to complete a Web-based survey through Amazon Mechanical Turk (MTurk) in July 2020. Incentives of $2 were provided through each respondent's MTurk account. The survey was posted as an MTurk task available for up to 400 respondents who met a set of criteria (U.S. location, 99% approval rate, age 18–25 years premium qualification status). Two hundred individuals initiated the survey during the 3-day data collection window. A total of 14 individuals began but did not complete the survey. Eight participants' responses were excluded from analyses—four for reporting an age older than 25 years, 1 for failure to pass attention/validation items, and three who indicated having been diagnosed with COVID-19.

The final sample included 178 U.S. adults, aged 19–24 years (mean = 23.5 years, SD = 1.5), and 52.2% female participants. Around one-half (47.2%) were college students (36.0% full-time, 16.3% part-time, 1 missing). Fifty-five percent (55.1%) of the sample were identified as white-only, 11.8% as black-only, 12.9% as Asian-only, .6% as American Indian-only, with 7.9% more than 1 race and with 11.8% identifying as Latino. The racial distribution was comparable with the 2019 U.S. proportion of 18- to 24-year-old people (53.1% white-only, 14.1% black-only, .8% American Indian), but with a higher proportion identifying as Asian-only (5.8% of U.S. young adults) [8].

Measures and Procedures

Intent to accept COVID-19 testing was measured with an item worded, "*Imagine that in the next several months you have symptoms of coronavirus. You call and talk with a health provider, who recommends that you get a COVID-19 test and explains how to go have the test done. Would you go get the COVID-19 test*?" Responses of *no*, *yes*, and *maybe* were converted to a dichotomous variable by combining "no" and "maybe" responses.

An 18-item instrument was created which included five 3-item scales adapted from research on 2009 H1N1 influenza vaccine acceptance [9] and designed to measure perceived susceptibility to SARS-CoV-2, severity of COVID-19 disease, perceived benefits and barriers to COVID-19 testing, and social cues related to COVID-19 testing. Three additional items measuring anticipated regret of not being tested were adapted from previous studies [7,10]. All scale items used a 5-point Likert-type scale from "strongly disagree" to "strongly agree." To reduce possible response bias, scale items were presented the testing intent question, in a random order. Sociodemographic variables included age, gender, race/ethnicity, college status, and residing in a COVID-19 high-risk state (as identified by the Centers for Disease Control and Prevention during the week of the survey).

Data were imported into SPSS (IBM Corp., Armonk, NY). Principal component exploratory factor analysis using varimax rotation was conducted on the scale items. The eigenvalues and scree plot indicated that a five-factor solution (66.2% cumulative variance) best fit the data, with items loading onto expected factors, with the exception that social cues and anticipated regret items loaded onto a single factor (Table 1). Considering their theoretical similarities, those items were considered a singular construct and combined into a *social concern* scale.

Univariate logistic regression analyses were conducted to identify variables associated with intent to accept testing. Because the model was underpowered to include all demographic variables and without hypotheses regarding those variables interaction with scale items, demographic predictors meeting a retention criteria of $p < .25$ in univariate analysis were eligible for inclusion in the multivariate logistic regression model. Because demographic variables met that selection criterion, only health belief scale scores were included in the final multivariable analysis.

Results

Among the 178 respondents, 86.0% intended to accept COVID-19 testing if recommended by a health professional (4.5% no; 9.6% unsure). In univariate analyses, no demographic factors were significantly associated with testing intent (Table 2). Of the health attitudes and beliefs, social concern, perceived disease severity, and testing barriers held significant associations with intent to test.

The final multivariable logistic regression analysis indicated that high social concern and low perceived barriers were associated with intent to test. The effect of social concern was particularly strong, with an odds ratio of 4.4 indicating that for every point higher a respondent scored on that measure (e.g., from *slightly agree* to *strongly agree*), she/he had more than four times the odds of intent to accept a COVID-19 test. Every point lower on the perceived barriers measure was associated with roughly twice the odds of testing acceptance.

Discussion

Among this sample of young adults there was a high level of intent to accept COVID-19 testing, with intentions largely differentiated by the degree to which respondents considered COVID-19 testing to be endorsed by family/friends and respondents' degree of concern regarding the impact of their testing decision on others. This finding is consistent with recent reports that COVID-19 preventive behaviors and intentions are associated with social responsibility and might be increased through prosocial health messages focused on avoiding COVID-19 transmission [11–14]. The association of young adults' testing intent and low perceived barriers is consistent with prior research on seasonal and H1N1 influenza immunization [1,9]. Future research might explore how COVID-19 testing might be optimized by increasing social awareness, while also minimizing perceived testing barriers.

Among study limitations, participants were limited to a convenience sample rather than a random sample. The quality and reliability of data collected via MTurk appears comparable with that of traditional methods when appropriate quality control measures are used [15], whereas MTurk samples may differ from the general population in meaningful ways including health status and behaviors [16]. Psychometric limitations included a high negative skew on two independent variables (perceived benefits and social concern), possibly related to item wording

Table 1
Factor loadings based on principal components factoring with varimax rotation for 18 items designed to predict intent to accept COVID-19 testing (N = 178)

	Item mean[b]	Soc[a]	Sev[a]	Sus[a]	Bar[a]	Ben[a]
Eigenvalue		5.53	2.17	1.60	1.42	1.19
% of Variance		30.73	12.07	8.88	7.89	6.62
Cronbach's a		.867	.803	.765	.709	.644
Item	Item mean[b]					
I would regret it if I avoided getting test for COVID-19 and accidently passed the virus to someone else.	4.65	.850				
If I declined a COVID-19 test, I would regret it later if I ended up getting someone else sick.	4.61	.804				
Most of the people important to me would say I should get a coronavirus test if a healthcare provider recommends it.	4.46	.802				
If a health provider recommended that I get a COVID-19 test but I chose not to, I'd be mad at myself later if I ended up passing the virus to someone I cared about.	4.68	.800				
My friends would say that I should get a coronavirus test if I might have coronavirus.	4.41	.634				
My parents would agree that getting a coronavirus test is a good idea if I have symptoms of coronavirus.	4.49	.533				
Having coronavirus would be worse than many people think.	3.96		.844			
Coronavirus is much worse than the flu.	4.37		.771			
Coronavirus is a severe condition.	4.29		.765			
I have a high chance of contracting coronavirus.	2.72			.845		
People like me are likely to get coronavirus.	2.84			.833		
It is easy for people my age to contract coronavirus.	3.75			.742		
Figuring where and when to get a coronavirus test would probably be complicated.	2.45				.839	
Getting a coronavirus test would probably be a hassle.	2.90				.748	
Getting tested for coronavirus would probably take too long or be too expensive for me.	2.15				.729	
A coronavirus test would definitely tell you if you have coronavirus.	3.90					.852
I believe that a coronavirus test would be effective way to diagnose coronavirus.	4.41		.385			.742
Having a coronavirus test is the best way to know if I have coronavirus.	4.56		.316			.512

Factor loadings < .3 suppressed for clarity.
[a] bar = perceived barriers to testing; ben = perceived benefits of testing; sev = perceived disease severity; soc = social concern; sus = perceived disease susceptibility.
[b] Scale items scored from 1 = strongly disagree, 2 = slightly disagree, 3 = neutral, 4 = slightly agree, 5 = strongly agree.

and/or small sample size. Finally, the survey did not account for actual COVID-19—related behaviors or risk. Despite these limitations, findings provide a snapshot of COVID-19 threat and prevention attitudes in a sample of U.S. young adults and thus may be useful for informing future research, education, and testing efforts.

Table 2
Summary of logistic regression analysis for variables predicting intention to get tested for COVID-19 if recommended by a health provider (n = 178)

Predictor	Summary statistic[a]	Univariate logistic regression odds ratio (95% CI)	Multivariate regression Adjusted odds ratio (95% CI)
Sex[b]			
Female	92 (52.2%)	Reference	
Male	82 (46.1%)	.864 (.37—2.05)	
Race/Ethnicity[c]			
White only	98 (55.1%)	2.03 (.86—4.81)	
Black only	21 (11.8%)	.47 (.15—1.42)	
Asian only	23 (12.9%)	1.83 (.40—8.34)	
Latino	21 (11.8%)	.467 (.15—1.41)	
College Student[b]			
No	84 (47.2%)	Reference	
Yes	93 (52.2%)	1.66 (.69—4.00)	
High-risk state resident[b]			
No	123 (69.1%)	Reference	
Yes	52 (29.2%)	3.56 (1.02—12.46)	
Age in years	23.52 (SD = 1.5)	1.12 (.85—1.46)	
Health Belief Score			
Social Concern	4.54 (SD = .7)	4.06 (2.22—7.45) ***	4.38 (1.89—10.19)***
Severity	4.21 (SD = .9)	2.13 (1.38—3.29) ***	1.67 (.94—2.96)
Susceptibility	3.11 (SD = 1.0)	1.09 (.70—1.68)	.65 (.37—1.14)
Barriers	2.49 (SD = 1.0)	.41 (.26—.66) ***	.44 (.25—.78)**
Benefits	4.29 (SD = .7)	1.81 (1.04—3.16) *	.56 (.21—1.46)
Constant			.61
X^2			41.03***
Df			5
Nagelkerke R^2			.37

*p < .05, **p < .01, ***p < .001.
[a] Summary statistics are presented for entire sample, including n (%) for categorical variables and mean (SD) for continuous variables.
[b] Three (1.7%) missing cases for sex, 1 (.6%) missing case for college student status, and 3 (1.7%) missing cases for high-risk state resident status.
[c] Analysis was not conducted for American Indian owing to low number of cases (n = 2).

References

[1] Bednarczyk RA, Chu SL, Sickler H, et al. Low uptake of influenza vaccine among university students: Evaluating predictors beyond cost and safety concerns. Vaccine 2015;33:1659–63.

[2] Hashmi S, D'Ambrosio L, Diamond DV, et al. Preventive behaviors and perceptions of influenza vaccination among a university student population. J Public Health 2016;38:739–45.

[3] Nivette A, Ribeaud D, Murray A, et al. Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study. Soc Sci Med 2020;268:113370.

[4] Pogue K, Jensen JL, Stancil CK, et al. Influences on attitudes regarding potential COVID-19 vaccination in the United States. Vaccine 2020;8:582.

[5] Becker MH, Maiman LA. Sociobehavioral determinants of compliance with health and medical care recommendations. Med Care 1975;13:10–24.

[6] Penţa MA, Crăciun IC, Băban A. The power of anticipated regret: Predictors of HPV vaccination and seasonal influenza vaccination acceptability among young Romanians. Vaccine 2020;38:1572–8.

[7] Brewer NT, DeFrank JT, Gilkey MB. Anticipated regret and health behavior: A meta-analysis. Health Psychol 2016;35:1264–75.

[8] U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics website. Estimates of resident population, by race/ethnicity and age group: Selected years, 1980 through 2019. Updated November, 2019. Available at: https://nces.ed.gov/programs/digest/d19/tables/dt19_101.20.asp. Accessed November 23, 2020.

[9] Ravert RD, Fu LY, Zimet GD. Reasons for low pandemic H1N1 2009 vaccine acceptance within a college sample. Adv Prev Med 2012. https://doi.org/10.1155/2012/242518.

[10] Zajac IT, Duncan A, Freegard S, et al. Exploring the potential of anticipated regret as an emotional cue to improve bowel cancer screening uptake. Biomed Res Int 2017;11:1–7.

[11] Pfattheicher S, Nockur L, Böhm R, et al. The emotional path to action: Empathy promotes physical distancing and wearing face masks during the COVID-19 pandemic. 2020. PsyArXiv. Available at: https://psyarxiv.com/y2cg5/. Accessed November 25, 2020.

[12] Everett JAC, Colombatto C, Chituc V, et al. The effectiveness of moral messages on public health behavioral intentions during the COVID-19 pandemic. 2020. PsyArXiv. Available at: https://psyarxiv.com/9yqs8/. Accessed November 25, 2020.

[13] Jordan J, Yoeli E, Rand D. Don't get it or don't spread it? Comparing self-interested versus prosocial motivations for COVID-19 prevention behaviors. PsyArXiv. Available at: https://psyarxiv.com/yuq7x/. Accessed November 25, 2020.

[14] Lunn PD, Timmons S, Belton CA, et al. Motivating social distancing during the Covid-19 pandemic: An online experiment. Soc Sci Med 2020;265:113478.

[15] Mortensen K, Hughes TL. Comparing Amazon's Mechanical Turk platform to conventional data collection methods in the health and medical research literature. J Gen Intern Med 2018;33:533–8.

[16] Walters K, Christakis DA, Wright DR. Are Mechanical Turk worker samples representative of health status and health behaviors in the US? 2018. PLoS One. 13: e0198835.