



American Singles' Attitudes Toward Future Romantic/ Sexual Partners' COVID-19 Vaccination Status: Evidence for both Vigilance and Indifference in a National Sample

Jessica T. Campbell¹ · Magaret Bennett-Brown^{1,2} · Alexandra S. Marcotte¹ ·
Ellen M. Kaufman¹ · Zoe Moscovici¹ · Olivia R. Adams¹ · Sydney Lovins¹ ·
Justin R. Garcia¹ · Amanda N. Gesselman¹

Accepted: 7 May 2023

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Abstract

Around 142 million American adults are currently single; at least half of these singles want to pursue a romantic partner. Romantic dating can involve exposure to numerous people. Thus, dating can significantly impact pathogen exposure risk. In a demographically-representative cross-sectional survey conducted in 2021 ($N=5,000$), we examined U.S. American singles' COVID-19 vaccination status, assessed their preferences around a potential partner's COVID-19 vaccination status, and identified demographic subgroups of singles particularly opposed to or indifferent to a partner being vaccinated against COVID-19. Our results showed 65% of participants were fully vaccinated, 10% were partially vaccinated, and 26% were unvaccinated against COVID-19. With regards to partner preferences, half wanted a vaccinated partner; 18.9% wanted a vaccinated partner but would make exceptions; 6.1% wanted an unvaccinated partner; and 25% reported that they did not care about their dating partner's vaccination status. Partner preferences were largely aligned with participants' own vaccination status, such that vaccinated participants preferred vaccinated partners. However, those preferring unvaccinated partners—or those willing to make exceptions for a partner—were most likely to identify as men, younger in age, a political affiliation outside of the two-party political system, a gender or sexual minority, or as a racial minority (i.e., Black/African-American or South Asian). Additionally, participants who were employed (vs. unemployed) were more likely to make exceptions for or prefer an unvaccinated partner. These results suggest that singles prefer homophily in COVID-19 vaccine status, and that minoritized subgroups of singles are more likely to maintain a social network including unvaccinated close others.

Extended author information available on the last page of the article

Keywords COVID-19 · Attitudes · Partner attitudes · Vaccination status · U.S. American singles

More than two years after COVID-19 was declared a global pandemic, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) continues to significantly impact health and well-being throughout the United States. Immunization is the most effective way to protect against contracting the virus and its potentially dire symptoms, and high vaccine uptake is crucial for population immunity (Kwok et al., 2020). While vaccines for COVID-19 have been developed, and are deemed safe and effective, substantial vaccine hesitancy has prohibited many from effectively protecting themselves (Brunson & Schoch-Spana, 2020; Centers for Disease Control and Prevention, 2021; Halbrook et al., 2021). Data collected in June 2021 suggest that nearly 20% of Americans are hesitant about receiving COVID-19 vaccines (Institute for Health Metrics and Evaluation, 2022).

Vaccine hesitancy is built from a combination of distrust in the safety and efficacy of the vaccine, in the healthcare system in general, and in policymakers, as all are directly involved in the development and dispersal of public health implementations (Finney Rutten et al., 2021). Vaccine hesitancy has been a growing concern for public health officials and clinicians; in fact, the World Health Organization deemed vaccine hesitancy one of its top ten global health threats in 2019, prior to the emergence of COVID-19 (World Health Organization, 2019). Although vaccine hesitancy can have profound implications for a number of viruses and diseases, hesitancy around COVID-19 is especially deadly, as people who are unvaccinated against COVID-19 face a mortality rate 11 times higher than that of vaccinated people (Dyer, 2021). For national and global public health, it is imperative to observe drivers of vaccine hesitancy and identify vaccine-hesitant subgroups for future intervention.

Some demographic correlates of COVID-19 vaccine hesitancy are already known. For example, hesitant participants are likely to identify as Black (Savoia et al., 2021), or as non-White (Cascini et al., 2021). Other vaccine hesitancy correlates include identifying as a woman, being younger in age, identifying as Republican, having lower levels of formal education and income (Savoia et al., 2021), lacking health insurance, and residing in a rural area (Cascini et al., 2021; Savoia et al., 2021). These demographic differences are at least in part a reflection of experiencing lower quality care—as a result of racial and gender discrimination in the realm of medical access and care, for example—and harboring distrust in government and public health organizations (Wang et al., 2021).

Demographic correlates of COVID-19 vaccine hesitancy are generally consistent with studies of vaccine hesitancy in other contexts, such as H1N1 influenza (Truong et al., 2022). As such, public health strategists have created evidence-backed plans for COVID-19 vaccine roll-out that aim to combat distrust in these population subgroups, based on prior hesitancy work in other health domains (e.g., Finney Rutten et al., 2021). These plans are crucial, but the existing foundational research to guide interventions is limited by a number of omissions. First, many published studies include reliance on peoples' self-reported plans to acquire a vaccine (or not; e.g., Benham et al., 2021; Leigh et al., 2020; Siegler et al., 2021), which provide important

but incomplete data. People may or may not seek out the vaccine, or report that they will or will not do so, for sociological and psychological reasons beyond their personal preferences. People may not want to receive a vaccine, but will do so because of an external expectation, such as a job's requirement or social pressure from family. Alternatively, they may want to receive a vaccine, but cannot because of various barriers (e.g., not being able to take time off of work, pre-existing health conditions). Thus, participants' forecasting about whether they themselves will obtain a COVID-19 vaccination may be an inaccurate reflection of vaccination attitudes in context and later vaccination uptake.

Second, although some behavioral forecasting assessments are complemented by zip-code or county-level data on COVID-19 vaccine rates (e.g., Brown et al., 2021; Hughes et al., 2021), an essential element of sustained public health upkeep is missing: people's attitudes and behaviors (e.g., positive or negative feelings about the vaccine and getting vaccinated) directly affect their own personal health decision-making. Further, people's attitudes and behaviors also impact the attitudes and behaviors of other people—and vice versa—subsequently affecting the health and well-being of the larger population: the inherent or unspoken guidelines within a social group (i.e., social norms) are strong catalysts for individual health behavior (Chung & Rimal, 2016; Reid et al., 2011). For example, a wealth of research on obesity as a health detriment emphasizes the significant influence that family environments and/or peer behavior can have on one's motivation to eat differently or to change one's lifestyle (Ali et al., 2011; Christakis & Fowler, 2007; Hammond, 2010; Pachucki et al., 2011). Social influences have been deemed significant factors in an array of other health domains, including HIV prevention among injection drug users (Latkin et al., 2013), uptake of pre-exposure prophylaxis (PrEP) for HIV prevention (Johnson et al., 2021), prevention of skin cancer (Mahler et al., 2008), smoking cessation (e.g., Dono et al., 2020) and, conversely, smoking uptake (Amin et al., 2020; Simons-Morton & Farhat, 2010).

The importance of social factors has also been evidenced in work on broader vaccine refusal; that is, refusing to be vaccinated or to vaccinate one's children against diseases other than COVID-19. This research has shown that mothers who refuse to have their children vaccinated are likely to be networked within a social group of other mothers who also harbor vaccine distrust (Brunson, 2013; Onnela et al., 2016; Ranji & Salganicoff, 2014; Smith & Graham 2019). Many of these mothers report that they aim to spread their attitudes opposing vaccines to other mothers in hopes of shaping their decisions (Reich, 2020), and tend to be involved in some form of community advocacy (e.g., Onnela et al., 2016). In fact, social relationships are so impactful in the groups opposing vaccines that scholars have proposed that "vaccine refusal in many ways represents an 'opting in' to a social group" (pg. 2, Reich 2020; Attwell et al., 2018; Sobo, 2016).

It is worth noting that vaccine hesitancy seems to function on a heterogeneous continuum, indicating that the motives driving vaccine uptake (or lack thereof) operates from a multitude of sources - including concern surrounding the vaccine involved, with newer vaccines eliciting more hesitancy (Dubé et al., 2013). Beyond the aforementioned social factors, vaccine hesitancy may also be influenced by "local health service experiences and vaccination settings" (Streefland et al., 1999; Streefland,

2001), as well as by the perceived threats to health associated with some vaccinations (e.g., François et al., 2005). Further, vaccine hesitancy may stem from low perceived effectiveness of specific vaccines, concerns about side effects or safety, and lack of knowledge surrounding the vaccine itself (Patty et al., 2017). For a more comprehensive perspective of the nuanced reasons for general vaccine hesitancy, please see Dubé et al. (2013), Dubé et al. (2018) or Wiyeh et al. (2018). For further perspective on the phenomenon of vaccine hesitancy in the context of the COVID-19 pandemic, see the review by Troiano and Nardi (2021) or the review by Yasmin and colleagues (2021) for a deeper look at vaccine hesitancy in the United States specifically. In the context of COVID-19, early reports do suggest substantial influence from one's social environment and relationships. Both experimental and descriptive research on precautionary behavior has demonstrated that when perceived social consensus is high, people are likely to comply with social distancing regulations (Ludeke et al., 2021; Martinez et al., 2021). Conversely, when people observe others not complying with precautionary behaviors like wearing masks, they begin wearing masks less or not at all (Dillard et al., 2021).

In terms of COVID-19 vaccine uptake and hesitancy, the source of information or who models a specific behavior (e.g., a 'role model') is an important contributing factor. For example, in a large, cross-national study of people from Turkey, the United Kingdom, and the United States, people were more likely to accept the COVID-19 vaccine if they saw a friend/family member or trusted expert receive the vaccine (Salali & Uysal, 2021). Interpersonal factors can also contribute to hesitancy or refusal: work conducted with older adults suggests that misleading or inaccurate information offered by close social partners was a primary impetus of their vaccine hesitancy (Wei et al., 2021). Taken together, it is likely that how someone feels about the vaccine is likely to influence the vaccine-relevant attitudes and behaviors of other people in their social networks, and vice versa. As the pandemic persists and additional vaccine boosters are needed, it is imperative to understand social expectations around receiving the COVID-19 vaccine. In the present research, we focus on vaccine expectations in the most significant and influential social relationship for many adults: intimate/romantic partnerships.

Humans have a fundamental 'need to belong,' spurring a drive for social relationships and feeling a part of a social network (Baumeister & Leary, 1995). In addition to this need for belongingness, developmental psychological theories point to romantic or intimate partnerships as a 'developmental goal' for most adults (Erikson, 1968). While the pandemic centered social interactions as a site for transmission risk, likely leading to a substantial decline in in-person dating, the need for intimacy and drive for connection remained (Eleuteri & Terzitta, 2021). People frequently used online dating apps during the pandemic, searching for and connecting with potential partners (Duguay et al., 2022). Online daters also reported swiping and messaging with potential partners in larger quantities than before the pandemic (Portolan & McAlister, 2022). Prior to COVID-19, people engaged with others on dating apps in hopes of translating an online connection into an in-person date or relationship (Duguay et al., 2022). While in-person romantic connections have been stifled because of COVID-19, recent evidence suggests that singles are now increasingly returning to in-person dating (Chaker, 2021).

In-person dating brings risk of exposure to COVID-19. Dating entails exposure to one or multiple new people, who may in turn carry the virus. Further, many dates with new people happen in public settings with a high chance of exposure, including restaurants and bars (Fisher et al., 2020). In-person dates carry risk of infection for both daters, and exponential risk of transmission as those daters interact with others in their social circles. While single adults (i.e., those engaging in dates with new partners) are but a subset of the overall American population, this group includes over 142 million people (i.e., one-third of the total American population; Brown, 2020). While not all single adults will be actively pursuing dates or romantic relationships at any given time, studies show that at least half are doing so or wish to do so (Brown, 2020). Re-entry into the in-person dating market represents a substantial public health concern for COVID-19 transmission.

In the current work, we assess single American adults' personal COVID-19 vaccination status to better understand the vaccination behaviors of single Americans. Beyond personal health, however, this substantial group of people has the capacity to shape the vaccine-related attitudes and behaviors of others through their own attitudes and behaviors. In particular, single Americans' expectations around their future romantic and/or sexual partners' COVID-19 vaccination status could drive hesitancy, refusal, and/or uptake for those potential partners. Thus, we examined single adults' attitudes toward a future partner's COVID-19 vaccination status. We also assessed demographic correlates to identify subgroups most likely to prefer an (un) vaccinated partner. These data are drawn from a cross-sectional investigation into singles' COVID-19 vaccination status and feelings around a partner's vaccine status in 2021 but are not intended to represent change over time in attitudes or behaviors of particular individuals.

Methods

Data Collection

The current study is a secondary analysis of data collected by an outside party (i.e., not the current authors). The authors of this manuscript had no interaction with participants and had access only to a de-identified dataset. Because these are secondary analyses of anonymized data, the Institutional Review Board (IRB) at the authors' university felt this study did not represent criteria to undergo review for human subjects research. The authors report no conflict of interest.

Data were collected in August 2021 as part of the Singles in America (SIA) study. The annual survey is designed by and funded by the relationship company Match, which operates Match.com. Participants were not recruited or in any way drawn from the Match population or subsidiary sites. Rather, the survey was created to gather information on what singles are doing or desiring in their dating lives that could potentially be used for later marketing purposes. While there are currently no publications associated with the 2021 SIA dataset, the SIA study is the data source for several previous publications in a variety of disciplines, including social relationships,

sexual identity, and body image, to name a few (e.g., see Frederick et al., 2020d; O’Sullivan et al., 2022 for two recent examples).

Each year, between 5,000 and 6,000 single adults are recruited based on demographic distributions in the most recent U.S. Census. Participants were recruited exclusively by ResearchNow (Dallas, TX, USA), using independent opt-in Internet research panels for population-based cross-sectional surveys. Participants were recruited from opt-in research panels, with recruitment targeting based on demographic distributions (i.e., age, gender, ethnicity, region, income) reflected in the most recent Current Population Survey conducted by the United States Bureau of the Census. Inclusion criteria required being at least 18 years old, being fluent in English, and having a relationship status of single (i.e., unmarried / single, i.e., not in a committed relationship).

To screen for inclusion criteria and ensure data quality, research panelists were required to verify their identity through a certification process, which employs validation technologies in real-time to identify and screen out fake, duplicate, unengaged, and unqualified respondents that may attempt to take a survey. All data were collected over the Internet. Cleaned and anonymized data was shared with the authors of this manuscript to use for academic publication.

Measures

Demographics

Participants self-reported several demographic characteristics, including their age, gender identity, transgender status, sexual identity, and race/ethnicity. See Table 1 in the supplemental materials for complete participant demographics.

Vaccination Status

Participants answered, “Have you been vaccinated against COVID-19?” Response choices were “fully vaccinated,” “partially vaccinated,” “not vaccinated,” and “prefer not to answer.”

Desire for Future Partner to be Vaccinated

Participants answered, “Do you want your potential dating partners to be vaccinated against COVID-19?” Response options were, “I would definitely want this,” “I would want this, but would be willing to make some exceptions,” “I would not want this,” “I do not care either way,” and “prefer not to answer.” See Table 2 in the supplemental materials for complete responses.

Table 1 Participant demographics

	Fully Vaccinated (<i>n</i> = 3157)	Partially Vaccinated (<i>n</i> = 470)	Not Vaccinated (<i>n</i> = 1261)	Total sample ^a (<i>N</i> = 5000)
Age (Years)				
Mean (<i>SD</i>)	49.38 (19.2)	32.89 (14.5)	41.49 (17.2)	45.68 (19.0)
Gender identity/<i>N</i>(%)				
Male	1227 (38.9%)	167 (35.5%)	425 (33.7%)	1847 (36.9%)
Female	1900 (60.2%)	292 (62.1%)	821 (65.1%)	3095 (61.9%)
Other / Missing	30 (1.0%)	11 (2.3%)	15 (1.2%)	58 (1.2%)
Sexual orientation/<i>N</i>(%)				
Heterosexual	2764 (87.6%)	392 (83.4%)	1079 (85.6%)	4329 (86.6%)
Homosexual / Gay / Lesbian	193 (6.1%)	39 (8.3%)	65 (5.2%)	302 (6.0%)
Bisexual	158 (5.0%)	33 (7.0%)	95 (7.5%)	297 (5.9%)
Other / Missing	42 (1.3%)	6 (1.3%)	22 (1.7%)	72 (1.4%)
Race / Ethnicity/<i>N</i>(%)				
White	2267 (71.8%)	227 (48.3%)	798 (63.3%)	3362 (67.2%)
Black / African American	514 (16.3%)	184 (39.1%)	346 (27.4%)	1077 (21.5%)
South Asian	46 (1.5%)	16 (3.4%)	15 (1.2%)	78 (1.6%)
East Asian	157 (5.0%)	16 (3.4%)	29 (2.3%)	204 (4.1%)
North American Indian or Alaskan Native or Pacific Islander	52 (1.6%)	10 (2.1%)	36 (2.9%)	101 (2.0%)
Hispanic or Latino	309 (9.8%)	59 (12.6%)	119 (9.4%)	499 (10.0%)
Other	47 (1.5%)	4 (0.9%)	43 (3.4%)	97 (1.9%)
Employment Status/<i>N</i>(%)				
Employed full time	1224 (38.8%)	229 (48.7%)	384 (30.5%)	1869 (37.4%)
Employed part-time	355 (11.2%)	109 (23.2%)	159 (12.6%)	641 (12.8%)
Not employed	297 (9.4%)	47 (10.0%)	299 (23.7%)	659 (13.2%)
Student	134 (4.2%)	38 (8.1%)	75 (5.9%)	258 (5.2%)
Retired	944 (29.9%)	21 (4.5%)	185 (14.7%)	1167 (23.3%)
Self-employed	110 (3.5%)	17 (10.5%)	83 (6.6%)	222 (4.4%)
Other	93 (2.9%)	9 (1.9%)	76 (6.0%)	184 (3.7%)
Total Annual Income/<i>N</i>(%)				
Less than \$15,000	454 (14.4%)	86 (18.1%)	366 (29.0%)	934 (18.7%)
\$15,000 – \$29,999	657 (20.8%)	93 (19.8%)	326 (25.9%)	1099 (22.0%)
\$30,000 – \$44,999	629 (19.9%)	73 (15.5%)	214 (17.0%)	943 (18.9%)
\$45,000 – \$59,999	443 (14.0%)	69 (14.7%)	148 (11.7%)	670 (13.4%)
\$60,000 – \$74,999	322 (10.2%)	45 (9.6%)	93 (7.4%)	470 (9.4%)
\$75,000 – \$99,999	351 (11.1%)	74 (15.7%)	57 (4.5%)	485 (9.7%)
\$100,000 – \$149,999	202 (6.4%)	26 (5.5%)	39 (3.1%)	272 (5.4%)
\$150,00 or more	99 (3.1%)	5 (1.1%)	18 (1.4%)	127 (2.5%)
Political Affiliation/<i>N</i>(%)				
Conservative Republican	376 (11.9%)	27 (5.7%)	227 (18.0%)	227 (18.0%)
Moderate Republican	361 (11.4%)	71 (15.1%)	141 (11.2%)	141 (11.2%)
Moderate Democrat	812 (25.7%)	170 (36.2%)	223 (17.7%)	223 (17.7%)
Liberal Democrat	758 (24.0%)	86 (18.3%)	155 (12.3%)	155 (12.3%)
Libertarian	69 (2.2%)	19 (4.0%)	42 (3.3%)	42 (3.3%)
Independent	520 (16.5%)	62 (13.2%)	244 (19.3%)	244 (19.3%)
No Affiliation	261 (8.3%)	35 (7.4%)	229 (18.2%)	229 (18.2%)

Note. ^aTotal sample includes participants who preferred not to discuss their vaccination status

Table 2 Descriptive statistics for dating partner vaccination preferences

Potential Dating Partner Vaccination Preference (%)	Participants (<i>n</i> = 5000) ^a
I definitely want my partner vaccinated for COVID-19	2357 (47.1%)
I want my partner to be vaccinated for COVID-19, but I could make some exceptions	893 (17.9%)
I don't want my partner to be vaccinated for COVID-19	289 (5.8%)
I don't care either way	1180 (23.6%)

^a281 participants (6% of the sample) preferred not to answer this question.

Participants

The sample included 5,000 participants. Age ranged from 18 to 100 years ($M_{\text{age}} = 45.68$, $SD = 19.04$); 36.9% participants identified as men and 61.9% as women. Most participants identified as heterosexual (86.6%) and White (67.2%).

To provide an understanding of generalizability, we compared our sample's demographics with those of the United States population as measured by the 2020 United States Census Bureau. In the U.S., the median age is 38.2 years, 61.6% of American adults are White, 18.7% Hispanic/Latino, 12.4% Black/African-American, 6% Asian, 1.1% American Indian or Alaska Native. Thus, our sample is relatively similar in terms of age and ethnicity, although our sample is slightly more diverse than the national average (see Table 1 for complete demographics).

Results

Below we review descriptive statistics, bivariate correlations with continuous variables (i.e., age, income), and chi-square analyses with categorical variables (e.g., race, sexual orientation). All tables for the current manuscript can be found online at: https://osf.io/qkrcj/?view_only=31dddcdbde5d441f4ae6d863ea4b22d61.

Participants' Vaccination Status and Demographic Correlates

The majority of the sample (64.6%) reported being fully vaccinated against COVID-19, while 25.8% were unvaccinated and 9.8% were partially vaccinated. Half (49.9%) of participants reported that they definitely want their dating partners to be vaccinated against COVID-19. An additional 18.9% reported that they want their dating partners to be vaccinated but would be willing to make some exceptions. Conversely, 6.1% reported that they do not want their dating partners to be vaccinated against COVID-19. Last, 25% reported that they do not care whether their dating partners are vaccinated against COVID-19.

Vaccine Expectations for Future Partners and Demographic Correlates

We conducted bivariate correlations and chi-square tests between participant demographics and their preferences for a partner being vaccinated against COVID-19. We coded their preferences such that "I would definitely want this" became the compari-

Table 3 Chi-square test results investigating participants' own vaccination status with their preferences for a future partner's vaccination status

	χ^2	p	Effect size ¹
Wants partner vaccinated v. Could make exceptions			
Own vaccination status	121.47	< 0.001	0.19
Men vs. Women	35.59	< 0.001	0.11
Cisgender vs. Transgender people	49.67	< 0.001	0.13
Heterosexual vs. Non-heterosexual people	2.64	0.104	0.03
Gay/Lesbian vs. Bisexual people	9.60	0.002	0.16
White vs. other groups	46.21	< 0.001	-0.12
Black/African-American vs. other groups	56.77	< 0.001	0.13
South Asian vs. other groups	11.52	< 0.001	0.06
East Asian vs. other groups	0.02	0.890	0.00
North American Indian / Alaska Native / Pacific Islander vs. other groups	0.53	0.468	-0.01
Hispanic/Latino vs. other groups	2.95	0.086	0.03
Conservative Republican vs. other affiliations	10.47	0.001	0.06
Moderate Republican vs. other affiliations	10.67	0.001	0.06
Moderate Democrats vs. other affiliations	0.41	0.524	0.01
Liberal Democrats vs. other affiliations	28.79	< 0.001	-0.09
Libertarians vs. other affiliations	8.71	0.003	0.05
Independents vs. other affiliations	1.68	0.195	-0.02
No affiliation vs. other affiliations	0.04	0.834	0.00
Employed vs. Unemployed	68.14	< 0.001	0.15
Wants partner vaccinated v. Does not want partner vaccinated			
Own vaccination status	425.93	< 0.001	0.40
Men vs. Women	6.79	0.009	0.05
Cisgender vs. Transgender people	51.14	< 0.001	0.14
Heterosexual vs. Non-heterosexual people	0.58	0.446	0.02
Gay/Lesbian vs. Bisexual people	0.03	0.861	-0.01
White vs. other groups	17.01	< 0.001	-0.08
Black/African-American vs. other groups	30.39	< 0.001	0.11
South Asian vs. other groups	6.01	0.014	0.05
East Asian vs. other groups	2.67	0.102	-0.03
North American Indian / Alaska Native / Pacific Islander vs. other groups	0.86	0.354	0.02
Hispanic/Latino vs. other groups	0.01	0.919	0.00
Conservative Republican vs. other affiliations	23.51	< 0.001	0.09
Moderate Republican vs. other affiliations	9.59	0.002	0.06
Moderate Democrats vs. other affiliations	3.06	0.080	-0.03
Liberal Democrats vs. other affiliations	43.88	< 0.001	-0.13
Libertarians vs. other affiliations	12.84	< 0.001	0.07
Independents vs. other affiliations	0.27	0.604	-0.01
No affiliation vs. other affiliations	10.97	< 0.001	0.06
Employed vs. Unemployed	29.66	< 0.001	0.11
Wants partner vaccinated v. Does not care either way			
Own vaccination status	1026.65	< 0.001	0.54

Table 3 (continued)

	χ^2	p	Effect size ¹
Men vs. Women	0.11	0.740	0.01
Cisgender vs. Transgender people	1.62	0.203	0.20
Heterosexual vs. Non-heterosexual people	0.57	0.452	0.01
Gay/Lesbian vs. Bisexual people	15.21	< 0.001	0.19
White vs. other groups	0.42	0.517	0.01
Black/African-American vs. other groups	3.06	0.080	0.03
South Asian vs. other groups	0.80	0.372	-0.02
East Asian vs. other groups	12.14	< 0.001	-0.06
North American Indian / Alaska Native / Pacific Islander vs. other groups	0.68	0.409	0.01
Hispanic/Latino vs. other groups	0.01	0.945	0.00
Conservative Republican vs. other affiliations	81.17	< 0.001	0.15
Moderate Republican vs. other affiliations	7.62	0.006	0.05
Moderate Democrats vs. other affiliations	42.68	< 0.001	-0.11
Liberal Democrats vs. other affiliations	140.63	< 0.001	-0.20
Libertarians vs. other affiliations	0.77	0.379	0.02
Independents vs. other affiliations	8.28	0.004	0.05
No affiliation vs. other affiliations	72.43	< 0.001	0.14
Employed vs. Unemployed	9.82	0.002	0.05

Note. Own vaccination status: 1 = not vaccinated, 2 = partially vaccinated, and 3 = fully vaccinated.

¹The effect size statistic used is Phi for all tests except those involving participants' own vaccination status, which uses Cramer's V for a 3 (vaccination status) x2 (participant preferences) test

son group (coded as 0) in three separate variables: (1) I want this but would make an exception (coded as 1; vs. I would definitely want this), (2) I don't want this (coded as 1; vs. I would definitely want this); and (3) I don't care either way (coded as 1; vs. I would definitely want this). Because we conducted multiple comparisons, to control for Type I error, we applied Bonferroni corrections with alpha levels of $p < .001$ to all correlational and chi-square analyses. We review results by each demographic characteristics below.

Participants' own Vaccination Status

Our analyses showed that participants who were vaccinated against COVID-19 preferred that a future partner also be vaccinated. Unvaccinated (vs. vaccinated) participants were more likely to make exceptions for an unvaccinated partner, to want an unvaccinated partner, and to not care about their future partner's vaccination status.

Age

Age was significantly, negatively correlated with vaccination preferences. Younger participants were more likely than older participants to make exceptions for a partner

($r = -.27, p < .001$), to not want their partner to be vaccinated ($r = -.25, p < .001$), and to not care about their partner's vaccination status ($r = -.18, p < .001$).

Gender

Men were more likely than women to make exceptions for a partner. However, there were no significant gender differences at $p < .001$ for not wanting a vaccinated partner or for not caring whether one's partner is vaccinated.

Transgender Identity

Compared to cisgender participants, participants who identified as transgender were more likely to make exceptions for a partner's vaccination status, or to not want their partner to be vaccinated against COVID-19. There was no difference for not caring about a partner's vaccination status.

Sexual Orientation

Sexual orientation emerged as a differentiating factor for only one comparison. Compared to gay and lesbian participants, bisexual participants were more likely to report that they do not care about their future partner's vaccination status.

Race / Ethnicity

Compared to other racial / ethnic groups, participants who identified as White were less likely to report that they would make an exception for a partner's vaccination status or that they do not want their partner to be vaccinated. Conversely, participants who identified as Black/African-American were more likely than other groups to report that they would make an exception for a partner or that they do not want a vaccinated partner. Participants who identified as South Asian were also more likely than other groups to report that they would make an exception for an unvaccinated partner, but no other effects emerged for South Asian participants. Finally, East Asian participants were more likely than other groups to report that they do not care whether their future partner is vaccinated. No other racial/ethnic effects emerged for whether participants care about their partner's vaccination status.

Political Affiliation

There were a number of significant effects for political affiliation. Regarding participants who were likely to make an exception for a future partner's vaccination status, only liberal Democrats differed from other affiliations. Liberal Democrats were less likely than other affiliations to report that they would make exceptions. Participants who identified as either conservative Republican, Libertarian, or politically unaffiliated were more likely than others to report that they do not want their partner to be vaccinated against COVID-19. Meanwhile, liberal Democrats were less likely than other groups to report that they do not want an unvaccinated partner. Finally, politi-

cally unaffiliated participants and participants who identified as conservative Republicans were more likely than other groups to report that they do not care about their partner's vaccination status, while moderate and liberal Democrats were less likely than other groups to report that they do not care.

Employment Status

Compared to unemployed participants, employed participants were less likely to make exceptions and less likely to want an unvaccinated partner. However, there were no differences in terms of not caring whether a partner is vaccinated.

Income

Finally, household income only emerged as significant when looking at those who reported that they do not care about their partner's vaccination status. People with lower income were more likely to report that they do not care ($r = -.11$, $p < .001$). Income was unrelated to making exceptions for an unvaccinated partner ($r = .02$, $p = .23$) and to not wanting a partner to be vaccinated ($r = .03$, $p = .16$).

Discussion

In the current national study of diverse adult participants, we provided an estimate of COVID-19 vaccine rates for single American adults in 2021, investigated singles' desire for potential partners to be (un)vaccinated against COVID-19, and identified demographic subgroups most likely to prefer unvaccinated partners. We also identified demographic subgroups of single Americans who expressed indifference about COVID-19 vaccination status. Our findings help to identify specific populations that are more vulnerable to COVID-19, more likely to transmit COVID-19 to others, and may pass on attitudes supporting vaccine hesitancy to others in their social networks.

In our study, most participants (65%) were fully vaccinated against COVID-19. This percentage very closely aligns with the reported 63% of vaccinated American adults, according to an August 2021 report that was released around the time of our own data collection (O'Donnell & Lambert, 2021). These similar vaccination uptake rates suggest that single Americans are generally following overall population trends in terms of their own personal COVID-19 vaccination rates. Nonetheless, 26% of participants remained unvaccinated against COVID-19. Single adults comprise one-third of the adult American population, accounting for 142 million people (Brown, 2020). Thus, our results suggest that approximately 37 million single adults remain unvaccinated and potentially at risk for more severe experiences with COVID-19.

Half (50%) of participants expressed that they wanted their dating partners to be vaccinated against COVID-19; 25% reported that they do not care about a partner's vaccination status; around 20% reported that they preferred a vaccinated partner but would make exceptions for an unvaccinated partner; and 6% wanted an unvaccinated partner. Preferences around a partner's vaccination status largely aligned with participants' own vaccination status: vaccinated people wanted vaccinated partners and

were less likely to make exceptions for an unvaccinated partner, to not want a vaccinated partner, or to not care about their partner's vaccination status. Considering how infectious and severe the COVID-19 pandemic has been in the United States, people who consider COVID-19 to be a serious threat to their personal health are also likely to be vigilant about the threat that their interactions may pose. Additionally, many social network science and relationship science scholars have noted that homophily—attraction to those demographically similar to oneself—is a central driver in how people choose to affiliate with others (Ertug et al., 2022; Lazarsfeld & Merton, 1954; McPherson et al., 2001). Our work suggests that vaccination homophily is another facet around which people may base their social decisions.

Further, COVID-19 vaccine uptake and refusal might be seen as organizing factors for designating and maintaining ideologically-based social groups (Reich, 2020). Attitudes and behaviors towards vaccines may serve as a shibboleth for designating one's broader worldview. Previous research suggests that shared belief systems are an indicator of dating compatibility (Berscheid, 1985; Columbus et al., 2021; Montoya et al., 2008). Racial, political, and educational homophily are particularly high in online dating, for example (Huber & Malhotra, 2017). In the context of COVID-19 vaccinations, enacting these partner preferences would help to affirm homophily amongst one's broader social groups, as introducing one's family and friends to a potential dating partner with a different vaccination status—and thus, implied social and/or ideological differences—may risk an untenable social burden. As such, demographic groups most open to an unvaccinated partner in our sample may hold less stringent ideological and social norms around vaccines, or simply different norms than the comparison group. Those most open to an unvaccinated partner tended to be men, younger in age, had a lower income, were not aligned with any major political party, identified with a sexual or gender minority group (i.e., bisexual or transgender), and identified with a racial minority group—namely either Black/African-American or South Asian. With the exception of the gender effect for men, participants who were open to an unvaccinated partner were largely from minoritized groups. Minoritized groups have historically been mistreated in the context of healthcare (e.g., Ash et al., 2021; Shelton et al., 2010), and group-based medical mistrust has been implicated in COVID-19 vaccine hesitancy. This may partly explain why people in these minoritized groups are potentially less adamant that their partners be vaccinated against COVID-19. Future researchers would benefit from better understanding how these and other unmeasured demographic subgroups view COVID-19 vaccinations, and how the vaccine aligns with ideals and worldviews outside of those held by White, cisgender, heterosexual American adults.

As it stands, our dataset cannot speak to why these demographic subgroups are more likely to be open to a partner who has not received a COVID-19 vaccine. However, some people encounter a smaller pool of potential dating partners due to stigma surrounding one or more of their identities (Blair & Hoskin, 2019). Transgender people in particular face a great deal of stigma due to gender-based discrimination (Lenning & Buist, 2013; Mizock & Mueser, 2014). Widespread transphobia likely contributes to attitudes around romantic partnering as well, making self-disclosure of transgender status potentially dangerous, whether physically or emotionally (Fernandez & Birnholtz, 2019; Gamarel et al., 2020). As such, the available number of

partners may be much fewer than a cisgender person's options for available partners. This may lead some transgender singles to be more willing to make exceptions for COVID-19 vaccination status in order to create or salvage a romantic connection.

Relatedly, bisexual individuals also face stigma for their sexual orientation (Dodge et al., 2016; Herek, 2002). Bisexual people report feeling stigmatized and discriminated against by both heterosexual and gay/lesbian individuals, as their deviation from monosexuality is viewed as illegitimate, a threat to society's view of the LGBTQ+ community, and/or as reflective of promiscuity (Dodge et al., 2016; Friedman et al., 2014; Price et al., 2020). Partner support would be important for those who wish to be "out" with their bisexual identity (Masini & Barrett, 2008), creating a smaller pool of eligible dating partners who do not hold stigmatizing attitudes toward bisexuality. As such, bisexual individuals—much like transgender individuals—may be more likely to make exceptions for an unvaccinated partner, even if they would prefer a vaccinated partner, because good quality romantic connections could be rare.

Why men are more open to unvaccinated partners may reflect societal views of women as romantic and sexual 'gatekeepers' (Webster et al., 2021). Because women's personal relationship standards are less likely to be fulfilled than men's relationship standards, possibly due to differences within socialization of gender roles (Vangelisti & Daly, 1997), women are more discerning when evaluating whether a potential partner is a suitable mate. In this heterosexual-centered context, men may be more willing to make exceptions about a partner's vaccination status because they tend to make less complex evaluations or are less selective of a potential partner in general (Buss & Schmitt, 1993), or perhaps because they are less often the pursued partner, at least in heterosexual dynamics (Clark et al., 1999; Valshtein et al., 2022).

Employed participants were more open to an unvaccinated partner than unemployed participants. This difference might be a reflection of the financial resources and abilities connected with employment: people who are employed are more likely to have the resources to afford getting sick (Åhs et al., 2012; Huang et al., 2014), while people who are not employed are less likely to have access to medical care including medical insurance, and simultaneously more likely to have a chronic illness that would potentially render them more susceptible to severe COVID-19 complications (Brenner, 2020; Griffiths et al., 2021; Lo & Cheng, 2014). As such, interacting with an unvaccinated person may be perceived as a much greater personal threat for many unemployed people.

Our pattern of results mostly replicates results from prior work on COVID-19 vaccine hesitancy. Specifically, other research has pinpointed people who identify as Black or non-White, women, Republican, as younger in age, as having lower levels of income and education, and as lacking health insurance as groups most hesitant or avoidant of the COVID-19 vaccine (Cascini et al., 2021; Savoia et al., 2021). Our results replicate prior findings in terms of effects around gender, age, race, and income. Unfortunately, our data cannot speak to differences in COVID-19 vaccination rates by health insurance status or education level, as these were not assessed in the current study—a limitation that should be addressed in future research to most accurately pinpoint at-risk subgroups of the population.

Our findings regarding political affiliation diverged from findings in prior research. Our results showed that people with no political affiliation were most likely to report

being open to an unvaccinated partner. Opposition to the COVID-19 vaccine has become a central tenet of conservative media, and work by Cascini et al. (2021) and Savoia et al. (2021) found that Republicans were most hesitant to receive the vaccine, when compared to other political identities. Numerous studies have reported higher rates of vaccine resistance among political conservatives, and lower actual vaccine uptake rates than amongst political liberals (e.g., Albrecht 2022; Callaghan et al., 2020; Viswanath et al., 2021). Our findings did not follow this pattern but do align with recent work identifying “political outsiders” as a group that places less importance on COVID-19 vaccination (Lee & Chu, 2021). The current political climate in the United States has been characterized as extremely hostile (Iyengar et al., 2019; Graham & Svobik, 2020), and negative attitudes toward people of the opposing political party are at an all-time high (Abramowitz & Saunders, 2008; Pew Research Center, 2020). Simultaneously, recent Pew statistics show that 66% of Americans report that they are burned out by the influx of politically driven news (Gottfried, 2020). While the COVID-19 vaccine has certainly been highly polarizing for Democrats and Republicans, our findings suggest that the vaccine may be more broadly seen as a political subject or tool. Such a tool is thus relevant to people who care about politics but may be viewed as irrelevant to those who are disconnected from a political community.

Limitations

This work contributed to the existing literature of social influence and norms surrounding vaccination status and focused on perceptions of vaccination preference among single people, a demographic that represents one third of U.S. adults. However, the present work is not without limitations. First, as reviewers of this manuscript noted, scholars have argued that naturally acquired immunity against disease is potentially equivalent to immunity acquired through vaccination (e.g., Abas et al., 2022; Pugh et al., 2022). Many individuals may have thus decided not to pursue vaccination for COVID-19 due to prior infection and subsequent assumed immunity or negligible benefits of the vaccine. We cannot say from our data why people chose to receive or not to receive the vaccine, but future researchers may wish to include this as a point of comparison.

Second, although all singles in our sample reported their preferences for a partner's vaccination status, not all will pursue relationships or dates with others. Of those who do pursue a relationship or date, not all will do so while COVID-19 still represents a health threat in some capacity. As such, desires around a partner's vaccination status may not be relevant for all participants. Further, and we did not specify the type of relationship partner when querying participants. Participants may have reported their preferences for a partner's vaccination status while considering a long-term partner or a one-night stand that they would not see again. We cannot know how this difference would affect vaccine preferences. This marks another line of research inquiry that future researchers should consider.

Third, our survey design did not always capture the nuances surrounding the practical aspects of vaccination against COVID-19. When asking participants whether they preferred a vaccinated partner, we assumed that “vaccinated” meant fully vacci-

nated, or receiving two doses of the vaccine. We do not have data on whether partner vaccination preference varied by the meaning of vaccination, or whether people were considering partial versus full vaccination status in their answering of the survey items. We did not ask about preference for specific vaccination brands, which may constitute another nuanced perspective on partner preference as different pharmaceutical companies published varying reports regarding the protection level of their COVID-19 vaccination products (e.g., the Pfizer vs. Moderna two-dose varieties). Relatedly, we also did not define “fully vaccinated” or “partially vaccinated” when asking participants about their own COVID-19 vaccination status, specify further what the three forms of COVID-19 vaccination entailed (e.g., fully vaccinated, partially vaccinated, or unvaccinated), which may have led to possible misinterpretations in participant responses. Future research should focus on these nuances as they would provide important contributions to the growing literature on vaccine preference in general and regarding the COVID-19 pandemic in particular.

Fourth, we relied exclusively on self-report data collected from the internet. We did not verify vaccination status among participants outside of self-report, which may affect the accuracy of actual vaccination status reported in this study. This limitation is especially noteworthy given the difficulties in predicting behaviors—in this case vaccine uptake—from participants’ reported attitudes (Wicker, 1969; Zanna et al., 1980). On average, prior research has suggested that there is a weak to moderate correlation between explicit attitudes and behaviors (e.g., 0.24 to 0.54 via Ajzen et al., 2019; Shrigley 1990; Zanna et al., 1980). For example, while the vast majority (90.4%) of Americans in 2019 claimed to support organ donation, nearly 46.2% of eligible, supportive people were not registered to donate organs (Health Resources and Services Administration, 2020). In other words, while someone may indicate a certain set of attitudes consistent with a specific social norm, there is evidence to suggest that people will frequently act in ways that are inconsistent with self-reported attitudes. Future researchers should endeavor to track preferences for a partner’s vaccination over time, to determine whether those that reported wanting a vaccinated partner act accordingly in their partner pursuits.

Fifth, online studies have their own limitations, including sample restrictions due to accessibility of the internet and associated technology (e.g., financial ability to obtain home internet access, ability to use smart phones and/or computers, quality of internet service providers in rural areas, etc.). Online surveys also remove the researcher’s ability to control the environment in which people answer the survey. For example, people may spend less time on—and subsequently, provide lower quality data for—questions related to romantic relationships and sexuality if they are in the presence of other people who may be able to see the survey items.

Further, the specific conditions of the COVID-19 pandemic itself contributed to additional limitations in this work. While this study focused on gaining a better understanding of how vaccination preference affects partner choice among single U.S. adults, conducting the survey during the pandemic meant that typical characteristics of romantic dating changed significantly due to increases in social distancing, quarantine, and other isolating behaviors. People have altered their romantic behaviors during the pandemic (Lehmiller et al., 2020; Balzarini et al., 2022), in part due

to risk perception (Bowling et al., 2022), which may affect their thoughts on potential partners and/or dating in the future.

However, recruitment for this study occurred in August and September of 2021, when COVID-19 infection rates were relatively low (Allen, 2022), in part due to the initial vaccine roll-out in Spring 2021 (Funk & Tyson, 2021). We know of no published research examining whether this period of lower infection rates prompted a rise in in-person dating before the winter season brought about higher numbers of COVID-19 cases. It may have been the case that people who previously limited their dating life earlier in the pandemic may have changed their dating behaviors in response to the lifting of COVID-19-related restrictions. Our data cannot answer these questions, but future researchers may wish to query participants about any behavioral changes in response to shifts in COVID-19 rates and/or care.

Finally, it is worth noting that some of our measures were based on single items. While more recent research has identified single-item measures as being comparable in reliability and validity to multi-item measures (e.g., Ahmad et al., 2014 and Ang & Eisend 2018), the single-item approach cannot capture a nuanced or multidimensional perspective associated with the participants' attitudes or preferences. Future researchers may consider incorporating additional validated measures for better generalizability.

Conclusion

In sum, at the most basic level, vaccine uptake within a population is important to reduce morbidity and mortality due to infectious diseases (Rodrigues & Plotkin, 2020). COVID-19 vaccination has been very successful in these respects, both at the individual and population level. Vaccination against COVID-19 reduces the risk of infection by up to 95%, reduces the risk of severe illness by over 90%, and reduces the risk of death by over 99% (Madad & Jetelina, 2021). As the population of vaccinated individuals grows, disease transmission and illness severity are both expected to decrease. However, social norms and resulting social influence are important components of sustained public healthcare (Bavel et al., 2020; Berkowitz, 2005). If 50% of singles are willing to date an unvaccinated partner, this suggests low social pressure toward unvaccinated people in their social networks more broadly. Without the extrapolation to social relationships in general, romantic partnerships are a paramount motivator for adult behavior (Heshmati et al., 2022). If half of those pursuing a romantic partnership either do not want – or do not care – if their partner is vaccinated, COVID-19 vaccination is unlikely to be a socially-regulated behavior. Lower social imperative for daters to be vaccinated may limit vaccine uptake – and booster uptake - within this high-risk population, potentially leading to high transmission, increased hospitalizations, complications, and deaths due to COVID-19 infection (Madad & Jetelina, 2021).

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12119-023-10097-9>.

References

- Abas, A. H., Marfuah, S., Idroes, R., Kusumawaty, D., Fatimawali, Park, M. N., Siyadatpanah, A., et al. (2022). Can the SARS-CoV-2 omicron variant Confer Natural immunity against COVID-19? *Molecules*, 27(7), 2221. <https://doi.org/10.3390/molecules27072221>. MDPI AG.
- Abramowitz, A. I., & Saunders, K. L. (2008). Is polarization a myth? *The Journal of Politics*, 70(2), 542–555. <https://doi.org/10.1017/s0022381608080493>.
- Ahmad, F., Jhaji, A. K., Stewart, D. E., Burghardt, M., & Bierman, A. S. (2014). Single item measures of self-rated mental health: A scoping review. *BMC Health Services Research*, 14(1), 1–11. <https://doi.org/10.1186/1472-6963-14-398>.
- Åhs, A., Burell, G., & Westerling, R. (2012). Care or not care—that is the question: Predictors of health-care utilisation in relation to employment status. *International journal of behavioral medicine*, 19(1), 29–38. <https://doi.org/10.1007/s12529-010-9129-2>.
- Ajzen, I., & Kruglanski, A. W. (2019). Reasoned action in the service of goal pursuit. *Psychological review*, 126(5), 774. <https://doi.org/10.1037/rev0000155>.
- Albrecht, D. (2022). Vaccination, politics and COVID-19 impacts. *BMC Public Health*, 22(1), 96. <https://doi.org/10.1186/s12889-021-12432-x>.
- Ali, M. M., Amialchuk, A., & Heiland, F. W. (2011). Weight-related behavior among adolescents: The role of peer effects. *PloS One*, 6(6), e21179. <https://doi.org/10.1371/journal.pone.0021179>.
- Allen, J., & the U.S. (2022, May 23). Coronavirus in : Latest Map and case count. The New York Times. Retrieved May 23, 2022, from <https://www.nytimes.com/interactive/2021/us/covid-cases.html>
- Amin, S., Dunn, A. G., & Laranjo, L. (2020). Social influence in the uptake and use of electronic cigarettes: A systematic review. *American Journal of Preventive Medicine*, 58(1), 129–141. <https://doi.org/10.1016/j.amepre.2019.08.023>.
- Ang, L., & Eisend, M. (2018). Single versus multiple measurement of attitudes: A meta-analysis of advertising studies validates the single-item measure approach. *Journal of Advertising Research*, 58(2), 218–227. <https://doi.org/10.2501/jar-2017-001>.
- Ash, M. J., Berkley-Patton, J., Christensen, K., Haardörfer, R., Livingston, M. D., Miller, T., & Woods-Jaeger, B. (2021). Predictors of medical mistrust among urban youth of color during the COVID-19 pandemic. *Translational Behavioral Medicine*, 11(8), 1626–1634. <https://doi.org/10.1093/tbm/ibab061>.
- Attwell, K., Navin, M. C., Lopalco, P. L., Jestin, C., Reiter, S., & Omer, S. B. (2018). Recent vaccine mandates in the United States, Europe and Australia: A comparative study. *Vaccine*, 36(48), 7377–7384. <https://doi.org/10.1016/j.vaccine.2018.10.019>.
- Balzarini, R. N., Muise, A., Zoppolat, G., Gesselman, A. N., Lehmillier, J. J., Garcia, J. R., Slatcher, R. B., & Mark, K. P. (2022). Sexual desire in the time of COVID-19: How COVID-related stressors are associated with sexual desire in romantic relationships. *Archives of Sexual Behavior*, 51(8), 3823–3838. <https://doi.org/10.1007/s10508-022-02365-w>.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>.
- Bavel, J. J. V., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., & Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature human behaviour*, 4(5), 460–471. <https://doi.org/10.1038/s41562-020-0884-z>.
- Benham, J. L., Lang, R., Kovacs Burns, K., MacKean, G., Léveillé, T., McCormack, B., & Marshall, D. A. (2021). Attitudes, current behaviours and barriers to public health measures that reduce COVID-19 transmission: A qualitative study to inform public health messaging. *PLOS ONE*, 16(2), e0246941. <https://doi.org/10.1371/journal.pone.0246941>
- Berkowitz, A. D. (2005). *An overview of the social norms approach*. Changing the culture of college drinking.
- Berscheid, E. (1985). *Compatibility, interdependence, and emotion. Compatible and incompatible relationships* (pp. 143–161). New York, NY: Springer. https://doi.org/10.1007/978-1-4612-5044-9_7.
- Blair, K. L., & Hoskin, R. A. (2019). Transgender exclusion from the world of dating: Patterns of acceptance and rejection of hypothetical trans dating partners as a function of sexual and gender identity. *Journal of Social and Personal Relationships*, 36(7), 2074–2095. <https://doi.org/10.1177/0265407518779139>.

- Bowling, J., Montanaro, E., Gattuso, J., Gioia, D., & Guerrero Ordonez, S. (2022). Everything feels risky now”: Perceived “risky” sexual behavior during COVID-19 pandemic. *Journal of health psychology*, 27(6), 1498–1506. <https://doi.org/10.1177/13591053211004684>.
- Brenner, M. H. (2020). Will there be an epidemic of corollary illnesses linked to a COVID-19– related recession? *American journal of public health*, 110(7), 974–975. <https://doi.org/10.2105/ajph.2020.305724>.
- Brown, A. (2020, October 2). A profile of single Americans. Pew Research Center’s Social & Demographic Trends Project. Retrieved May 20, 2022, from <https://www.pewresearch.org/social-trends/2020/08/20/a-profile-of-single-americans/>
- Brown, C. C., Young, S. G., & Pro, G. C. (2021). COVID-19 vaccination rates vary by community vulnerability: A county-level analysis. *Vaccine*, 39(31), 4245–4249. <https://doi.org/10.1016/j.vaccine.2021.06.038>.
- Brunson, E. K. (2013). The impact of social networks on parents’ vaccination decisions. *Pediatrics*, 131(5), e1397–1404. <https://doi.org/10.1542/peds.2012-2452>.
- Brunson, E. K., & Schoch-Spana, M. (2020). A social and behavioral research agenda to facilitate COVID-19 vaccine uptake in the United States. *Health Security*, 18(4), 338–344. <https://doi.org/10.1089/hs.2020.0106>
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological review*, 100(2), 204. <https://doi.org/10.1037/0033-295x.100.2.204>.
- Callaghan, T., Moghtaderi, A., Lueck, J. A., Hotez, P. J., Strych, U., & Motta, M. (2020). Correlates and disparities of COVID-19 vaccine hesitancy. Available at SSRN 3667971. <https://doi.org/10.2139/ssrn.3667971>
- Cascini, F., Pantovic, A., Al-Ajlouni, Y., Failla, G., & Ricciardi, W. (2021). Attitudes, acceptance and hesitancy among the general population worldwide to receive the COVID-19 vaccines and their contributing factors: A systematic review. *EClinicalMedicine*, 40, 101113. <https://doi.org/10.1016/j.eclinm.2021.101113>.
- Chaker, A. M. (2021, June 22). *Singles Return to In-Person Dating. And It’s Extra Awkward* Wall Street Journal. <https://www.wsj.com/articles/singles-return-to-in-person-dating-and-its-extra-awkward-11624377526>
- Christakis, N. A., & Fowler, J. H. (2007). The spread of obesity in a large Social Network over 32 years. *New England Journal of Medicine*, 357(4), 370–379. <https://doi.org/10.1056/NEJMsa066082>.
- Chung, A., & Rimal, R. N. (2016). Social norms: A review. *Review of Communication Research*, 4, 1–28. <https://doi.org/10.12840/issn.2255-4165.2016.04.01.008>.
- Clark, C. L., Shaver, P. R., & Abrahams, M. F. (1999). Strategic behaviors in romantic relationship initiation. *Personality and Social Psychology Bulletin*, 25(6), 709–722. <https://doi.org/10.1177/0146167299025006006>.
- Columbus, S., Molho, C., Righetti, F., & Balliet, D. (2021). Interdependence and cooperation in daily life. *Journal of Personality and Social Psychology*, 120(3), 626. <https://doi.org/10.1037/pspi0000253>.
- Dillard, J. P., Tian, X., Cruz, S. M., Smith, R. A., & Shen, L. (2021). Persuasive Messages, Social Norms, and Reactance: A Study of Masking Behavior during a COVID-19 Campus Health Campaign. *Health Communication*, 1–11. <https://doi.org/10.1080/10410236.2021.2007579>
- Dodge, B., Herbenick, D., Friedman, M. R., Schick, V., Fu, T. C., Bostwick, W., & Sandfort, T. G. M. (2016). Attitudes toward bisexual men and women among a nationally representative probability sample of adults in the United States. *PLoS One*, 11(10), e0164430. <https://doi.org/10.1371/journal.pone.0164430>.
- Dono, J., Miller, C., Ettridge, K., & Wilson, C. (2020). The role of social norms in the relationship between anti-smoking advertising campaigns and smoking cessation: A scoping review. *Health Education Research*, 35(3), 179–194. <https://doi.org/10.1093/her/cyaa008>.
- Dubé, E., Laberge, C., Guay, M., Bramadat, P., Roy, R., & Bettinger, J. A. (2013). Vaccine hesitancy: An overview. *Human Vaccines & Immunotherapeutics*, 9(8), 1763–1773. <https://doi.org/10.4161/hv.24657>.
- Dubé, E., Gagnon, D., MacDonald, N., Bocquier, A., Peretti-Watel, P., & Verger, P. (2018). Underlying factors impacting vaccine hesitancy in high income countries: A review of qualitative studies. *Expert Review of Vaccines*, 17(11), 989–1004. <https://doi.org/10.1080/14760584.2018.1541406>.
- Duguay, S., Dietzel, C., & Myles, D. (2022). The year of the “virtual date”: Reimagining dating app affordances during the COVID-19 pandemic. *New Media & Society*, 14614448211072256. <https://doi.org/10.1177/14614448211072256>.
- Dyer, O. (2021). Covid-19: Unvaccinated face 11 times risk of death from delta variant, CDC data show. *Bmj*, 374, n2282. <https://doi.org/10.1136/bmj.n2282>.

- Eleuteri, S., & Terzitta, G. (2021). Sexuality during the COVID-19 pandemic: The importance of internet. *Sexologies*, 30(1), e55–e60. <https://doi.org/10.1016/j.sexol.2020.12.008>.
- Erikson, E. H. (1968). *Identity: Youth and crisis*. Norton & Co.
- Ertug, G., Brennecke, J., Kovacs, B., & Zou, T. (2022). What does homophily do? A review of the consequences of homophily. *Academy of Management Annals*, 16(1), 38–69. <https://doi.org/10.5465/annals.2020.0230>.
- Fernandez, J. R., & Birnholtz, J. (2019). "I Don't Want Them to Not Know" Investigating Decisions to Disclose Transgender Identity on Dating Platforms. *Proceedings of the ACM on Human-Computer Interaction*, 3(CSCW), 1–21. <https://doi.org/10.1145/3359328>
- Finney Rutten, L. J., Zhu, X., Leppin, A. L., Ridgeway, J. L., Swift, M. D., & Jacobson, R. M. (2021). Evidence-Based Strategies for Clinical Organizations to Address COVID-19 Vaccine Hesitancy. *Mayo Clinic Proceedings*, 96(3), 699–707. <https://doi.org/10.1016/j.mayocp.2020.12.024>
- Fisher, K. A., Tenforde, M. W., Feldstein, L. R., Lindsell, C. J., Shapiro, N. I., Files, D. C., & IVY Network Investigators. (2020). Community and close contact exposures associated with COVID-19 among symptomatic adults ≥ 18 years in 11 outpatient health care facilities—United States, July 2020. *Morbidity and Mortality Weekly Report*, 69(36), 1258. <https://doi.org/10.15585/mmwr.mm6936a5>.
- François, G., Duclos, P., Margolis, H., Lavanchy, D., Siegrist, C. A., Meheus, A., Lambert, P. H., Emiroğlu, N., Badur, S., & Van Damme, P. (2005). Vaccine safety controversies and the future of vaccination programs. *The Pediatric Infectious Disease Journal*, 24(11), 953–961. <https://doi.org/10.1097/01.inf.0000183853.16113.a6>.
- Frederick, D. A., Garcia, J. R., Gesselman, A. N., Mark, K. P., Hatfield, E., & Bohrnstedt, G. (2020). The happy american body 2.0: Predictors of affective body satisfaction in two US national internet panel surveys. *Body Image*, 32, 70–84. <https://doi.org/10.1016/j.bodyim.2019.11.003>.
- Friedman, M. R., Dodge, B., Schick, V., Herbenick, D., Hubach, R., Bowling, J., & Reece, M. (2014). From bias to bisexual health disparities: Attitudes toward bisexual men and women in the United States. *LGBT Health*, 1(4), 309–318. <https://doi.org/10.1089/lgbt.2014.0005>.
- Funk, C., & Tyson, A. (2021, November 23). Growing share of Americans say they plan to get a COVID-19 vaccine – or already have. Pew Research Center Science & Society. Retrieved May 23, 2022, from <https://www.pewresearch.org/science/2021/03/05/growing-share-of-americans-say-they-plan-to-get-a-covid-19-vaccine-or-already-have/>
- Gamarel, K. E., Jadwin-Cakmak, L., King, W. M., Lacombe-Duncan, A., Trammell, R., Reyes, L. A., Burks, B. R., Arnold, E., & Harper, G. W. (2020). Stigma experienced by Transgender Women of Color in their dating and romantic Relationships: Implications for gender-based violence Prevention Programs. *Journal of Interpersonal Violence*, 37(9–10), NP8161–NP8189. <https://doi.org/10.1177/0886260520976186>.
- Gottfried, J. (2020, August 18). *Americans' news fatigue isn't going away – about two-thirds still feel worn out*. Pew Research Center. Retrieved May 20, 2022, from <https://www.pewresearch.org/fact-tank/2020/02/26/almost-seven-in-ten-americans-have-news-fatigue-more-among-republicans/>
- Graham, M. H., & Svolik, M. W. (2020). Democracy in America? Partisanship, polarization, and the robustness of support for democracy in the United States. *American Political Science Review*, 114(2), 392–409. <https://doi.org/10.1017/s0003055420000052>.
- Griffiths, D., Sheehan, L., van Vreden, C., Petrie, D., Grant, G., Whiteford, P., Sim, M. R., & Collicie, A. (2021). The impact of work loss on mental and physical health during the COVID-19 pandemic: Baseline findings from a prospective cohort study. *Journal of Occupational Rehabilitation*, 31(3), 455–462. <https://doi.org/10.1007/s10926-021-09958-7>.
- Halbrook, M., Gadoth, A., Martin-Blais, R., Gray, A. N., Kashani, S., & Rimoim, A. W. (2021). Longitudinal assessment of coronavirus disease 2019 vaccine acceptance and uptake among frontline medical workers in Los Angeles, California. *Clinical Infectious Diseases*, ciab614. <https://doi.org/10.1093/cid/ciab614>.
- Hammond, R. A. (2010). Social influence and obesity. *Current Opinion in Endocrinology Diabetes and Obesity*, 17(5), 467–471. <https://doi.org/10.1097/MED.0b013e32833d4687>.
- Herek, G. M. (2002). Heterosexuals attitudes toward bisexual men and women in the United States. *Journal of Sex Research*, 39(4), 264–274. <https://doi.org/10.1080/00224490209552150>.
- Heshmati, S., Cabrerós, E., Ellis, O., & Blackard, B. (2022). Love and Friendship Across the Lifespan. <https://doi.org/10.31234/osf.io/ujbpbk>
- Huang, J., Birkenmaier, J., & Kim, Y. (2014). Job loss and unmet health care needs in the economic recession: Different associations by family income. *American journal of public health*, 104(11), e178–e183. <https://doi.org/10.2105/ajph.2014.301998>.

- Huber, G. A., & Malhotra, N. (2017). Political Homophily in Social Relationships: Evidence from Online dating Behavior. *The Journal of Politics*, 79(1), 269–283. <https://doi.org/10.1086/687533>.
- Hughes, M. M., Wang, A., Grossman, M. K., Pun, E., Whiteman, A., Deng, L., & Toblin, R. L. (2021). County-level COVID-19 vaccination coverage and social vulnerability — United States, December 14, 2020–March 1, 2021. *Morbidity and Mortality Weekly Report*, 70(12), 431.
- Iyengar, S., Lelkes, Y., Levendusky, M., Malhotra, N., & Westwood, S. J. (2019). The origins and consequences of affective polarization in the United States. *Annual Review of Political Science*, 22, 129–146. <https://doi.org/10.1146/annurev-polisci-051117-073034>.
- Johnson, L. M., Green, H. D., Koch, B., Stockman, J. K., Felsher, M., & Wagner (2021). K.D.
- Kwok, K. O., Lai, F., Wei, W. I., Wong, S. Y. S., & Tang, J. W. T. (2020). Herd immunity -estimating the level required to halt the COVID-19 epidemics in affected countries. *Journal of Infection*, 80(6), E32–E33. <https://doi.org/10.1016/j.jinf.2020.03.027>.
- Latkin, C., Donnell, D., Liu, T. Y., Davey-Rothwell, M., Celetano, D., & Metzger, D. (2013). The dynamic relationship between social norms and behaviors: The results of an HIV prevention network intervention for injection drug users. *Addiction*, 108(5), 934–943. <https://doi.org/10.1111/ADD.12095>.
- Lazarsfeld, P. F., & Merton, R. K. (1954). "Friendship as a social process: A substantive and methodological analysis." In *Freedom and Control in Modern Society*, edited by Morroe Berger, Theodore Abel and Charles H. Page, 18–66. New York: Van Nostrand. <https://doi.org/10.2307/1951443>
- Lee, B., & Chu, J. (2021). COVID-19 Vaccination Rates Are Lowest among Political Outsiders in the United States. <https://doi.org/10.31235/osf.io/hy7gx>
- Lehmiller, J. J. (2020). Fantasies about consensual nonmonogamy among persons in monogamous romantic relationships. *Archives of Sexual Behavior*, 1–14. <https://doi.org/10.1007/s10508-020-01788-7>.
- Leigh, J. P., Fiest, K., Brundin-Mather, R., Plotnikoff, K., Soo, A., & Stelfox, H. T. (2020). A national cross-sectional survey of public perceptions of the COVID-19 pandemic: Self-reported beliefs, knowledge, and behaviors. *Plos One*, 15(10), e0241259. <https://doi.org/10.1371/journal.pone.0241259>.
- Lenning, E., & Buist, C. L. (2013). Social, psychological and economic challenges faced by transgender individuals and their significant others: Gaining insight through personal narratives. *Culture health & sexuality*, 15(1), 44–57. <https://doi.org/10.1080/13691058.2012.738431>.
- Lo, C. C., & Cheng, T. C. (2014). Race, unemployment rate, and chronic mental illness: A 15- year trend analysis. *Social psychiatry and psychiatric epidemiology*, 49(7), 1119–1128. <https://doi.org/10.1007/s00127-014-0844-x>.
- Ludeke, S. G., Vitriol, J. A., Larsen, E. G., & Gensowski, M. (2021). Personality in a pandemic: Social norms moderate associations between personality and social distancing behaviors. *Personality and Individual Differences*, 177, 110828. <https://doi.org/10.1016/j.paid.2021.110828>.
- Madad, S., & Jetelina, K. (2021). Positive Impact of COVID19 Vaccines at the Individual and Population Level. Belfer Center for Science and International Affairs, Harvard Kennedy School. <https://www.belfercenter.org/publication/positive-impact-covid19-vaccines-individual-and-population-level>
- Mahler, H. I. M., Kulik, J. A., Butler, H. A., Gerrard, M., & Gibbons, F. X. (2008). Social norms information enhances the efficacy of an appearance-based sun protection intervention. *Social Science & Medicine*, 67(2), 321–329. <https://doi.org/10.1016/j.socscimed.2008.03.037>.
- Martinez, D., Parilli, C., Scartascini, C., & Simpsen, A. (2021). Let's (not) get together! The role of social norms in social distancing during COVID-19. *IDB Working Paper Series, IDB-WP-1168*. <https://doi.org/10.18235/0003044>
- Masini, B. E., & Barrett, H. A. (2008). Social support as a predictor of psychological and physical well-being and lifestyle in lesbian, gay, and bisexual adults aged 50 and over. *Journal of Gay & Lesbian Social Services*, 20(1–2), 91–110. <https://doi.org/10.1080/10538720802179013>.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual review of sociology*, 27(1), 415–444. <https://doi.org/10.1146/annurev.soc.27.1.415>.
- Mizock, L., & Mueser, K. T. (2014). Employment, mental health, internalized stigma, and coping with transphobia among transgender individuals. *Psychology of sexual orientation and gender diversity*, 1(2), 146. <https://doi.org/10.1037/sgd0000029>.
- Montoya, R. M., Horton, R. S., & Kirchner, J. (2008). Is actual similarity necessary for attraction? A meta-analysis of actual and perceived similarity. *Journal of Social and Personal Relationships*, 25(6), 889–922. <https://doi.org/10.1177/0265407508096700>.
- O'donnell, C., & Lambert, L. (2021, August 31). About 14 million in U.S. get first COVID-19 shot in August, up from July. Reuters. Retrieved May 20, 2022, from <https://www.reuters.com/world/us/us-gives-14-million-americans-first-covid-19-shot-august-up-july-2021-08-31/>

- O'Sullivan, L. F., Belu, C. F., & Garcia, J. R. (2022). Loving you from afar: Attraction to others ("crushes") among adults in exclusive relationships, communication, perceived outcomes, and expectations of future intimate involvement. *Journal of Social and Personal Relationships*, 39(2), 413–434. <https://doi.org/10.1177/02654075211038612>.
- Onnela, J. P., Landon, B. E., Kahn, A. L., Ahmed, D., Verma, H., O'Malley, A. J., & Christakis, N. A. (2016). Polio vaccine hesitancy in the networks and neighborhoods of Malegaon, India. *Social science & medicine*, 153, 99–106. <https://doi.org/10.1016/j.socscimed.2016.01.024>.
- Pachucki, M. A., Jacques, P. F., & Christakis, N. A. (2011). Social network concordance in food choice among spouses, friends, and siblings. *American Journal of Public Health*, 101(11), 2170–2177. <https://doi.org/10.2105/AJPH.2011.300282>.
- Patty, N. J., Van Dijk, H. M., Wallenburg, I., Bal, R., Helmerhorst, T. J., Van Exel, J., & Cramm, J. M. (2017). To vaccinate or not to vaccinate? Perspectives on HPV vaccination among girls, boys, and parents in the Netherlands: A Q-methodological study. *Bmc Public Health*, 17(1), 1–12. <https://doi.org/10.1186/s12889-017-4879-2>.
- Partisan antipathy: More intense, more personal*. Pew Research Center, Pew Research Center - U.S., & Politics (2020, August 17). & Policy. Retrieved May 23, 2022, from <https://www.pewresearch.org/politics/2019/10/10/partisan-antipathy-more-intense-more-personal/>
- Portolan, L., & McAlister, J. (2022). Jagged love: Narratives of Romance on dating apps during COVID-19. *Sexuality & Culture*, 26(1), 354–372. <https://doi.org/10.1007/s12119-021-09896-9>.
- Price, D. M., Gesselman, A. N., & Garcia, J. R. (2020). Single bisexual men's and women's perceptions of acceptance in the LGBTQ community. *Journal of Homosexuality*, 67(14), 1923–1947. <https://doi.org/10.1080/00918369.2019.1618645>.
- Pugh, J., Savulescu, J., Brown, R. C., & Wilkinson, D. (2022). The unnaturalistic fallacy: COVID-19 vaccine mandates should not discriminate against natural immunity. *Journal of Medical Ethics*, 48(6), 371–377. <https://doi.org/10.1136/medethics-2021-107956>.
- Ranji, U., & Salganicoff, A. (2014, October 20). *Balancing on shaky ground: Women, work, and family health* Kaiser Family Foundation. <https://www.kff.org/womens-health-policy/issue-brief/data-note-balancing-on-shaky-ground-women-work-and-family-health/>
- Reich, J. A. (2020). "We are fierce, independent thinkers and intelligent": Social capital and stigma management among mothers who refuse vaccines. *Social Science & Medicine* (1982), 257, 112015. <https://doi.org/10.1016/j.socscimed.2018.10.027>
- Reid, A. E., Cialdini, R. B., & Aiken, L. S. (2011). Social norms and health behavior. In A. Steptoe, K. Freedland, J. R. Jennings, M. M. Llabre, S. B. Manuck, & E. J. Susman (Eds.), *Handbook of behavioral medicine: Methods and applications* (pp. 263–274). Springer Science + Business Media. https://doi.org/10.1007/978-0-387-09488-5_19.
- Rodrigues, C. M., & Plotkin, S. A. (2020). Impact of vaccines: Health, economic, and social perspectives. *Frontiers in Microbiology*, 11(1526). <https://doi.org/10.3389/fmicb.2020.01526>.
- Salali, G. D., & Uysal, M. S. (2021). *Why Some Hesitate More: Cross-Cultural Variation in Conspiracy Beliefs, Belief in Science, and Vaccine Attitudes* (p. 2021.07.09.21260228). medRxiv. <https://doi.org/10.1101/2021.07.09.21260228>
- Savoia, E., Piltch-Loeb, R., Goldberg, B., Miller-Idriss, C., Hughes, B., Montrond, A., & Testa, M. A. (2021). Predictors of COVID-19 vaccine hesitancy: Sociodemographics, co-morbidity, and past experience of racial discrimination. *Vaccines*, 9(7), 767. <https://doi.org/10.3390/vaccines9070767>.
- Shelton, R. C., Winkel, G., Davis, S. N., Roberts, N., Valdimarsdottir, H., Hall, S. J., & Thompson, H. S. (2010). Validation of the group-based medical mistrust scale among urban black men. *Journal of General Internal Medicine*, 25(6), 549–555. <https://doi.org/10.1007/s11606-010-1288-y>.
- Shrigley, R. L. (1990). Attitude and behavior are correlates. *Journal of Research in Science Teaching*, 27(2), 97–113. <https://doi.org/10.1002/tea.3660270203>.
- Siegler, A. J., Luisi, N., Hall, E. W., Bradley, H., Sanchez, T., Lopman, B. A., & Sullivan, P. S. (2021). Trajectory of COVID-19 vaccine hesitancy over time and association of initial vaccine hesitancy with subsequent vaccination. *JAMA Network Open*, 4(9), e2126882. <https://doi.org/10.1001/jamanetworkopen.2021.26882>.
- Simons-Morton, B. G., & Farhat, T. (2010). Recent findings on peer group influences on adolescent smoking. *The Journal of Primary Prevention*, 31(4), 191–208. <https://doi.org/10.1007/s10935-010-0220-x>.
- Smith, N., & Graham, T. (2019). Mapping the anti-vaccination movement on Facebook. *Information Communication & Society*, 22(9), 1310–1327. <https://doi.org/10.1080/1369118X.2017.1418406>.
- Sobo, E. J. (2016). Theorizing (vaccine) refusal: Through the looking glass. *Cultural Anthropology*, 31(3), 342–350. <https://doi.org/10.14506/ca31.3.04>.

- Streefand, P. H. (2001). Public doubts about vaccination safety and resistance against vaccination. *Health policy*, 55(3), 159–172. [https://doi.org/10.1016/S0168-8510\(00\)00132-9](https://doi.org/10.1016/S0168-8510(00)00132-9).
- Streefand, P., Chowdhury, A. M. R., & Ramos-Jimenez, P. (1999). Patterns of vaccination acceptance. *Social science & medicine*, 49(12), 1705–1716. [https://doi.org/10.1016/S0277-9536\(99\)00239-7](https://doi.org/10.1016/S0277-9536(99)00239-7).
- Troiano, G., & Nardi, A. (2021). Vaccine hesitancy in the era of COVID-19. *Public health*, 194, 245–251. <https://doi.org/10.1016/j.puhe.2021.02.025>.
- Truong, J., Bakshi, S., Wasim, A., Ahmad, M., & Majid, U. (2022). What factors promote
- Valstein, T. J., Gollwitzer, P. M., & Oettingen, G. (2022). The Grey Areas of Romance: A Measure of Presumptuous Romantic Intentions. <https://doi.org/10.31234/osf.io/8p3sz>
- Vangelisti, A. L., & Daly, J. A. (1997). Gender differences in standards for romantic relationships. *Personal Relationships*, 4(3), 203–219. <https://doi.org/10.1111/j.1475-6811.1997.tb00140.x>.
- Viswanath, K., Bekalu, M., Dhawan, D., Pinnamaneni, R., Lang, J., & McLoud, R. (2021). Individual and social determinants of COVID-19 vaccine uptake. *Bmc Public Health*, 21(1), 1–10. <https://doi.org/10.1186/s12889-021-10862-1>.
- Wang, C., Han, B., Zhao, T., Liu, H., Liu, B., Chen, L., Xie, M., Liu, J., Zheng, H., Zhang, S., Wang, Y., Huang, N., Du, J., Liu, Y. Q., Lu, Q. B., & Cui, F. (2021). Vaccination willingness, vaccine hesitancy, and estimated coverage at the first round of COVID-19 vaccination in China: A national cross-sectional study. *Vaccine*, 39(21), 2833–2842. <https://doi.org/10.1016/j.vaccine.2021.04.020>.
- Webster, G. D., Smith, C. V., Orozco, T., Jonason, P. K., Gesselman, A. N., & Greenspan, R. L. (2021). Missed connections and embarrassing confessions: Using big data to examine sex differences in sexual omission and commission regret. *Evolutionary Behavioral Sciences*, 15(3), 275. <https://doi.org/10.1037/ebbs0000199>.
- Wei, Z., Sun, X., Yang, Y., Zhan, S., & Fu, C. (2021). Seasonal influenza vaccine hesitancy profiles and determinants among chinese children's guardians and the elderly. *Expert Review of Vaccines*, 20(5), 601–610. <https://doi.org/10.1080/14760584.2021.1908134>.
- Wicker, A. W. (1969). Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects. *Journal of Social Issues*, 25, 41–78.
- Wiyeh, A. B., Cooper, S., Najji, C. A., & Wiysonge, C. S. (2018). Vaccine hesitancy 'outbreaks': Using epidemiological modeling of the spread of ideas to understand the effects of vaccine related events on vaccine hesitancy. *Expert review of vaccines*, 17(12), 1063–1070. <https://doi.org/10.1080/14760584.2018.1549994>.
- Yasmin, F., Najeeb, H., Moeed, A., Naeem, U., Asghar, M. S., Chughtai, N. U., Yousaf, Z., Seboka, B. T., Ullah, I., Lin, C. Y., & Pakpour, A. H. (2021). COVID-19 vaccine hesitancy in the United States: A systematic review. *Frontiers in public health*, 9, 770985. <https://doi.org/10.3389/fpubh.2021.770985>.
- Zanna, M. P., Olson, J. M., & Fazio, R. H. (1980). Attitude-behavior consistency: An individual difference perspective. *Journal of Personality and Social Psychology*, 38(3), 432. <https://doi.org/10.1037/0022-3514.38.3.432>.
- Centers for Disease Control and Prevention (CDC) (2021). Centers for Disease Control and Prevention COVID Data Tracker: Cases & Deaths among Healthcare Personnel.
- Centers for Disease Control and Prevention (2021, September 15). Science brief: Covid-19 vaccines and vaccination. Centers for Disease Control and Prevention. Retrieved May 20, 2022, from <https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/fully-vaccinated-people.html>
- Health Resources and Services Administration (2020). (rep.). *National Survey of Organ Donation Attitudes and Practices, 2019*. Retrieved May 23, 2022, from <https://www.organdonor.gov/sites/default/files/organ-donor/professional/grants-research/nsodap-organ-donation-survey-2019.pdf>.
- Institute for Health Metrics and Evaluation (2022, March 10). Covid-19 vaccine hesitancy in the US by county and ZIP code. COVID-19 vaccine hesitancy in the US by county and ZIP code. Retrieved May 20, 2022, from <https://www.healthdata.org/acting-data/covid-19-vaccine-hesitancy-us-county-and-zip-code>
- Role of social networks and social norms in future PrEP use in a racially diverse sample of at-risk women and members of their social networks. *Journal of Acquired Immune Deficiency Syndromes*, 86(4), 422–429. <https://doi.org/10.1097/QAI.0000000000002571>
- vaccine hesitancy or acceptance during pandemics? A systematic review and thematic analysis. *Health Promotion International*, 37(1), daab105. <https://doi.org/10.1093/heapro/daab105>
- World Health Organization (2019). Ten threats to global health in 2019. World Health Organization. Retrieved May 20, 2022, from <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

Authors and Affiliations

**Jessica T. Campbell¹ · Magaret Bennett-Brown^{1,2} · Alexandra S. Marcotte¹ ·
Ellen M. Kaufman¹ · Zoe Moscovici¹ · Olivia R. Adams¹ · Sydney Lovins¹ ·
Justin R. Garcia¹ · Amanda N. Gesselman¹**

✉ Jessica T. Campbell
jestcamp@iu.edu

¹ Indiana University Bloomington, Bloomington, USA

² Texas Tech University, Lubbock, Texas, USA