



# Young Adults Underestimate How Well Peers Adhere to COVID-19 Preventive Behavioral Guidelines

Scott Graupensperger<sup>1</sup> · Christine M. Lee<sup>1</sup> · Mary E. Larimer<sup>1</sup>

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## Abstract

To combat the rampant spread of the SARS-CoV-2 virus that is responsible for the COVID-19 pandemic, the Centers for Disease Control and Prevention (CDC) has provided Americans with empirically supported preventive behavioral guidelines (e.g., wearing a face mask). However, there is a need to develop behavioral strategies that can effectively increase adherence to these guidelines, especially for young adults, who report particularly poor adherence. Across several domains of prevention science, norms-based interventions have successfully motivated constructive health behavior by correcting normative misperceptions, but these strategies are only relevant when these misperceptions are widespread. We examined the accuracy of young adults' perceptions of peers' adherence to CDC-recommended behavioral guidelines (i.e., perceived social norms) to assess the rationale for employing norm-correcting strategies. Young adult college students ( $N = 539$ ;  $M_{age} = 19.5$  years) self-reported their level of adherence to a list of preventive behavioral guidelines and estimated the norms regarding the extent to which other young adults adhered to these guidelines. We measured adherence and perceived norms for each guideline in terms of adherence frequency, ranging from 0 to 100% of the time. We found that young adults, on average, underestimated the extent to which other young adults adhere to each of the recommended preventive behaviors. That is, young adults tended to think that other young adults are failing to adhere to CDC guidelines, whereas our self-reported data showed adherence frequency may be quite high. Moreover, we found positive associations between self-reported adherence and perceptions of others' adherence—that is, those who underestimated others' adherence also self-reported lower adherence to guidelines. Findings from this study establish proof-of-concept for the development of norms-based strategies designed to improve young adults' adherence to preventive behavioral guidelines that are both specific to the COVID-19 pandemic and that prepare for future contagious outbreaks.

**Keywords** Social norms · SARS-CoV-2 · Personalized normative feedback · Social distancing

## Introduction

As of this writing, the COVID-19 pandemic continues to be an unmitigated public health crisis, although vaccines that are now beginning to be administered show great promise. Regardless, there remains a pressing need to identify behavioral strategies to reduce person-to-person transmission (Van Bavel et al., 2020). The Centers for Disease Control and Prevention (CDC) has endorsed empirically supported preventive behavioral guidelines that can reduce the spread of the virus, including using face masks and avoiding congested indoor spaces (CDC, 2020). These preventive behaviors are critical to ongoing pandemic efforts, especially as citizens resume societal roles that require that they return to workplaces, schools, and other places with high risk of transmission. Although COVID vaccination will help contain the spread of the virus, it is not yet clear whether we will achieve sufficient vaccine coverage to facilitate herd immunity (Anderson et al., 2020), especially considering evidence of substantial vaccine hesitancy among U.S. adults (Fisher et al., 2020). As such, increasing adherence to preventive behavioral guidelines remains a central public health priority.

COVID-19 preventive behaviors include both approach strategies (e.g., hand washing, mask wearing, and disinfecting shared spaces) and avoidance strategies (e.g., avoiding or limiting the following: close social interactions, group gatherings and events, travel/vacations, and public transportation). Although recent reports are encouraging—estimating that, on average, American adults adhere to COVID guidelines over 75% of the time—these estimates also indicate that there is a subset of Americans who are not adequately adhering to guidelines (Park et al., 2020).

Young adults are reporting the poorest adherence (e.g., Jørgensen, Bor, & Petersen, 2020). One contributing factor is that many young adults feel less at-risk for the consequences of COVID-19 (Park et al., 2020) and discount the importance of preventive behavioral guidelines (Farber & Johnson, 2020). Because young adults seem to have a lower risk of developing severe symptoms and complications (Zhu et al., 2020), they may be less likely to self-isolate when unknowingly infected and thus are more likely to transmit the virus—including spreading it to high-risk people with whom they come into contact (e.g., elderly; Farber & Johnson, 2020). It follows that the increased likelihood of presymptomatic or asymptomatic spread of the virus among young adults makes adherence to preventive behavioral guidelines especially critical for this population.

## Social Norms Regarding Preventive Behaviors

Peers are a central influence on young adults' health behaviors, as these are powerfully influenced by the behaviors and attitudes of peers (i.e., social norms). In line with several behavioral change models such as Social Norms Theory (Berkowitz, 2004) and the Theory of Reasoned Action (Fishbein & Ajzen, 2011), social norms are robust predictors of health behaviors. For example, perceptions of social norms have been found to be important antecedents of health-related behaviors including seatbelt use (Litt et al.,

2014), exercise and healthy eating behavior (Ball et al., 2010), and risky sexual behaviors (Lewis et al., 2014). Throughout the pandemic, the media has highlighted instances of large gatherings of young adults (e.g., at parties) with little to no adherence to CDC guidelines. While it may be important to publicly denounce these activities, one unintended drawback is potentially normalizing such behavior. That is, heavy media focus on instances of non-adherence may lead young adults to believe that most other young adults are not adhering to guidelines. For example, media messaging portraying substance use as normative can influence young adults' decisions to use substances via social learning processes (Jackson et al., 2018).

Across numerous domains of prevention science, it has been shown that people tend to misperceive the social norms related to health behaviors – often perceiving that others engage in more risky behavior (e.g., alcohol use; Cox et al., 2019) and less preventive health behavior (e.g., using malaria-preventing mosquito nets; Perkins et al., 2019) than is actually the case. Misperceptions of social norms can facilitate increased engagement in health-risk behavior and, as such, prevention strategies have found success in correcting misperceived norms as a means of motivating healthy behavior (for a review, see Miller & Prentice, 2016). In particular, personalized normative feedback interventions correct normative misperceptions by presenting individuals with tailored and individually-delivered feedback that highlights disparities between personal behavior, *perceptions* of peers' behaviors, and peers' *actual* behaviors (e.g., Labrie et al., 2013). Normative feedback interventions have effectively improved an array of health behaviors including sun protection (Reid & Aiken, 2013), alcohol use (see meta-analysis by Dotson et al., 2015), and problematic gambling (see meta analysis by Peter et al., 2019). As such, norms-based interventions may be a prudent strategy to increase adherence to COVID guidelines and are especially compelling given that these interventions are low-cost and easily disseminated for widespread reach. However, these strategies are only appropriate when the target population misperceives the social norms for a given behavior so that they can be corrected via an intervention.

## Current Study

We designed this study to examine the accuracy of young adults' perceptions of social norms regarding adherence to COVID-19 preventive behavioral guidelines. Informed by Social Norms Theory (Berkowitz, 2004) and similar prevention science literature (Litt et al., 2014), we hypothesized that young adults would, on average, underestimate the adherence of their peers. That is, we anticipated that young adults would largely think that other young adults are less diligently adhering to preventive guidelines relative to estimates derived from self-report data (i.e., actual norms).

## Method

### Participants and Procedures

In September 2020, we recruited 1603 young adults from a large public university in the Pacific Northwest via e-mail invitation. College student e-mail addresses were selected at random from the University Registrar's Office. Those who were interested in participating in the study were asked to click a link to the online survey portal (i.e., survey links were tied to specific e-mail addresses so that participants could only take the survey once). Surveys were anticipated to take approximately 15 min and all responses were confidential in that they were only linked to a personal identification number. A total of 539 (34%) young adults completed the survey. The mean age of the sample was 19.5 years ( $SD=0.8$ ) and comprised 58.8% women. The ethnoraical demographics approximately matched the university student body: 46.2% White, 38.9% Asian, 15.0% multiracial or other. We e-mailed all participants who completed the survey a \$10 e-gift card, and all procedures were approved by the Institutional Review Board at the University of Washington.

### Measures

Standard demographic items were asked pertaining to age, student status (e.g., year in school), birth sex, living status (e.g., with parents), and race/ethnicity. A series of alcohol use items were also asked as this survey served as a screening survey for eligibility into an alcohol use intervention study.

In the current study, we focused on preventive behaviors that were recommended by the CDC guidelines as of September 2020. Park and colleagues (2020) created a measure which included the most salient CDC recommendations as of September 2020. We used 14 items from their measure asking participants about their degree of adherence to each specific preventive behavior in terms of adherence frequency (from 0 to 100% of the time). The stem for these items asked: "Please rate your degree of adherence to the CDC preventive behavioral guidelines ranging from 0 (*Never*) to 100% (*All of the time*)."

Participants entered a number between 0 and 100, and example items included "Wearing a face mask when in public (e.g., shopping)" and "Avoiding crowded hang-out spots (e.g., bars, pubs, lounges)." The full list of self-reported adherence behaviors is shown in Table 1 ( $\alpha=0.79$ ).

Using the same items shown in Table 1, we also asked participants to estimate the extent that their peers (i.e., 'typical young adults') adhere to these preventive behavioral guidelines ( $\alpha=0.89$ ). The stem for these items asked: "Please rate how well you think that typical young adults adhere to the CDC preventive behavioral guidelines ranging from 0 (*Never*) to 100% (*All of the time*)."

These perceived norms items were assessed in terms of adherence frequency (from 0 to 100% of the time) and participants entered a number between 0 and 100.

**Table 1** Paired samples *t* tests and correlations between self-report adherence and perceptions of peers' adherence to preventive behavioral guidelines

| Self-report stem: <i>Please rate your degree of adherence to the CDC preventive behavioral guidelines ranging from 0% (Never) to 100% (All of the time)</i>                                     | Self-report adherence Mean (SD) | Perceptions of peers' adherence Mean (SD) | Difference between self-report and perceptions of peers | Correlation between self-report and perceptions of peers |
|---|---------------------------------|---|---|--|
| Perceptions of peers stem: <i>Please rate how well you think that typical young adults adhere to the CDC preventive behavioral guidelines ranging from 0% (Never) to 100% (All of the time)</i> |                                 |   |   |  |
| 1. Hand washing with soap and water for 20 s when available   | 82.7 (23.0)                     | 59.0 (24.0)                               | <i>t</i> (531) = 23.07***                               | <i>r</i> = .49***  |
| 2. Using hand sanitizer in between activities   | 73.1 (30.1)                     | 50.9 (24.2)                               | <i>t</i> (531) = 18.07***                               | <i>r</i> = .47***  |
| 3. Wearing a face mask when in public (e.g., shopping)  | 97.5 (10.5)                     | 75.9 (20.0)                               | <i>t</i> (530) = 23.21***                               | <i>r</i> = .12**   |
| 4. Staying 6 feet away from other people you don't live with  | 74.7 (24.2)                     | 51.3 (22.9)                               | <i>t</i> (531) = 19.57***                               | <i>r</i> = .30***  |
| 5. Doing things at home rather than in public, when possible (e.g., work)   | 86.1 (20.9)                     | 61.6 (21.9)                               | <i>t</i> (531) = 21.51***                               | <i>r</i> = .24***  |
| 6. Clean and disinfect frequently touched surfaces (e.g., counters/ desks)  | 61.7 (31.4)                     | 38.2 (24.4)                               | <i>t</i> (529) = 18.29***                               | <i>r</i> = .47***  |
| 7. Avoiding dining in restaurants by cooking meals at home and using takeout/delivery options   | 85.1 (21.6)                     | 56.9 (23.4)                               | <i>t</i> (531) = 24.47***                               | <i>r</i> = .27***  |
| 8. Avoiding crowded hang-out spots (e.g., bars, pubs, lounges)  | 93.8 (15.5)                     | 56.2 (22.6)                               | <i>t</i> (528) = 33.69***                               | <i>r</i> = .14**   |
| 9. Avoiding large gatherings such as weddings, shows, or parties  | 94.7 (15.1)                     | 57.0 (22.9)                               | <i>t</i> (528) = 33.53***                               | <i>r</i> = .12**   |
| 10. Avoiding social gatherings (e.g., friends' houses)  | 73.2 (30.0)                     | 37.9 (22.0)                               | <i>t</i> (528) = 24.98***                               | <i>r</i> = .26***  |
| 11. Avoiding non-essential travel such as trips/vacations   | 83.8 (26.0)                     | 55.9 (23.9)                               | <i>t</i> (528) = 21.35***                               | <i>r</i> = .28***  |
| 12. Avoiding contact with at-risk individuals (e.g., older people)  | 90.7 (18.0)                     | 68.7 (21.9)                               | <i>t</i> (528) = 20.69***                               | <i>r</i> = .27***  |
| 13. Avoiding physical contact with others you do not live with (e.g., handshake/hugs)   | 82.7 (24.7)                     | 53.1 (24.4)                               | <i>t</i> (528) = 22.32***                               | <i>r</i> = .22***  |
| 14. Avoiding public transportation  | 89.9 (23.9)                     | 66.9 (22.8)                               | <i>t</i> (528) = 19.56***                               | <i>r</i> = .33***  |

*N* = 539. Mean values represent percentage of adherence ranging from 0 (Never) to 100% (All of the time). The reported *t* values were estimated using paired sample *t* tests. \*\*\**p* < .01, \*\**p* < .001

## Analyses

We sought to examine the accuracy of young adults' perceptions of social norms for COVID-19 preventive behaviors, which entailed contrasting participants' self-reported adherence to their perceptions of peers' adherence. We used paired-samples *t* tests for each preventive behavior; significant effects indicated a difference between self-reported adherence and perceptions of peers' adherence. Mean differences between perceived social norms and 'actual' adherence behaviors for this sample were displayed in a plot with corresponding 95% confidence intervals to further interpret the accuracy of young adults' perceptions of peers' adherence. We also computed correlations between self-reported adherence and perceptions of peers' adherence for each behavior to estimate the associations between one's own adherence and perceptions of peers' adherence.

## Results

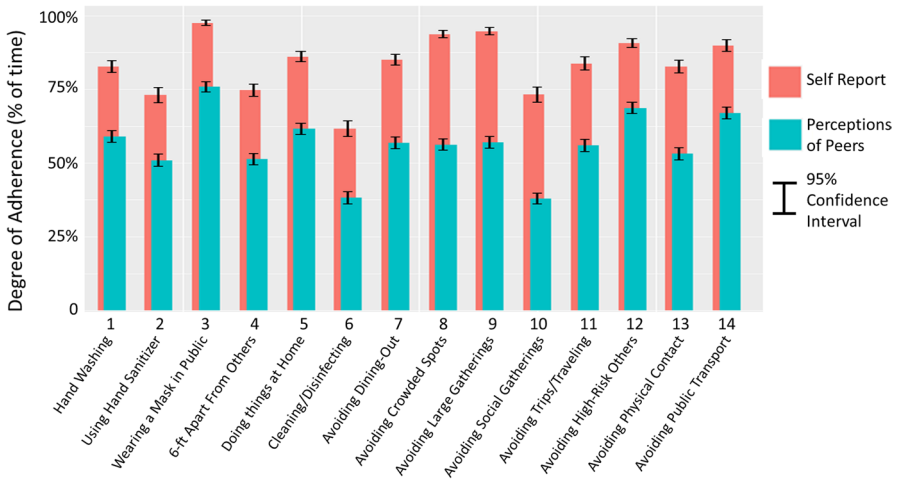
Sample means for self-reported adherence to COVID-19 preventive behavioral guidelines are shown in Table 1. Overall, young adults in our sample reported strong adherence to most behaviors. Notably, average adherence was highest for wearing a mask in public (97.5%) and lowest for cleaning and disinfecting frequently touched surfaces (61.7%). Perceptions of peers' adherence are also displayed in Table 1. Of note, young adults perceived the lowest peer adherence for the item regarding avoiding social gatherings such as those at friends' houses (37.9%).

Pertaining to the central aims of our study, perceptions of peers' adherence frequency (i.e., perceived norms) were significantly lower than self-reported adherence frequency (i.e., actual norms) for all 14 behaviors, indicating significant *underestimation* of social norms. The largest discrepancies were found for avoiding crowded hang-out spots and avoiding large gatherings. Contrasts between self-reported adherence and perceived adherence of peers are displayed in Fig. 1.

Across all 14 preventive behaviors, significant bivariate correlations indicated positive associations between young adults' self-reported adherence and their perceptions of peers' adherence. That is, those who felt that peers adhere more strongly to CDC guidelines also self-reported stronger adherence; however, these associations also highlight troubling evidence that those who held lower perceptions of peers' adherence also self-reported lower adherence to these crucial guidelines.

## Discussion

In support of our study's hypotheses, the young adults in our sample significantly underestimated the extent to which other 'typical' young adults adhere to the CDC-recommended preventive behaviors. We also found evidence that young adults' perceptions of peers' adherence were positively associated with their own self-reported adherence behaviors. These findings align with prominent behavior change theories such as Social Norms Theory (Berkowitz, 2004), Social Learning Theory (Bandura,



**Fig. 1** Bar graph contrasting self-report to perceptions of peers' adherence to preventive behavioral guidelines. Participants consistently rated their own adherence as being higher than their perceptions of typical young adults' adherence. Guidelines listed on X-axis correspond to the items displayed in Table 1.  $N = 539$  college students

1977), and Theory of Reasoned Action (Fishbein & Ajzen, 2011). Findings also align with similar literature examining normative misperceptions for others' engagement in health behaviors such as seatbelt use (Litt et al., 2014), malaria net use (Perkins et al., 2019), and alcohol use (Cox et al., 2019).

Evidence of normative misperceptions for preventive behavioral guideline adherence has immediate implications for public health messaging and strategies pertaining to COVID-19. Specifically, our findings provide initial support and rationale for the development of norms-based interventions to increase young adults' adherence to CDC behavioral guidelines for COVID-19. Personalized normative feedback interventions may be a prudent strategy to correct young adults' normative misperceptions pertaining to peers' adherence—especially for those behaviors that were greatly underestimated—which may subsequently increase young adults' motivation to adhere to preventive behavioral guidelines. Specifically, correcting the normative misperceptions of those individuals who think that 'no one else is adhering' is an economical and efficient strategy to help combat the COVID-19 pandemic. In light of this proof-of-concept evidence, our forthcoming research will evaluate the efficacy of a COVID-19 personalized normative feedback intervention designed to correct normative misperceptions pertaining to peers' guideline adherence and ultimately increase engagement in the recommended preventive behaviors.

Although this study was only intended to assess initial proof-of-concept, several limitations warrant mention. This convenience sample of young adults was recruited from one university, so additional research is needed to ensure these effects generalize across geographic regions as well as other age groups. Similarly, population-wide data is needed to estimate the true norms for guideline adherence, which would strengthen inferences about the accuracy of students' normative perceptions.

Although assessing potential subgroup differences in normative misperceptions is beyond the scope of this current proof-of-concept study, identifying groups who may be more likely to misperceive the norms for peers' guideline adherence may facilitate more targeted interventions. We only assessed normative perceptions for a distal referent group—typical young adults—which is warranted given RCT-generated evidence that personalized normative feedback interventions are most effective when the referent group is more distal as there is more room to correct misperceptions (Labrie et al., 2013). Nevertheless, forthcoming studies could also consider utilizing proximal referent groups (e.g., friends). Although previous research on the association between norms and behavior indicate that norms have a prospective association on behavior (e.g., Graupensperger et al., 2020), the bivariate correlations between perceptions of peers' adherence and self-reported adherence should not be interpreted as causal or directional and additional research should examine the prospective direction of this association. Lastly, we only examined perceptions of peers' *behaviors* about COVID safety measures, while further research is needed to examine normative misperceptions pertaining to estimates of peers' *attitudes* and *beliefs*.

## Conclusions

Findings indicated that young adults largely underestimated the fidelity of their peers' adherence to COVID-19 preventive behaviors. This study has thus established proof-of-concept for norm-correcting intervention strategies specific to the COVID-19 pandemic and in-preparation for future epidemics that will require strict societal adherence to preventive behavioral guidelines.

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## Declarations

**Conflict of Interest** The authors declare that they have no conflict of interest.

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## Authors and Affiliations

Scott Graupensperger<sup>1</sup>  · Christine M. Lee<sup>1</sup> · Mary E. Larimer<sup>1</sup>

✉ Scott Graupensperger  
graups@uw.edu

<sup>1</sup> Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, USA