“I Just Wanted to Triple Check . . . They were all Vaccinated”: Supporting Risk Negotiation in the Context of COVID-19

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During the COVID-19 pandemic, risk negotiation became an important precursor to in-person contact. For young adults, social planning generally occurs through computer-mediated communication. Given the importance of social connectedness for mental health and academic engagement, we sought to understand how young adults plan in-person meetups over computer-mediated communication in the context of the pandemic. We present a qualitative study that explores young adults’ risk negotiation during the COVID-19 pandemic, a period of conflicting public health guidance. Inspired by cultural probe studies, we invited participants to express their preferred precautions for one week as they planned in-person meetups. We interviewed and surveyed participants about their experiences. Through qualitative analysis, we identify strategies for risk negotiation, social complexities that impede risk negotiation, and emotional consequences of risk negotiation. Our findings have implications for AI-mediated support for risk negotiation and assertive communication more generally. We explore tensions between risks and potential benefits of such systems.

CCS CONCEPTS • Human-computer interaction • Empirical studies in HCI

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1 Introduction

In-person contact has long offered a path to feelings of social connectedness and belonging, which in turn contribute to mental and physical health as well as educational engagement [4, 29, 58, 59]. However, during the COVID-19 pandemic, views and guidelines differed on what it means to meet in person safely: individuals have been left to negotiate real-world practices that address their safety concerns and preferences. This paper focuses on risk negotiation, an active process of assessing, strategizing and often collaborating to navigate ambiguous risk. We carve out risk negotiation from the broader realm of health communication, which may involve acts such as education, disclosure, listening, observing, and coaching. In risk negotiation, but not necessarily in other forms of health communication, individuals assess and disclose information so that they can formulate appropriate precautions to protect their own (or a loved one’s) safety. Risk negotiation often requires influencing others to follow a joint plan when meeting up. As with other interpersonal situations involving health risks, COVID risk

negotiation can potentially involve awkwardness and conflict. Asking someone to wear a mask is similar in some ways to asking someone not to smoke in one's presence or asking personal health questions of a prospective sexual partner. One may cross personal boundaries, violate social norms, or run up against differences in values. These conversations call for sensitivity and interpersonal assertiveness [3]. However, little is known about how risk negotiation plays out in the context of COVID-19, particularly among young adults, and how technology can help or hinder this communication.

To understand risk negotiation of safe in-person contact, and to understand the possibilities for technology to support it, we conducted a qualitative, exploratory study inspired by research using cultural probes [24]. Our study took place during the early summer of 2021 (May-June) in the U.S., after sixteen months of COVID-related restrictions on social contact, when in-person gatherings were resuming. The Delta variant was spreading in the U.S [8]. Health recommendations, such as those pertaining to masks and social distancing, were conflicting. As is the case again in Spring 2022, the onus fell on individuals to set their own policies for safe interactions. Public health guidelines in the U.S. were mixed, with the U.S. Centers for Disease Control and Prevention (CDC) dropping mask recommendations for fully vaccinated individuals, while the World Health Organization (WHO) recommended continued use [33,50,56]. Contributing to the conflicting communications were changes in scientific understanding, variants of the virus, widespread misinformation campaigns [49] and intensified racism towards Asian Americans [22,48,52]. Vaccination verification processes had not been widely instituted. Vaccine passports had been implemented in some states, such as New York State's Excelsior Pass [62], but not in Washington state where this study was conducted. Difficulty controlling the virus and anticipated more virulent strains, led experts to expect that the virus would become endemic [43]. (See A1 Table 1 for a timeline of events). Individuals had to navigate these uncertainties as they estimated risks directly and indirectly associated with COVID-19 [44].

In this study, we asked 17 undergraduate college students to share their experiences as they communicated about upcoming in-person interactions. During an initial interview, we provided probe examples of how one might communicate preferred precautions relating to the pandemic, and other situations involving safety concerns that require personal assertiveness. Over the course of one week, we asked participants to express their preferences in a way that felt natural to them, as they planned in-person meetups. These communications of preferences - between participants and people they were planning to meet from outside their household – occurred primarily over direct messaging in social media, text messaging, and video conferencing. We interviewed participants again at the end of the week about these experiences.

Our findings illustrate the nuances in how young adults negotiated risk as they planned in-person meetups, planning which occurred primarily through messaging and other computer-mediated communication (CMC). We describe their risk negotiation strategies, the social complexities they encountered and emotional consequences of their attempts.

Strategies: Participants described multiple approaches for risk negotiation. In addition to direct communication, they used indirect explanations, implicit references (e.g., "uncrowded" as a proxy for safe), social media surveillance, third-party systems (e.g., CDC checklists), and informal approaches.

Social complexities: Participants encountered multiple challenges to risk negotiation. These included situations where clear communication wasn't enough (such as when one lacked the power to enforce preferences that they expressed), fears of offending others, unchecked assumptions about shared values and precautions among peers, and unknowns in the larger social environment.

Emotional Consequences: Attempts at risk negotiation did not just impact the safety of in-person meetings, they also affected how the individuals who expressed preferences felt about themselves. Increased confidence sometimes resulted from validating responses or even from the experience of standing up for oneself. In addition, some described an interest in becoming more assertive in related contexts such as sexual safety. Anxiety often resulted when requests were met with resistance or ambiguous responses. Social anxiety sometimes compounded safety concerns, leading participants to retreat from social engagement.

These findings present opportunities for the design of supportive technology. We close with a discussion of ideas about future work in the area of CMC, particularly conversational support.

2 Related work

This review draws on several areas of research related to how individuals negotiate risk in uncertain and dynamic contexts. While a comprehensive review of risk negotiation is outside the scope of this paper, we focus on literature in several areas of direct relevance to this study. First, we review studies related to risk negotiation in the context of COVID-19. Some of these studies focus on an important component of risk negotiation, assessment of risk, and others explore how individuals negotiate COVID-19 related risks in close family and romantic relationships. We also review studies on negotiations of sexual safety and secondhand smoke. In these domains, as with COVID-19, risks of illness are balanced against potential for conflict and rejection. In addition, we draw on research about negotiation in professional contexts to highlight challenges and skills that may apply to health risk negotiation. Our review of work in these domains highlights the tensions in risk negotiation and the importance of interpersonal assertiveness skills tailored to various relational contexts.

2.1 Risk negotiation related to COVID-19

In an analysis of risk perception related to COVID-19, Pine et al [44] describe challenges of assessing risk during a period of ambiguous and changing health information. Building on Gui et al.'s [27] study of risk perception during the Zika outbreak that distinguished between risk related to Zika infection and risk related to interventions such as pesticides, Pine et al examine how individuals assess risk and the different types of risks that were salient in the context of COVID-19. They describe how individuals gather and configure information from multiple sources – including media, conversations, and personal observations – to assess risks including COVID-19 illness, secondary illness such as exacerbation of other health conditions, economic loss, socio-behavioral issues such as isolation and weakened institutions such as schools and business. Our study extends this work by examining the conversational strategies and other interpersonal tactics employed to mitigate risk.

Another exploration of how individuals assessed COVID-19 risk drew on a survey of over 2500 New Zealanders and an online panel [55]. This qualitative analysis describes the ways in which individuals independently assessed risk and customized restrictions. The customized restrictions set by individuals were shaped not just by self-protectiveness, but by moral imperatives to take care of others and society at large. Some respondents appreciated the clarity of governmental guidelines and others complained of ambiguity in these guidelines or of noncompliance. Similar concerns about the clarity of government-issued safety guidelines were expressed by Irish adults [19].

Negotiation of COVID-19 risks, specifically attempts to mitigate risk of exposure associated with in-person interactions, has been examined in he context of close family and romantic relationships. Farrell et al. [19] described individuals' feelings of being unable to refuse requests for physical closeness, worries about family not being sufficiently cautious and fears of being ridiculed. Trnka et al. [55] described the pain and conflict that resulted when individuals expressed concern about risk. A study of minority women surfaced similar themes including negative effects on long-term partner relationships and avoidance of family members with conflicting risk assessment [46].

Negotiation of COVID-19 risk has also been examined in online daters. When deciding whether to meet up with a prospective date, some young adults [40] reported that they directly asked about that person's precautions, while others used indirect approaches such as asking about what the person had been doing for fun or noting whether the person raised the topic of COVID-19 related safety during the conversation (i.e., ruling out people who avoided the topic). Williams et al [60] describe fluidity in risk behaviors among online daters depending on their interest in a prospective partner. Online daters sought out "COVID compatible" partners with whom they had implicit or explicit alignment in agreement on beliefs and health behaviors. Far from a simple symptom checklist, COVID compatibility assessment involves "decoding of social signifiers about … prospective partners'

broader belief and value systems." Daters with low concern levels described implicit understanding and a feeling that explicit communication about precautions was not necessary, whereas those more concerned with risk relied on explicit questions about others' behaviors. While on dates, individuals employed a range of tactics to manage risk including meeting outside or at a business that enforced precautions (unburdening that individual from enforcing or coming across as overly cautious). Even daters intent on avoiding risk were found to rely on fallible assessment criteria, specifically their sense of trust about people they had just met. Our study expands upon this finding, exploring assumptions among young adults and their trusted peers.

These recent studies highlight the importance of understanding and supporting risk negotiation during the COVID-19 pandemic, and the potential role for technology.

2.2 Risk negotiation of other health concerns

Given the limited information about risk negotiation during COVID-19, we turn to other health domains where interpersonal negotiation of risk has been studied. Like COVID-19, sexually transmitted infections (STIs) require negotiation with others in order to assess and reduce risk. This negotiation of sexual safety is only with prospective partners and pertains to intimate contact rather than aerosol exposure, but as with COVID-19 risk negotiation, individuals balance risk of illness against threats of isolation and rejection. We also touch on secondhand smoke, another case in which one person's behavior can affect the health of others, increasing their risk for disease, albeit through a different pathway than a transmissible virus.

To assess risk of STIs, online daters have been found to rely not just on explicit questions but on inferences drawn from indications of promiscuity in self-descriptions, photos and online interactions [18]. When it comes to navigating perceived risks, strategies vary by context and health concern. To motivate condom use with male partners, women negotiating risk of STIs reported using direct measures such as presenting risk information and indirect approaches such as withholding sex [39]. In contrast, individuals confronted with secondhand smoke report avoiding direct confrontation; they were far more likely to increase physical distance (75%) and remain silent (16%) than initiate a discussion (6%) [25]. Reviews of smoking and vaping exposure negotiation [5] and condom negotiation [20,42] have highlighted characteristics that influence strategies and outcomes, specifically gender [20,42], ethnicity [42], relationship type [20,42], perception of risk [5,20], assertiveness [38], communication self-efficacy [5], and history of trauma [42].

Individuals' practices for negotiating risks associated with HIV and other STIs have not yet been well-translated to technology. Individuals do negotiate these risks and do draw on technology but manage interpersonal and social dynamics as they do so. Features within hookup apps related to HIV risk negotiation, such as HIV status disclosure within an app interface, have been resisted by users and critically examined by scholars [26,45] for exacerbating stigma and relying on medically outdated delineations. As Green points out, one dating app shared this data with partner companies, putting users at increased risk of discrimination [26]. Other research indicates that individuals are open to negotiating sexual risk using technology but when it is on their own terms rather than forced by a particular feature. Broaddus and Dickson-Gomez [13], for example, who examined use of text messaging for condom negotiation among African American young adults, found that text messaging felt more comfortable and private for expressing their preferences than in-person communication. These researchers suggest text messaging as a platform for fostering negotiation skills related to sexual safety.

2.3 Negotiation skills and norms relevant to health risk negotiation

Research on negotiation outside the realm of health also offers insight into challenges and skills relevant to health risk negotiation. For example, a review by Ames et al. [3] shows the importance of interpersonal assertiveness in negotiation and summarizes key components such as balancing one's goals with the expectations of others when determining how much to request, how to ask, when to concede and when to say no [3]. Some negotiation guides suggest scripts or templates with components such as describing the situation, expressing thoughts and feelings about the situation, specifying the desired outcome, and outlining the consequences of the requested behaviors

[9,41]. Other classic negotiation guides focus on identifying erroneous assumptions, regulating emotional responses of all parties, constructive reframing and collaborative problem solving [51]. However, negotiation tactics and their effectiveness need to be examined through the lens of gender and socio-cultural norms. It is increasingly understood that women are up against the threat of backlash in business and career negotiation [1,2,10,11], as they are in health negotiations [20,42]. When women are advocating for themselves, assertive negotiation is seen as inconsistent with female gender roles; the anticipated backlash for self-advocacy decreases women's assertiveness [1]. Research suggests a no win situation: assertive self-advocating women suffer a social backlash in which they are seen as less likable while non-assertive women who advocate for others suffer a leadership backlash in which they are deemed less competent [2]. Strategies for minimizing social backlash include conveying warmth, expressing concern for relationships and explaining the organizational benefits of a particular request; [10,11] however, these may not mitigate leadership backlash. Socio-cultural norms, in particular lower assertiveness among East Asians that is incongruent with U.S. norms about leadership communication, have also been examined as a factor in the lack of diversity in corporate leadership [34]. Cross cultural differences in directness during conflict negotiation, e.g., an avoiding style of Chinese managers that contrasts with a competing style of U.S. managers, have also been examined [37]. While these studies of negotiation in different contexts are valuable starting places, we expect that tactics may vary depending on the concern, social roles, and situations.

2.4 Summary

It is clear from past work that risk negotiation and elements of it, such as risk assessment, are often difficult. Although there is significant literature on negotiation and communication about risks associated with particular health issues, there is little research on negotiation strategies and concerns specific to COVID-19. In particular, there is a lack of nuanced research on how young adults negotiate these risks with each other and others outside their households. Across domains, it is clear that risk negotiation involves assertiveness and that it is tailored in complex ways to relationship dynamics and other contextual factors. While there is potential for technology to assist with risk negotiation, it must support personal agency in communication and help individuals avoid negative social consequences of risk negotiation.

3 Methods

The goal of our study was to provide insight into how young adults negotiate risks associated with COVID-19 as they resume in-person meetups: what tensions they experience and their strategies for navigating them. Seventeen individuals participated in the study, which included an initial semi-structured interview, a week of daily email prompts and surveys about participants' daily experiences of risk negotiation, and a second interview at the end. One researcher conducted all interviews over video conferencing software. We begin the methods with a description of probes and nudges, and those used in this research.

3.1 Probes and nudges

Our study was loosely inspired by literature on cultural probes and nudges. Cultural probes are an approach to design inquiry introduced by Gaver et al. [6,7,24], in which artifacts are shared with participants to evoke reflection. While most prior work with probes has involved material artifacts, typically low fidelity prototypes, cameras and notebooks, our probes were digital mockups and online questions. Like the physical probes used in previous work, ours were intended as rough concepts that would spark participants' imagination. We wanted participants to think about COVID-19 risk negotiation broadly, to draw associations with other areas in which they negotiate health risk, and the interpersonal challenges in those negotiations.

The probe in this study was a set of examples of how one might negotiate risk while planning upcoming in person meetings. Examples were created by the research team to illustrate risk negotiation over messaging, dating apps, and other communication platforms (See Figure 1). The examples were intended to reflect informal

but direct, assertive communication. They depicted a variety of social situations (e.g., communicating preferred precautions in the context of inviting others to parties or a group hike, responding to a lunch invite, dating and other meetups). The examples illustrated risk negotiation via text, images (emoji and avatars), worksheets for identifying shared preferences, design templates for direct messaging and calendar invites. Some examples branched out from COVID-19 to other safety concerns (e.g., sexual protection, safety walking home, etc.), to invite discussion about how participants negotiate such concerns or how they could imagine doing so. We included these additional safety concerns to open up discussion of the feelings and interpersonal dynamics involved in risk negotiation. The concerns reflected those expressed by students in a related previous study [36], online forums and mainstream media. The probe examples were created with a university student co-author.

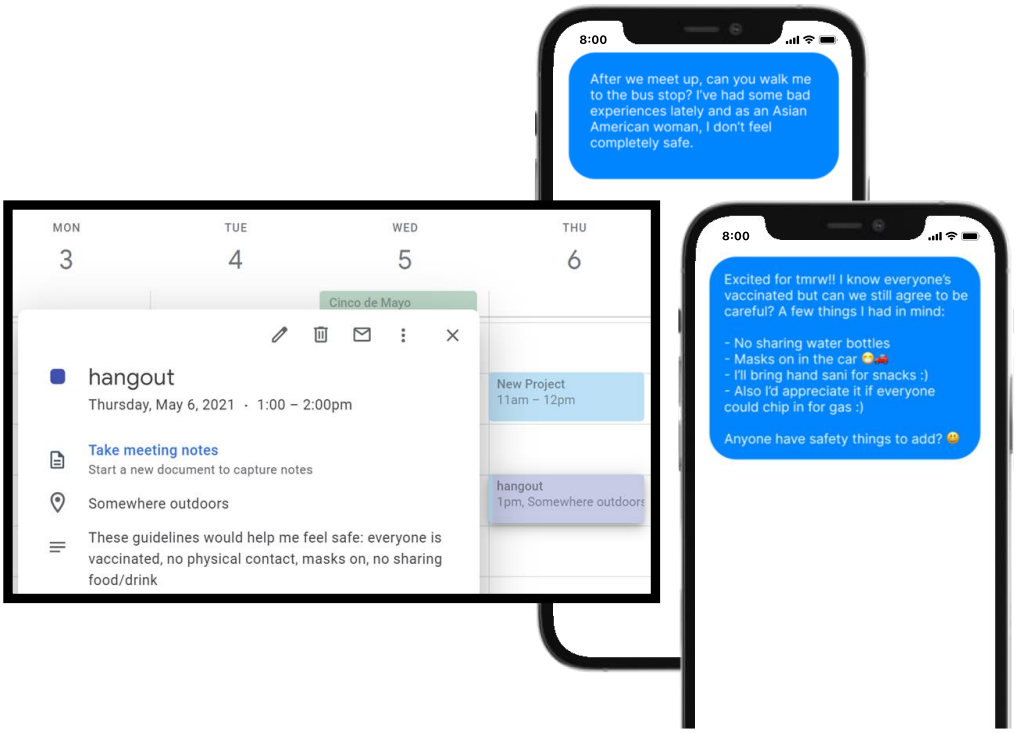

Figure 1: Examples shown to participants illustrating a range of approaches to expressing preferences for in-person meetups. (A calendar invite specifying preferences (left), an invitation for a group hike specifying precautions such as mask-wearing in the car (right), and a request for accompaniment walking home at night (top)).

Nudges are defined by behavioral economists as an aspect of the environment that shapes behavior without preventing alternative choices [53]. Examples include placement of healthy options at eye level in a school cafeteria and a social media notification of a friend's birthday. In this study, participants were nudged with daily email prompts over the course of one week to express preferred precautions when planning in-person meetings.

This email nudge included a link to the probe examples that participants could optionally draw on for reference as they composed their messages.

3.2 Participants and recruiting

We recruited through broad advertising to university undergraduates at the same institution primarily via Facebook pages and asking colleagues to distribute our advertisement to student groups. Participants were included in the study if they were likely to have in-person contact with others and had concern about safety, based on their responses to a screening survey. Students rated their concern on a seven-point scale where one indicated "not at all concerned" and seven indicated "very concerned." (See A2 for Screening Survey). Of 44 students who responded to the advertisement, all anticipated possible in-person contact in the near future, and 39 rated their concern about safety between two and six. There were no students who reported their level of concern as seven. Students who indicated they were not at all concerned about COVID safety were excluded since our objective was to identify opportunities to support students who were concerned about risk as they resumed in-person meetups. We sought participants who would be initiating risk negotiation.

We sought 15 participants and enrolled the first 17 participants who met our leveling requirements below (anticipating some participants would withdraw after enrolling). We enrolled three to four students from concern levels two-six, for a total of 17 participants. Of the 17 participants, 14 identified as women, two as men and one as non-binary. Nine identified as Asian, four as White, two as Latinx, one as Middle Eastern and one as Black. We use the general term Asian because only some of the nine participants who identified as Asian specified East Asian, South Asian, or Southeast Asian. We did not apply any demographic criteria or seek a balance of gender, race, or ethnicity in the sample; these numbers reflect self-selection. The demographics of our sample may reflect a greater concern about COVID-19 among women [23] and possibly also among Asians compared to other students. All participants were residing in Washington state at the time of these interviews.

Participants were enrolled in two batches. In the first batch (eight participants), initial interviews were conducted between May 27-29, 2021, and the second interviews between June 3-4, 2021. In the next batch (nine participants), initial interviews were conducted between June 7-9, 2021, and the second interviews between June 15-16, 2021. Fifteen of the 17 participants completed the entire study. Two participants completed the first interview and then exited the study because they were not intending to plan any in-person meetups in the upcoming week (although they had indicated that they would be planning meetups in the screening) and would therefore have nothing to report in surveys and the follow up interview. We included data from their initial interviews in our analysis.

Participants were compensated up to $50 USD in gift cards for full participation. Partial participation was compensated as follows: $10 for the first interview, $20 for completing three or more daily surveys, and $20 for the second interview.

3.3 Initial Interview

The initial interview inquired about participants' recent in-person interactions with people outside their household. We asked them to describe any precautions that they had communicated or questions they had asked in advance of their in-person interactions, any preferences or questions they wanted to communicate but didn't, and anything that they would have done differently or wished that someone else had done differently in retrospect. In addition, we presented the probe examples of risk negotiation described above in a slide deck that the researcher and participant reviewed together during the interview. The researcher asked participants for their general reactions to each example and any aspects of the example that they could imagine incorporating or adapting for their own purposes. At the end of the initial interview, the interviewer confirmed each participant's interest in continuing with the study and their intention to plan in-person meetups in the upcoming week. Initial interviews on average lasted 54 minutes, with a range of 30 to 84 minutes. See A3 for the Initial Interview Guide.

3.4 Experience Sampling of Risk Negotiation

During the week between the initial and second interviews, we asked participants to express their safety preferences as they planned in-person meetups and to reflect on this communication. We asked them to socialize only as they would otherwise (i.e., not to plan meetups for the sake of the study). Participants received a daily email nudge to express their preferences related to safety as they planned any in-person interactions, stating "Remember to express your preferences as you plan in-person meet-ups. Consider adding your preferences to your message with words, emoji, within a calendar invite, or using a template." These email reminders included a link to the slide deck of risk negotiation probe examples shown in the initial interview. While describing this phase of the study to participants (at the end of the initial interview), the interviewer explained that the examples were shared as references that participants could optionally draw on and adapt for their own messages.

We asked participants to complete a daily survey about their risk negotiation, a minimum of three days that week. Each evening, participants received a short survey via email asking about any planning of in-person meet-ups in which they expressed preferences or considered doing so. They were asked to describe the exchange, any events that changed their perspectives on safety, what they communicated, how the other person/people responded and how they felt about the exchange. As part of the survey, participants had the option of sharing screenshots of messages in which they planned in-person interactions.

Participation in the daily surveys varied with participants submitting between two and seven entries over the week; on average, participants completed five. Eight of the participants shared from one to ten screenshots. Screenshots were anonymized by the researcher who conducted interviews before sharing with the rest of the research team. See A4 for Materials for Experience Sampling of Risk Negotiation.

3.5 Second Interview

In the second interview, held approximately one week after the first, participants were asked about their experiences. Researchers reviewed the survey responses and screenshots that participants uploaded before the second interview and referred to them during interviews. The researcher asked participants to elaborate on the interactions described in their survey responses and other instances in which they negotiated risk. Participants were asked to describe the preferences they communicated, how they communicated these preferences, what they wanted to communicate but chose not to, how they felt about the exchanges and what, in retrospect, they might have done differently. Participants were also asked if, in the course of this reflection, they thought about communicating differently about any other matters. We did not ask participants to explicitly list out negotiation strategies, barriers, or outcomes. The second interviews were, on average, 57 min long, with a range of 47 min to 77 min. See A5 for the Second Interview Guide.

3.6 Data collection and preparation

Initial and second interviews were conducted over video conferencing software. Transcripts were auto-generated from the audio recordings and saved to CSV files. The researcher who conducted the interviews later reviewed the audio recordings and transcripts to develop detailed summaries with verbatim capture of the risk negotiation exchanges that were described. These exchanges were the primary unit of analysis. These exchanges were primarily over messaging and other CMC, but in several cases, we also include some details of the in-person communication that followed. Secondary data included participants' reactions to the probe examples presented in the initial interview. These data points were unitized by the first researcher, a straightforward process because, in the initial interview, participants described their recent meetups (and exchanges to plan those meetups) and in the second interview, participants described each instance in which they communicated preferred precautions for meetups (i.e., each instance of risk negotiation). The survey responses were already unitized as each response described an instance of risk negotiation. Survey responses were aggregated into a single spreadsheet for analysis, labeled with participant ID. Screenshots (as part of survey responses) were similarly aggregated for analysis.

4 Ethics

This study involved the collection of sensitive material, including participants' feelings about friends and family members. We recruited from a single institution, which might increase the risk of re-identifying participants. To reduce the risk of participant identification we took several steps in gathering data and presenting findings.

In gathering data, we attached only participant IDs (rather than names) to audio recordings. Participants were asked not to state their own or others' names in the interview. Audio recordings were saved to the cloud for transcription, but video was not recorded. Consent for audio recording was obtained at the start of each interview. The study was determined to be exempt from formal review by the university's Institutional Review Board (IRB). A consent information sheet was emailed to participants prior to the initial interview outlining study procedures and steps to protect their anonymity. This form stated that names and identifying information would be removed from any quotes or screenshots used in any publications or presentations of the work.

In writing the paper, we took the following steps to protect anonymity: (1) We report summary demographics in the text rather than a participant table. A participant table could be used to piece together the identity of a participant, particularly since the participants were recruited from a single university. (2) Rather than including participant IDs after quotes and examples, we provide summary information about the number of quotes and examples from any given participant. Specifically, we share 31 quotes (in the text and table) from 13 participants (with no more than five per individual) and 34 described examples from 13 participants (with no more than six per individual). All participants are quoted, mentioned, and/or paraphrased with the exception of one participant who did not complete the probe exercises or second interview. (3) We removed identifying information and potential speech markers from quotes and example dialogues. Minor edits were made to anonymize quotes; substantive or stylistic content that could identify participants was removed and spelling errors were corrected. (4) We recreated screenshot examples rather than using the actual screenshot images shared by participants. As with quotes, we removed substantive and stylistic content that could identify participants. In these examples, we paraphrased the messages of nonparticipants (i.e., the people with whom participants were communicating) to protect their privacy.

5 Analysis

We used an inductive, open coding approach to data analysis [54]. A single primary coder conducted open coding, and periodically presented codes to the larger team, an approach used by other HCI researchers [17,61]. This coding focused on describing the characteristics of risk negotiation in the examples relayed by participants (i.e., in their descriptions of how they planned particular in-person encounters), resulting in 130 codes. We did not calculate interrater agreement or reliability (IRR); as noted by McDonald et al. [35], the effort to reach agreement can lead to a simplification of concepts.

Coding was followed by thematic analysis [12]. Based on the open coding and the team discussions, the first author developed and documented an 18-point framework. This framework of findings was discussed with the larger team. Next, the second author reviewed the transcripts, assigning relevant framework points to each instance of risk negotiation. Disagreement was resolved through discussion and several points were condensed. The resulting framework consisted of 13 points, grouped into three categories: Strategies for Negotiating Risk, Social Complexities Influencing Risk Negotiation, and Emotional Consequences of Risk Negotiation. See Table 1 for the Framework of Key Findings.

6 Results

We organize our results in terms of Strategies for Negotiating Risk, Social Complexities Influencing Risk Negotiation and Emotional Consequences of Risk Negotiation (outlined in Table 1).

Table 1. Framework of Key Findings on Risk Negotiation

	Subcategory	Example quote
Strategies	Direct requests to limit ambiguity	"Pretty much I knew she would wear a mask, I just wanted to say it, so you know it's out there."
	Indirect explanations to protect feelings and avoid conflict	"My family member asked me if I wanted to share a dish because that's just kind of the assumption, I said "Oh I kind of want to eat this today." ... It was a [dish] for [one], because I feel like sharing saliva is not really the safest thing to do. And I knew ... they wouldn't want to eat it because it was spicy"
	Reframing to avoid suggesting blame, e.g., by emphasizing shared allegiances	"I've definitely been considering reaching out to them and being like 'I don't want to be associated with this [partying] … I chose to live [house in Greek system], specifically because they've been taking things really seriously'. … so I'm sure they take that reputation seriously as well
	Implicit references to shared knowledge. 'Outdoor seating' and 'uncrowded' as proxies for safety	"It was more casual, I texted her saying "instead of being in our house we should probably be somewhere outside…. let's be outside, let's be away from as [many] people as possible"
	Third party systems (vaccine cards, CDC checklists) for verification or neutral authority	"Both of us literally just pulled out the [CDC] COVID-19 ... checklist ... for making sure you're safe ... you haven't been in contact with anyone who tested positive, have you gone anywhere the past two weeks …"
	Social media surveillance of peers' health behaviors	"We saw through social media that she was going to a party, lots of people … enclosed small apartment, no masks ... everybody's sharing drinks"
Social Complexities	Situations where clear communication didn't suffice often involving power differences	"My older brother … could be a bit forceful, he said he wanted to come talk in a more intimate setting where I kind of gave in. Which was not advisable."
	Fears of offending or coming across as distrustful, invasive, rude, or unreasonable	"It feels awkward to ask if you've been safe, but I know a lot of people that aren't necessarily taking the proper precautions. … It does feel intrusive and also feels like you're kind of making assumptions about a person."
	Unchecked assumptions of shared behaviors and values among peers	"I believe most of the people I would be spending time with have the same values as me — they would want to be vaccinated."
	The larger social environment, i.e., unknown safety conditions of places and events	"The park we went to was actually really crowded which surprised me and it made me a little uncomfortable … a lot of them didn't have masks on or they were purposely close."
Emotional Outcomes	**Confidence** after expressing COVID related preferences, motivating assertiveness in other domains	"I had to speak up and go 'Okay like am I doing this?' ... Now [I'm] more willing to speak up and say like 'Actually I don't feel comfortable with this.'"
	Anxiety following ambiguous or negative responses to safety requests	"I mentioned [preferred precautions] to her and surprisingly she didn't say much besides a heart emoji. … I don't want to keep pressuring her and make her feel uncomfortable ... I was really hesitant ... because I guess I'm scared."
	Social retreat when COVID concerns interacted with social anxieties	"An old friend … we made plans to meet last Friday. But then my partner reminded me that during the phone call I didn't ask if she was fully vaccinated … so I kind of contrived a reason to push off the appointment."

6.1 Strategies for Negotiating Risk

Participants employed a range of strategies for negotiating risk from direct requests and explicit explanations of COVID-19-related precautions to indirect hints at desired behaviors. In addition, participants relayed a variety of other approaches to gathering information about and influencing the behavior of others. Across the examples, risks of contracting COVID-19 or exposing vulnerable family members were balanced against concerns of offending others or of social rejection. Categories of participants' strategies for negotiating risk with contextualized examples are shared below.

6.1.1 Direct communication to remove ambiguity.

Often, participants expressed desired precautions and sought information in a direct manner. Examples include asking if a friend or the friend's household had been vaccinated, sharing a list of precautions to follow when meeting up, or matter-of-factly explaining safety reasons for not meeting with someone. This direct communication and explicit reference to COVID-19 related safety was consistent with statements that many participants made about preferring unambiguous communication. One participant described an interaction with the host of a graduation party, *"I just wanted to triple check with him that everyone he invited, they were all vaccinated."* Another participant made plans with a friend to walk around and possibly get something to eat. When making these plans, she asked her friend if they could keep their masks on the whole time. *"Pretty much I knew she would wear a mask. I just wanted to say it, so you know it's out there."* In this case, the participant wanted to be explicit and on the record about her preference for wearing masks to avoid any ambiguity. Some participants shared examples of their direct negotiations that occurred before the study and said that they would have used the same directness whether or not they were in the study.

6.1.2 Indirect explanations to protect others' feelings and avoid conflict.

When indirect explanations were used, the intent was to protect another person's feelings and give the impression that the motivation was unrelated to COVID-19. For example, one student suggested postponing a visit by a friend from out-of-state until after her finals were over, when an important factor for the delay was that the friend hadn't yet been fully vaccinated. One woman described an interaction with an older relative that included multiple indirect explanations. The relative (in his 70s) texted her to meet for dinner. Rather than directly referring to COVID-19, she replied with a proposal that they eat outside because the weather was nice. Upon meeting, when he asked if she wanted to share a dish, which would be customary, she said that she'd really like to try a particular item that is designed as a single serving, one that she knew he wouldn't want. On a walk after lunch, when he asked why she was wearing a mask, she explained that she forgot to put on sunscreen.

6.1.3 Reframing concerns to avoid blaming.

To avoid suggesting blame, some reframed their concerns. For example, when asked by a church member when she would return to her church, one participant reflected and then said that she would do so when COVID-19 rates in the area came down. She decided not to say *"when more people in the area get vaccinated"* because she feared that might have sounded accusatory -- as it called out an action that many were choosing not to take. Reframing her explanation in terms of COVID-19 prevalence allowed her to avoid conflict. To effectively make a case for precautions, one participant thought about reframing personal concerns in terms of shared affiliations and reputations. She was considering writing to the student in charge of the residence where she would be living over the summer to request that this student leader communicate policies on masking and vaccination to all residents. As she mentally drafted the note, she emphasized upholding the reputation of her sorority and the Greek system on campus.

6.1.4 Implicit references to leverage a shared understanding.

At the time of the interviews in Spring 2021, participants had been living with the pandemic for over a year and had developed shorthand ways of communicating about it. These implicit references were understood by both parties as COVID-related safety precautions, but unlike the indirect explanations described above, they weren't

intended to protect anyone's feelings or suggest that a particular precaution was unrelated to the pandemic. One woman explained as she reacted to a probe example, that it was no longer necessary to explicitly mention 'safety' or 'pandemic.' She and other participants explained that they used 'less busy', 'outside', or 'uncrowded' as proxies for lower risk, as they messaged with friends to make plans:

> *"We can go to a coffee shop and just get coffee and leave and walk around .... I guess my way of, kind of insinuating, like choosing the coffee shop, I just said, 'whichever one is less busy.'"*

These implicit references acknowledged shared experiences of the pandemic and, compared to explicitly referencing the pandemic and safety protocols, set a relaxed tone.

6.1.5 Third party systems to broker and fortify communication.

Participants sometimes incorporated third party systems to broker communication such as messaging images of test results and vaccination cards. This allowed for verification, as in the case of a participant who messaged a picture of her vaccination card to the students who would be giving her a tour of a residence. In addition to providing verification, this sharing (e.g., posts of vaccine shots) often had a celebratory tone. One participant described how, before she and a friend met up, they spoke over video chat software and pulled up CDC symptom and behavioral checklists to interview each other. She described it as a mutual interview where they used the checklist as a tool to ask each other about social interactions, recent contact with people who tested positive or any potentially concerning symptoms. Both the participant and her friend were cautious about meeting people in person. Using the CDC checklist in this way allowed them to feel confident they had done their best to be thorough in their questions for each other. This was described as a reciprocal process, rather than an interrogation of one person by another.

6.1.6 Social media surveillance to learn about peers' health related behaviors.

Information, such as peers' vaccination status, was often learned effortlessly from social media posts. However, participants sometimes actively investigated social media activity of others to assess risky behaviors in a form of peer surveillance. For example, considering whether a friend could visit, one participant and her housemates scoured the friend's social media posts: *"We did some detective work."* One housemate recalled seeing a post from this friend at a party, which was considered taboo at that phase of the pandemic. They examined posts from that party, looking for indications of how many people were there and any precautions that were followed. They were surprised that not only was no one in the photo wearing a mask, but the friend hadn't posted a comment explaining that they had just removed masks for the picture. They shared their findings with this friend in a kind, but direct, group text, explaining that she could not visit at this time. They held their ground even when the friend responded defensively that they had misinterpreted this photo.

A related exchange played out between another participant and her boss. When her boss emailed her, asking that she come over for a work session, she hesitated. The boss had asked about the participant's vaccination status but didn't seem as concerned about the risk she or others in her home might pose for the participant. The participant had taken note of pictures on social media that indicated her boss *"wasn't being super safe, in my opinion."* After much deliberation, the participant responded by email that she couldn't meet at her boss' home due to transportation challenges. The transportation challenges were not fabricated, but they were a more comfortable and less direct justification than pointing out her boss' risky behavior.

6.1.7 Attempts at lighthearted communication sometimes undermined serious requests.

Participants wanted to express their preferences in ways that were informal, personal, and lighthearted, but also clear. Probe examples that involved preformatted templates were almost universally critiqued as impersonal, and those that included emoji as unclear. However, sometimes participants' goals for lightheartedness and clarity were conflicting. For example, adding "haha" or "hehe" to serious requests may have undermined the effectiveness of these requests. One participant described how she messaged a date about wearing masks, texting *"also is it cool if I ask you to wear a mask? I'm fully vaxxed but still tryna be careful. hehehe"* (Figure 2). She described her approach: *"I used "haha" to keep things light, to convey 'I am a relaxed person… I'm still cool even*

though I care about COVID'." This participant was disappointed that her date removed his mask during the date, when they were outside. She kept her mask on the entire time and thought she had clearly requested that he do the same.

Figure 2: Example dialogue illustrating attempts at lightheartedness that may undermine serious requests.

Informal communication took many forms, however, and it didn't always undermine serious requests. One participant and her friends mixed COVID-19 precautions and planning about where they would meet and what they would be wearing in their group chat:

Participant: "I'm going wedges, jeans, and a fun top...We're all vaccinated right?!? So I'm okay sitting inside/outside."

Friend: "I have not decided what I am wearing. I am vaccinated up."

Similarly, participants added reassurances to difficult messages in which they said they couldn't see someone. For example, while unequivocally declining a friend's request to visit, the housemates described above emphasized their excitement to see this friend in the future. Unlike the insertion of "hehe" after a request, this type of warm reassurance did not undermine the negotiation.

6.2 Social complexities influencing risk negotiation

Risk negotiation was complicated by social complexities. In contrast to previous work that linked risk negotiation strategies to an individual's level of concern [60], our research highlighted the influence of relational and social dynamics on strategy. Several of these dynamics, which we capture under the umbrella term of social complexities, stand out. First were situations where clear communication didn't suffice, for example, where the person making a request felt blocked by someone with more power. The second type of complexity relates to fear of offending others, for example, by asking invasive questions or making unreasonable requests. The third type of complexity included unchecked assumptions, for example, about shared behaviors, beliefs, and values among peers. The fourth type of complexity relates to the larger social environment.

6.2.1 Situations where clear communication wasn't enough.

Even when participants clearly expressed their preferred precautions, they found it difficult to effectively negotiate risk in some situations. In many of these situations, participants either weren't the ones controlling an event or felt that another person had more power. Participants found it difficult to influence policies for a group when they were not the event organizer, to make requests of people they perceived to be more powerful, and to fend off emotional pressure for unsafe behaviors from close family or friends.

Participants found one of the most challenging circumstances for communicating precautions to be asking someone else (e.g., a party host or housing leader) to convey and enforce one's preferences. One participant messaged the host of an upcoming gathering with a set of guidelines for guests that the host could share within a group text. She described her attempt to persuade him:

> *"I was just hoping that he will also convey this message to the additional people that he's going to invite. I was thinking that if he doesn't say in the group chat [then] ... I will ... probably closer to the day .... It was a little awkward and I felt bad because ... I'm not the host, and I'm asking the host to make all these guidelines, I felt stressed about perhaps overstepping my boundaries."*

The host responded to her message in a resistant, teasing way (see Figure 3), agreeing noncommittally to share the guidelines in the group text. The participant was left wondering if she should message the guests directly.

Figure 3. Example dialogue illustrating the challenges of regulating a group when one is not the organizer.

Similarly, another participant described feeling "scared" of pushing a friend for confirmation regarding her requests that certain precautions be taken for a night out. This friend was organizing the event and hadn't responded in a clear way to the participant's request that she convey the desired precautions to the rest of the group. Other power differences that impeded risk negotiation included communicating with one's boss, landlord, or a forceful relative. One participant described giving in to pressure from his older brother who pushed him to meet inside, contrary to the plans they made earlier.

> *"My older brother wanted to come talk to me up in my apartment but I was like hey, can I just come down, and we can talk in the parking lot .... But there were other times when my brother could be a bit forceful, he said he wanted to come talk in a more intimate setting where I kind of gave in. Which was not advisable."*

He and other participants sometimes felt they had no choice but to go along with relatives' stated needs for close physical contact.

Another circumstance that called for more than just a clear statement of preferences was when requesting new precautions in a very close relationship. For example, during the study, a participant sent her closest friend a message with a list of new precautions she wanted him to follow when they met up (Figure 4). He was taken aback and hurt by what felt like an out-of-the-blue request. In situations like these, clear statements of preferences may also require an explanation and dialogue.

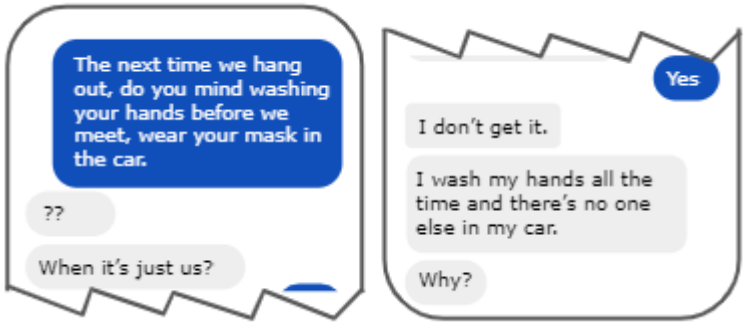

Figure 4: Example dialogue indicating the awkwardness of requesting increased precaution within a close relationship (where norms have already been established).

6.2.2 Fears of offending.

Participants were well aware of the potential interpersonal risks of communicating their preferences, particularly of offending or invading the privacy of their communication partners. Participants also mentioned concerns about being seen as rude or unreasonable. It felt invasive in some relationships to ask friends about risk factors, such as social activity or precautions like masking. One woman described the tensions between wanting certainty but not wanting to invade privacy when responding to a graduation party invitation:

> *"It feels awkward to ask someone if they've been safe, but I know a lot of people who aren't necessarily taking the proper precautions … It does feel intrusive and also feels like you're kind of making assumptions about a person."*

This participant felt comfortable asking about vaccination status and the number of attendees but held back from asking about other precautionary behaviors. Another participant described a similar hesitancy to directly ask about social activities:

> *"Sometimes I get really nervous about what kind of interactions they've been having, what kind of hangouts that they've been having and whether or not those hangouts are COVID-cautious or not. But I feel like sometimes I don't like to ask them directly, because it's like I'm peeping into whatever they've been doing with their lives."*

This was a balancing act, with most participants feeling more comfortable asking about vaccination status than social activity. One participant waited until she saw a friend in person to ask questions about his social activity. She felt that she could express the questions in a less invasive and more casual way through in person conversation, but this delay could have put her at risk. Vaccination status was more concrete and didn't require sensitive conversations about social interactions. However, participants did note that asking friends to share vaccination information in a shared message or document could also feel invasive. One participant emphasized that she relies on social media posts to determine who is vaccinated and who is not. She doesn't discuss vaccination when she travels back to her home state in order to avoid conversations that could spiral into political conflict.

In some cases, participants held back from expressing preferences or dialed back their requests due to concerns about coming across as rude. One participant wanted to ask that guests at a friend's graduation party not share food or drink and that masks be worn when not eating or drinking, but held back because she felt these would be perceived not just as rude, but unreasonable. In another case where she did speak up, *"It felt kind of rude and mean. [They were] confused since I've never expressed my preferences before."*

Even when great care was taken to avoid offending others, hurt feelings sometimes resulted from risk negotiation. In an aforementioned example, members of a group house tried to clearly but sensitively communicate that they didn't feel it was safe for a particular friend to visit. The six housemates sat around a table

for an hour crafting a diplomatic text declining their friend's request to visit. As described above, social media posts by this friend suggested that she was not following precautions for masking while socializing indoors. Their note to her was full of reassurances about their affection for her and their hope to meet up in the future. Despite all of this effort, the friend still took offense and texted back that they had misinterpreted the photos she had posted and misjudged her.

6.2.3 Unchecked assumptions.

In addition to the barriers that participants recognized were those that they didn't — unchecked assumptions that prevented them from seeking information or requesting precautions. As a result of not seeking more information, these assumptions were unchecked, possibly increasing individuals' health risks.

One such assumption was that friends shared health related values and adhered to the same precautions. Due to these assumptions, participants often felt that it was unnecessary to ask about risk behaviors or request precautions. In interviews, participants described unspoken rules by which they and their friends abided.

> *"There's not an explicit sharing of information, like 'Oh, this is what I've been doing to keep safe,' … it's kind of just a mutual agreement that we both know that we're safe."*

Some participants were confident they didn't need to ask about vaccination status, either because of social media postings or because of assurance that their friends and their friends' friends shared values. One participant explained, *"I believe most of the people I would be spending time with have the same values as me — they would want to be vaccinated."* At other times, participants drew conclusions about vaccination of peers based on very little data. For example, one participant concluded that because some individuals in a social group had previously worn a mask, everyone in that group must be responsible and therefore must have also been vaccinated. This participant interpreted mask wearing as a sign of responsible behavior and concluded that someone who chose that one behavior probably made a similar choice about vaccines, and that everyone in a particular group had made similar choices. He may have overestimated the correlation between those two behaviors and the similarity of everyone in a particular peer group.

Participants generally did not express awareness of these assumptions as a barrier to communication. It was only when the assumption was shattered by a COVID-19 scare or other incident that participants became aware of differences in their friends' behaviors, beliefs, or values. For example, one participant realized, after a new member of her group house tested positive for COVID-19 and was treated in the ER, that she had glossed over precautions with this individual. She and her other housemates, all very close friends, had established shared policies that they assumed were understood by the new housemate. Similarly, it was only when a friend slipped during a phone call and mentioned that he wasn't at work on the day his employer was offering vaccinations that another participant realized this friend wasn't vaccinated. He had already started to make plans to visit this friend in another state. This sparked his awareness of assumptions he had made about this friend and others he was planning to visit over the summer.

Conversely, participants may have underestimated the likelihood that peers with conservative political views or those who were from predominantly conservative states were unvaccinated or unsafe.

> *"I don't know why, but with some of my friends I kind of expect them to not be … fully vaccinated while with others, I expect them to be fully vaccinated. Whether it's because of their health issues or their ability to access vaccines … or their political inclinations, whether they support [vaccines] or not."*

Whether under- or overestimating vaccination rates of peers, these assumptions often went unchecked.

Another barrier to open dialogue and to following precautions related to mirroring, the often unconscious process of matching one's behaviors and language to others [15]. One participant observed that her peers were hesitant to appear more concerned than others. Some participants described silently mirroring others' behaviors, such as taking off a mask when a friend did so.

6.2.4 The larger social environment.

While making social plans, participants also struggled to factor in the safety affordances of places whether that was a lab class that met outside, a cafe, movie theater, gym, or a park. It was difficult when participants felt no opportunity to shape policies of their immediate environments.

Participants developed various strategies to feel as safe as possible in these circumstances, for example, waiting until the very last moment to buy movie tickets online to see how many other tickets had been purchased for a particular showing. One participant described the uncomfortable ambiguity of an optional in-person meeting for one of her classes. If many students attended, distancing wasn't feasible. She thought about how she could have obtained information in advance about how crowded and risky these meetings would be:

> *"I think I would have made a public spreadsheet … that all the students had access to, and then you could see who's coming, even if vaccination information is private … so I could plan ahead, whether I felt comfortable in that group setting."*

Another participant described a situation where she and a friend made what felt like very safe plans — meeting outdoors in a park, sitting apart, wearing masks the whole time. But they did not account for other people's behaviors in the park:

> *"I would have preferred to have planned out a more private meeting area, because the park we went to was actually really crowded which surprised me and it made me a little uncomfortable…. I was surprised that there were so many people at the park and a lot of the people there weren't following the guidelines … a lot of them didn't have masks on or they were purposely close to each other."*

In these situations, participants didn't get adequate information from the university, businesses, or public services to plan meetings that felt safe.

As participants managed interpersonal dynamics within unpredictable social environments, they occasionally adjusted plans on the fly to find places that felt safer. They sometimes shared notes with their peers afterwards to inform future meetups. Stated guidelines of businesses and other organizations provided limited help. It was generally only by being in a space that they felt they could adequately assess safety.

6.3 Emotional consequences of risk negotiation

Following attempts at risk negotiation, emotional reactions varied with participants describing increased confidence, anxiety, and social retreat. These emotional reactions sometimes depended on the responses by the other party, for example whether a response was validating. But in some cases, emotional reactions such as confidence followed the act of asserting, rather than any particular response.

6.3.1 Confidence.

Some participants experienced increased confidence after successfully negotiating COVID-related risks. Confidence often followed when their requests were acknowledged or mirrored. Figure 5 illustrates the mirroring that occurred as one participant asked a friend about preferred precautions before they met up. Her friend sent an itemized list, which the participant responded to with another itemized list, which the friend upleveled and so on. At each turn, they mirrored and added on to each other's concerns, conveying that they agreed and were even more careful than the other person (as a way of reassuring each other). This validation provided reassurance and left the participant feeling confident about expressing her preferred precautions. Confidence also resulted from taking an assertive, well-informed stance even if the other party disagreed, in some cases, as when a participant and her housemates sent a firm message refusing a friend's request to visit (described above).

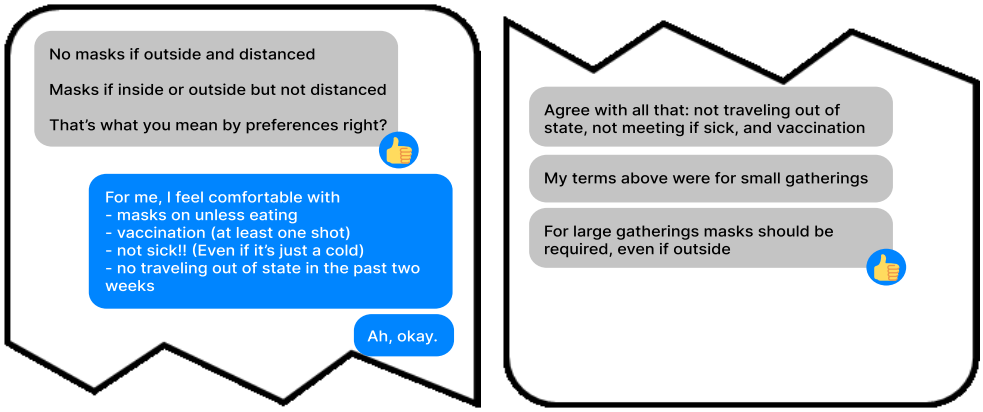

Figure 5: Example dialogue illustrating a validating response, in which requested precautions are mirrored and upleveled.

Some participants shared thoughts about negotiation in arenas outside of COVID-19, in which their increased confidence with risk negotiation might benefit them. For example, some participants spoke about a desire to express expectations more confidently with regard to sexual protection, disclosure of sexual health status and protecting themselves or others from assault. One participant said that reflecting on her preferences related to COVID-19 led her to more explicitly state her relationship goals as she communicated on a dating app. Others drew parallels to negotiating logistics such as reimbursement from employers and friends. Another participant realized that she should be more explicit with her housemates, not just about COVID-19 related practices, but also about the lease agreement and other practical matters.

> *"I learned a great deal from that about the need for explicit communication, especially with people you don't know very well. And we made some big changes in our house like making a more concrete lease agreement between the people who were going to live there."*

Some participants described a role shift or desired role shift, after reflecting on expressing preferences related to COVID-19. For example, one participant said that she was experimenting with being more active in shaping group plans rather than just following along with the plans made by others.

6.3.2 Anxiety following negative or ambiguous responses.

Expressions of preferences were sometimes met with resistance or responded to ambiguously, leading the person who made a request to feel anxious. One participant described an emotionally uncomfortable delay after she messaged a set of preferred precautions to her close friend (someone who typically responds instantly). The awkwardness stretched out for what felt like a long time, even though when asked by the interviewer how much time had actually passed, she observed that it was only a two-minute delay. In some situations, participants were left unsure if their requests would be met or if they should follow up and risk further social awkwardness. In these situations, participants felt anxious because they weren't in control of the social situations and weren't sure how assertively they could negotiate.

Even when planning went well, participants were often anxious starting conversations about risk and safety. Some participants felt burdened by being the one to raise safety concerns in conversation and by the additional effort that was required of them to ensure their concerns were addressed, such as identifying a cafe with outdoor seating. Other participants mentioned that in any conversation about meeting up, someone had to break the ice and raise the question of safety. Some were tired of doing this, or unsure how to.

6.3.3 Social retreat, when uncomfortable with expressing preferences.

Without being able to comfortably express preferences or feel confident that they could arrange a safe meetup, some participants retreated from social contact. Anxieties about COVID-19 and social anxieties combined, weighing the scales against making or adjusting plans. For example, one participant said he was partially relieved to back out of plans after realizing he didn't know the other person's vaccination status. An old friend had contacted him out of the blue and they made plans to meet. After reflecting on the uncertainty, he *"contrived a reason to push off the appointment"* but hadn't yet rescheduled. While his primary concern was COVID-19, another participant leaned on COVID concerns to justify social ambivalence. She wavered on whether she would attend a party at a group house where she would be the only external guest. She didn't have someone to accompany her and anticipated there would be no one to turn to in awkward social moments. She feared feeling like an outsider. As she thought about the social awkwardness, she reflected on the number of people in the house as a reason that the event might not be safe: "*That's a lot of people*." The safety concerns provided a reason not to attend.

For some participants, the social retreat was explicitly associated with fears of contamination. One participant's concerns about hygiene intensified over the pandemic. She wanted to continue her classes remotely even after in-person classes resumed. She didn't see a way that she could influence the university to establish what she felt would be adequate safety measures:

> *"I never felt comfortable sitting on the surfaces when I'm not certain that it was cleaned down every single time people touch … the tables and chairs, and people next to you left and right, people walking by me, that makes me feel uncomfortable. … I was scared about being dirty to begin with, but then, knowing that there's COVID ... adds onto my not wanting to be dirty."*

This participant's intense focus on hygiene could have significant educational and developmental costs were she to go on leave or limit herself to classes that were offered online in future academic terms.

7 Discussion

Resuming in-person contact after over a year of social restrictions, the young adults in this study negotiated risk carefully. They tried to balance concerns about exposure to COVID-19 with the desire, or in some cases pressure, to meet with their peers, extended family, and others in person. Although we did not ask participants why they were concerned about exposure to COVID-19, some voiced concern about getting sick, concern about medical expenses, and concern about vulnerable family members – a subset of the risks identified in previous studies [44]. Sometimes unchecked assumptions, interpersonal power differences, fears of offending others and other social complexities limited effectiveness in risk negotiation, but in many cases, these young adults felt that they were able to gather enough information to understand risk and make plans accordingly. Some participants experienced confidence as a result of expressing their preferred precautions, even from declining invitations that felt unsafe. Others experienced anxiety or exacerbated social isolation when risk negotiation felt overwhelming or when their requests were not validated.

Below, we discuss how participants effectively leveraged CMC for risk negotiation and areas where participants faltered in their attempts at risk negotiation. Effective strategies described by individuals in this study, such as interviewing friends with symptom checklists, point to features that could be explored as ways to support risk negotiation. Areas of struggle, such as unchecked assumptions about shared precautions, also suggest potential areas for technologies to support risk negotiation. We explore some ways that technology might assist individuals as they communicate along with the risks introduced by such approaches.

7.1 Building on effective use of CMC for risk negotiation

Participants took advantage of CMC in various ways as they gathered information and expressed preferences. In keeping with Walther's description of hyperpersonal CMC [57], asynchronicity and other properties of messaging were used in support of tactful risk negotiation. In this remote communication, participants could gather information in ways that would not be practical or acceptable in in-person interactions, such as surveilling peers'

social media activity before responding to an invitation, incorporating third party media such as CDC checklists for a mutual interview to determine if it was safe to meet, and directly asking about vaccination at the very start of an exchange. Similarly, they negotiated precautions in ways that drew on the affordances of messaging platforms. For example, it was probably less awkward to message a bulleted list of preferred precautions than it would have been to open an in-person or phone conversation with a set of personal safety policies. One participant who was nervous about asking a host to communicate precautions explained *"I waited to ask him over text instead of in-person because I felt more comfortable asking over text, and I didn't have to force him to respond to my request on the spot."* The asynchronous nature of messaging and email also gave participants the opportunity to consult with others as they composed replies to invitations and to consider strategies such as indirect explanations and reframing that avoided accusation or blame.

This sensitivity and flexibility in many of the negotiation strategies used by participants are characteristic of interpersonal assertiveness [3]. Participants assessed others' expectations and balanced these with their own goals as they formulated requests. They generally tried to present their preferences as requests rather than hard line negotiations, sometimes provided an explanation for their caution (such as contact with vulnerable family members or patients), asked for input and looked for common ground. They took care not to insult others in their exchanges.

Some of these strategies for using existing CMC in risk negotiation have implications for technologies. For example, symptom checklists, commonly designed as tools that are completed by an individual and if shared, only with a medical practice, could be designed more flexibly to allow for interviewing among peers, family members, and others. Similarly, the practice of sharing third party materials, such as current guidelines, suggests opportunities to easily incorporate such materials to message threads. As elaborated below, conversational agents could prompt individuals to share such materials based on what is typed.

Our results echo previous findings that messaging was a comfortable platform for health risk negotiation – a medium that was often preferred over in-person communication for this purpose, and a promising platform for negotiation skills training and support [13]. Some of our participants preferred to ask questions and express their preferences via messaging because they could clearly convey these requests without seeing or hearing the other person's immediate reaction. These observations support the idea that CMC is sometimes chosen for the ability to shield oneself [47] in addition to its affordance for reflecting and editing, consulting with others, including materials as evidence or support, and documenting one's own and others' commitment to an agreed upon course of action.

7.2 Augmenting CMC to support difficult aspects of risk negotiation

There were areas where risk negotiation faltered and where support may have been helpful. Below, we consider these communication struggles in light of technology capabilities that could conceivably support risk negotiation. These technologies include AI Mediated Communication, in which conversational agents mediate interpersonal communication (see Hancock et al. [28] for review and examples), in addition to generic prompts and crowd sourcing. Assistance or cueing within text communication might provide meaningful benefit because so much planning happens over messaging and other computerized platforms, especially during a pandemic, and because sensitive health conversations are so difficult that they are often avoided. Such interventions may lower the burdens of planning safe meetups by raising awareness of unchecked assumptions, coaching users in assertive communication, or reducing reliance on a host or organizer to establish guidelines for an event. Risks as well potential benefits of such conversational assistance are considered below. We identified these technology directions as we analyzed participants' communication. Participants did not use or react to these technologies.

Unchecked assumptions that one's friends shared the same values, health beliefs and behaviors impeded participants' effectiveness in risk negotiation. It often took an unwelcome surprise, such as finding out that a housemate had contracted COVID-19, to raise awareness of these assumptions. Our findings extend previous observations that young adults rely on feelings of trust in risk assessment [60]. It is possible that AI Mediated Communication could raise users' awareness of such assumptions through analysis of text conversations or

identifying omissions (e.g., lack of statements about vaccination, absence of masks in photos) in a conversation history or social media feeds of the people involved in an exchange.

Power differences also impeded risk negotiation. When communicating with older family members, employers, and landlords, for example, the individuals in our study didn't always feel empowered to request COVID-related information or to set precautions. Some participants felt obligated to follow family customs (e.g., an indoor meal around a crowded table) and, as previously found [19], pressured by demands for physical proximity. It was also intimidating to request that a group organizer (e.g., a party host) institute policies on one's behalf. Requests were sometimes met with resistance, teasing or ambiguous responses. It is conceivable that a conversational agent could prompt individuals to strengthen their negotiations, for example by describing the situation, desired behaviors and outcome [9] or nudging recipients to respond. Prompting, similar to that which has been explored for politeness in online forums [14], might help level the playing field. Even generic non-AI-prompts for all parties to specify preferred precautions or respond to others' preferences may lower the burden on individuals who have the greatest concerns about risk and the least influence in a particular social situation.

Ambiguity, stemming from a desire to come across as lighthearted, also appeared to impede risk negotiation. In several instances, participants followed up requests about masking and other precautions with "hehe" and smiley face emoji. These were requests made by women to men. These juxtapositions can be seen as strategies for combining assertiveness with warmth [10,11], but the failure of the other parties to comply with the requests in these instances suggests the seriousness of the requests was cast into doubt. Conversational support tools could highlight such contradictions in tone and possibly nudge individuals to think about alternative ways to express their requests.

Despite strong attempts to negotiate risk, unknowns in the larger environment got in the way. Participants found it difficult to get accurate information in advance about ventilation in restaurants or crowdedness of parks, for example. The display of crowdedness in public transportation in some mapping applications could be expanded to other venues and a broader set of metrics. Crowdsourcing approaches that have been applied to public transit tracking [21] and identifying accessible public spaces [31] could be used in a way that facilitates risk negotiation in CMC.

These technological opportunities also bring risks. Some of these concepts involve a degree of surveillance that may ultimately degrade personal communication and erode privacy. To begin, the feeling of being surveilled may reduce comfort and interpersonal trust, particularly if a system is inviting users to confront each other with evidence gathered across various platforms. Such systems could breach privacy in more blatant ways, such as revealing disabilities or other vulnerabilities to inappropriate recipients. The analysis of individuals' communication could be also used in unintended ways such as profiling health risks by insurers or employers. It may be difficult to obtain meaningful consent to these risks from all parties who might be affected by such systems. Finally, unless such systems understand the nuances in a given exchange, coaching could backfire, clashing with cultural, gender or situational expectations. AI suggested text may end up lowering trust as has occurred in online profiles [30], privileging some styles of communication over others, or distorting an intended message if communication norms of particular subgroups are not taken into account. Some concerns about AI Mediated Communication, including homogenization of language and deep fakes that distort or fabricate what someone has said, have been reviewed by Hancock et al. [28].

Despite these risks, we believe that there is value in exploring how technology can support effective risk negotiation and the positive emotional outcomes associated with assertiveness and with social connectedness. In addition to the anxiety and uncertainty that many students felt as they tried to negotiate risk, social retreat was a worrisome outcome. Some individuals appeared ready to give up on in-person meetings when they weren't sure they could arrange a safe meetup or when they were overwhelmed with the burden of expressing questions or preferred precautions. Social connectedness and belongingness are important factors in wellbeing and academic engagement [29, 32, 58, 59] that were challenged during the pandemic [36]. It is important to address difficulties with risk negotiation because these can exacerbate social isolation. Since so much planning occurs over texting

and other computer mediated communication, support for risk negotiation may be most effective if offered within these channels.

7.3 Limitations

This study drew on a small sample of college students, over half of whom were Asian women. We did not recruit for any particular demographic criteria but rather for concerns about the safety of in-person socializing (as self-reported in a screener). Our findings may not fully generalize to all college students given variation in student bodies, to non-college young adults or to other age groups. Due to anti-Asian violence and hate speech during the pandemic [22,48,52], including associations of the virus with Asians [16], and socio-cultural norms of lower assertiveness among women and East Asians [2,34], the Asian women in our study may have felt less safe than other young adults – not only about walking across campus alone at night, but also about directly asserting their preferred precautions and directly asking about risk information from others. Indirect negotiation strategies may have been motivated by a desire to avoid conflict, calling attention to oneself, or inviting association with the virus. Our findings are also limited by the lack of fine-grained demographic descriptions. The lack of detailed demographic data (some participants simply identified as Asian instead of specifying East Asian, South Asian or Southeast Asian) limits our ability to draw links with some related work, such as that contrasting assertiveness among East Asians and South Asians [34]. Studies with different demographic representation may find different strategies for risk negotiation. Additionally, this was an exploratory study that used probes and nudges to illuminate communication challenges and approaches. We did not evaluate an intervention. We cannot determine how much of the expression that occurred during the study was due to the interview discussion and daily nudges to express preferences. In a few instances, several participants said that they communicated more explicitly about risk factors than they otherwise would have. It is possible that the probe exacerbated some of the tensions we described (e.g., feelings of being invasive when asking for information). Despite these limitations, the findings illustrate challenges of negotiating risk in the midst of the COVID-19 pandemic and some areas for future work to provide support.

7.4 Future work

We suggest support for risk negotiation and interpersonal assertiveness in general as a challenging area for computer mediated communication. Among the challenges are privacy issues associated with monitoring text communications to provide this support. Monitoring and analysis can introduce new social and ethical risks. Individuals who opt in to receive such support may put their own messages and those of their communication partners at risk. Additional difficulties relate to accurately identifying breakdowns in communication, such as those due to social intimidation, or noticing what is not stated to identify unchecked assumptions of shared behaviors. This identification would require historical analysis of what has and hasn't been shared. Presuming such breakdowns can be detected, a related challenge is providing feedback that is actionable, welcomed and leaves agency with the people involved in an exchange.

Another area of future work relates to integrating support for navigating the larger social and physical environment (factors such as crowdedness, ventilation, and vaccination status in micro regions) into CMC. Some map services occasionally show crowdedness data for public transit, a feature that may become more common in mapping applications for reflecting the crowdedness of public spaces and private businesses. Future research could explore the role of crowdsourcing, similar to that used to communicate actual schedules of public transit [21] and accessible public spaces [31], to facilitate dialogue and collaborative decision making about negotiating health risk.

Future research should also examine the longstanding sociocultural variables that drive risk negotiation strategies. In many instances, the indirect tactics we observed were used in part to protect other people's sense of control and power. It is possible that these health risk negotiation strategies reflect gender and socio-cultural norms, such as those found in business negotiation [2,34]. Further research in this area may shed light on the

complexities of assisting assertive communication and possibly also on coaching recipients as well as initiators of risk negotiation.

8 Conclusions

The conflicting health directives that were in place when this study was conducted in Spring 2021 left the burden on individuals to negotiate risk of in-person interaction. One year later, despite meaningful advances in vaccines and understanding of disease transmission, individuals have again been held responsible for setting their own precautions. Risk negotiation skills, that is assessing risk and agreeing on COVID-related safety precautions, became especially important with the re-opening of businesses and some campus services in the Spring and Summer of 2021, and continue to be important as mask mandates drop in the U.S., including on public transportation. Support for risk negotiation skills should be explored since, for young adults in college, social connectedness affects not only mental health but also academic engagement. Risk negotiation is often fraught for young adults. Reluctant to offend others and prone to overestimating shared values with peers, young adults may avoid the difficult conversations that allow them to plan safe in-person meetups. We explore directions for supporting risk negotiation and assertive communication more generally in AI mediated communication and other technologies while considering the risks of these approaches.

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A APPENDICES

A.1 Timeline of Study and Public Health Events

Date	Event
April 15, 2021	All individuals age 16+ become eligible for vaccine in WA State
May 3, 2021	University announces that COVID-19 vaccinations will be required for fall 2021
May 12, 2021	All individuals age 12+ become eligible for vaccine in WA State
May 13, 2021	CDC states that fully vaccinated individuals do not need to wear masks indoors or outdoors. WA state announces it will adopt this guidance later the same day.
May 20, 2021	County health officer issues directive for continued use of masks indoors by all individuals.
May 27 & 28, 2021	First batch, Initial interviews
June 3 & 4, 2021	First batch, Second interviews
June 7 & 8, 2021	Second batch, Initial interviews
June 15 & 16, 2021	Second batch, Second interviews
June 15, 2021	County reaches vaccination goal (70% of adults fully vaccinated)
June 25, 2021	WHO guidance encourages vaccinated individuals to continue to wear masks.
June 29, 2021	University continues to require masks in all campus facilities, regardless of vaccination status.
June 30, 2021	State lifts nearly all remaining COVID-19 restrictions.

A.2 Screening Survey

- Please enter your name:
- Are you currently an undergraduate student at [university]? (yes, no)
- Are you age 18 or older? (yes, no)
- Do you anticipate that you will meet with any peers in person in the near future? (yes, no, maybe)
- Are you willing to try out different ways of expressing your preferences for those interactions in the context of COVID-19 (e.g., communicating safety precautions in texts before meeting with friends)? (yes, no)
- Are you willing to respond to daily surveys about your experiences communicating these preferences during the 7-10 day study period? (yes, no)
- How concerned are you about meeting up with peers in-person? (1 [not concerned at all] … 7 [very concerned])
- Briefly describe some of your concerns related to in-person contact:
- What precautions would you like to take during in-person meet ups (e.g. masks, distance, vaccinations)?
- Please provide your email so we can contact you if you are eligible for the study.

A.3 Initial Interview Guide

Reflection on recent in-person interactions

Please reflect on any recent interactions you had with people outside your household. These should be interactions that you planned, even if very casually. Please describe each interaction in detail. For each interaction, describe:

- The situation: who you were you communicating with, your relationship, and what you were planning
- Any anxieties or concerns you had about the meet-up
- Any precautions you discussed before meeting up
- How it went and any precautions you took while meeting up
- What the other person could have done to make you more comfortable
- Anything you wish you had done differently for either yourself or the other person

Reactions to examples of expressing preferences

I'm going to show you some examples of how one could express preferences. For each example, please share any reactions that you have to it and describe any elements of this communication that you could imagine incorporating into your own communication as you plan in-person meetups with people outside your household.

This week, we will ask you to try expressing preferences as you plan interactions with peers. Each evening you will receive a short survey asking how things went. Please answer with as much detail as possible. It will be helpful if you share screenshots that capture how you expressed your preferences. In the second interview, we will ask how this went.

A.4 Materials for Experience Sampling of Risk Negotiation

Daily Prompt

Remember to express your preferences as you plan in-person meet-ups. Consider adding your preferences to your message with words, emoji, within a calendar invite, or using a template in Canva. Other examples can be found in these slides (link). These preferences can be any that occur to you, including but not limited to COVID-related precautions and safety. Please take screenshots of your communication. We will ask you to upload them to your participant folder each day. You can block out the names of your communication partners, or we will do this for you.

Daily Query

- Describe a situation(s) since the last survey where you expressed your preferences (please include who you were communicating with, what preferences you expressed and how).
- How did you feel about doing this?
- How did others react? How did you handle their reaction?
- Did anything happen recently to change your preferences (e.g., a public health announcement)? If so, please describe.

A.5 Second Interview Guide

1. Overview of experience expressing preferences while planning in-person meetups.

Prompt: At a high level, what were your reactions to the idea of expressing your preferences about in person meetings?

2. Examination of specific incidents or exchanges or incidents.

Prompt: Let's walk through the preferences you expressed. Please describe these in as much detail as possible including:

Interviewer prompts for details including:

- The situation, including the relationships of people involved in the exchange
- What preferences were expressed and in what way (words, images etc.)
- What preferences were not expressed and why
- Reactions of the other person
- How it felt to do this

3. Reflection on assertiveness in other domains

Prompt: In the process of thinking about and expressing your preferred precautions related to COVID, did you have any thoughts about how you communicate your preferences in other areas of your life?