

Supporting Women in Online Dating with a Messaging Interface that Improves their Face-to-Face Meeting Decisions

DOUGLAS ZYTKO, Oakland University, USA

VICTOR REGALADO, New Jersey Institute of Technology, USA

NICHOLAS FURLO, Oakland University, USA

SUKESHINI A. GRANDHI, Eastern Connecticut State University, USA

QUENTIN JONES, New Jersey Institute of Technology, USA

This paper presents a study of a messaging interface prototype for online dating intended to improve women's face-to-face meeting decisions, and therefore the capacity to manage the gendered risks involved with such meetings. The interface prompts users with discussion topics that are potentially more valuable for user evaluation than the impression management-motivated topics often chosen by men. These topics come in the form of first-date scenarios that messaging partners either agree or disagree on. Through a mixed-methods study utilizing speed dating events, daters used the interface to interact before meeting face-to-face. Results indicate that women's face-to-face meeting decisions improve when the interface prompts them to discuss scenarios involving agreement of opinion. Men's decisions are worsened by the same interface variant, potentially due to the displayed agreement being misinterpreted as a signal of compatibility. The study ultimately stresses that designs intended for women, and at-risk groups more broadly, must also be assessed with other user demographics—namely those that pose a risk—to identify unforeseen implications.

CCS Concepts: • Human-centered computing → Empirical studies in collaborative and social computing; • Social and professional topics → Gender → Women

KEYWORDS

Online dating; dating apps; social matching; safety; risk; women; sexual violence; feminist HCI; impression management

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1 INTRODUCTION

"Men are afraid that women will laugh at them. Women are afraid that men will kill them."

– Margaret Atwood

Author's e-mail address: Douglas Zytko, zytko@oakland.edu

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The benefits of online dating for enriching one's social life are well founded [1,6,20], yet there are also risks such as emotional and physical harm [15,21,30,45]. Here we focus on the harms that online daters risk when deciding to meet another user face-to-face. A potent example is sexual violence: online dating is associated with an increased likelihood of sexual violence [23,44], and reports of sexual violence between online daters have been on an upward trend [3]. Other risks include the loss of privacy (a meeting partner discovering where one lives or socializes), stalking, and harassment [78] – risks that can magnify if sexual or romantic advances are refused, or invitations for future meetings declined.

The risks assumed when meeting online daters face-to-face are greater for women than men because of general disadvantages in size [63], evolved mate selection processes [17] (p. 322), and gendered scripts around power and control [4]. For example, the victims of online dating-initiated sexual violence are predominantly women [3].

Drawing from feminist HCI [7], we consider it essential that the disproportionate, gendered costs of face-to-face meeting decisions be acknowledged and addressed through online dating system design. We question how women can be empowered through interface design to make informed face-to-face meeting decisions, or in other words: retain agency over the risks that they subject themselves to by effectively predicting who they will enjoy a face-to-face encounter with.

Evaluation of face-to-face meeting potential—and risk—goes beyond blatant indicators of safety such as history of sexual or violent offenses and identity validation [66,73]. Behavioral Theory positions social interaction as a fundamental mechanism through which people assess the costs and benefits of pursuing a social relationship [16,47]. Interaction enables individuals to collect subjectively interpreted information through behavior and statements, which can signal traits pertinent to social relationships and predictive of future discourse [38,56].

This understanding positions messaging interfaces in online dating systems as key to user evaluation. Yet prior research suggests that messaging interfaces, as currently designed, are suboptimal for informing online daters' face-to-face meeting decisions [37,68]. Users have reported little confidence in, and disappointment with [37], their decisions to meet [87,89]. This is at least partly due to an “audition” dynamic between heterosexual users during messaging in which men pick conversation topics in an attempt to enhance their attractiveness—which may or may not have any semblance to traits they actually possess [82,87]—and women passively evaluate message content in the context of these male-driven conversations [88]. While there have been recent advances in online dating systems that give women control over who can message them and when (e.g., Tinder, Bumble [10,13]), designs seeking to improve their evaluation of users through messaging are relatively scarce.

In this paper we report on the design and assessment of the *prompted discussion interface*, which aims to support women in determining which users they would enjoy face-to-face conversations with. The interface prompts users to discuss a system-selected scenario about first dates at the start of messaging interaction. Results from a quantitative assessment indicate that women's face-to-face meeting decisions benefit when the interface prompts them to discuss a scenario that their messaging partner agrees with them on. However, the study also reveals unexpected implications of the interface, such as fear of angering men when discussing prompted disagreements, and misinterpretations of prompted agreements by men that may lead them to expect attraction during face-to-face meetings.

The rest of the paper is structured as follows. First, we review gender differences in dating that render women disproportionately susceptible to dating or sex-related harms. We review

empirical knowledge of how online dating systems are used to evaluate potential partners for face-to-face meetings, and limitations with system design for informing such meeting decisions. The prompted discussion interface prototype is then presented, followed by a mixed methods study of the interface. The paper concludes with discussion of how the study can inform future gender-equitable designs for online dating systems and unintended consequences of the prompted discussion interface regarding risk.

2 BACKGROUND

Online dating research in HCI has traditionally explored how online dating systems are used to present oneself online [26,27,34,86] or evaluate the attractiveness of other users [34,37,50], and commonly through the lens of Goffman and impression management [46]. That research interest has evolved into studying the use of online dating systems by marginalized and under-represented groups, such as men seeking men and LGBTQIA+ users [12,14,36,48]. This line of research has more recently emphasized and studied the risks around self-presentation and user evaluation during online dating that such groups are disproportionately susceptible to, such as the disclosure of disability status [67], transgender status [30], and HIV status [84]. Our study builds on the burgeoning focus towards risk of online dating that some user demographics are disproportionately subjected to, in this case: women. The rest of our Background is structured as follows. First we review gender differences that contextualize the (online) dating risks confronting women. We then review research about how online daters utilize the typical components of online dating interfaces to inform face-to-face meeting decisions, which emphasizes the failure of traditional messaging interface design for informing such decisions.

2.1 Gender Risks in Dating

Multiple theoretical perspectives concur that there are behavioral differences between men and women in the context of dating [4,18,22,35,71]; differences that carry over to online dating [2], and make women disproportionately susceptible to dating and sex-related harm [3,8,61,72]. From evolutionary psychology, Trivers' Parental Investment Theory posits that the degree of investment devoted by each parent to raising children is a key influence on mate selection [83]. According to the theory, women will be relatively choosier in mate selection because they generally have higher parental investment or reproductive costs (e.g., pregnancy) [18,57]. Men will be less choosy and will "compete more vigorously for access to...members of the opposite sex" [18] (p. 206). Extensions of this premise have elaborated on the ways that men and women differ during long-term and short-term mating situations [24] and have specified sex-differentiated mate preferences [25,31,41]. For example, men are considered to value physical attractiveness more than women because it indicates fertility, while women value earning prospects and social status more than men because of resources needed for raising children [19,25].

The imbalance in sexual access between men and women leaves women susceptible to physical and psychological harm [17] (p. 322). Examples include forced sexual contact such as rape [74], and retaliatory actions when sexual contact is denied, such as stalking and harassment [78,80]. The public health literature has applied a social-ecological lens to further our understanding of the connection between gender, dating, and harm against women [22,71]. For example, social structures idealizing hegemonic masculinity, particularly in the western part of the world, frame dominance and control as masculine traits that men should aspire to, and

violence as a means for demonstrating masculinity [4,55]. Related ecological factors include hostile masculinity (distrust of women and gratification from exercising power over them) [61] and societal norms or scripts that support sexual entitlement in men and sexual submissiveness in women [51].

2.2 Using Online Dating Systems to Evaluate Potential Meeting Partners

Online dating systems enable discovery of numerous potential partners for face-to-face social desires. We use the term “user evaluation” to describe the process of forming impressions about other users online to determine their appropriateness for a face-to-face meeting. In this subsection we review research about user evaluation of online daters, which collectively indicates that online dating systems are not optimally designed for informing users’ face-to-face meeting decisions: an issue that disproportionately impacts women over men because of the gendered risks with meeting face-to-face.

Online dating systems typically provide two interface components for evaluation of potential meeting partners: a profile page for each user and a messaging interface for dyadic interaction. Common elements of a profile page include pictures of the user’s physical appearance (profile pictures), text fields for demographic traits like age, location information (proximity and even where two users crossed paths [60]), and open-ended text boxes (e.g., “about me...” prompts). Masden and Edwards found profile pages to contain “tired, clichéd, or uninformative” content [62], and users in other research have indicated that they do not consider profile pages alone to be sufficient for making face-to-face meeting decisions [37,89]. This likely coincides with users’ impression management [46] motives, or desires to maintain appeal through their profiles [26,27].

Messaging interaction is valued as an evaluation tool [43], and should provide users with opportunity to seek and collect further information pertinent to in-person meeting decisions. Yet the literature suggests that messaging interfaces also leave users’ evaluation needs unsatiated [37,68]. For example, a study of OkCupid users found evidence of online daters taking “their communication with a user off of the online dating system faster than they would have liked” to better gather information [90]. More concerning, users in that study reported that a majority of their initial face-to-face meetings did not culminate in a second meeting, and some even expected their online impressions to be deemed inaccurate. Similarly, self-proclaimed online dating experts have been found to advise users to skip in-depth evaluation online because impressions will likely be incorrect [87].

The literature provides some explanation for the shortcomings of messaging interfaces as tools for user evaluation, particularly for women. In line with evolutionary theory [18,83], women typically receive more messages in online dating systems than men [33]. They have also been found to prioritize impression management and impression formation differently during messaging. Ztyko describes a gender dynamic echoing Parental Investment Theory [83] in which men prioritize impression management during messaging to maintain or compete for the attention of potential meeting partners who they fear may reject them at any moment [88]. Instead of crafting and responding to messages in a natural, “off-the-cuff” manner, they adopt methodical and deliberate messaging tactics to maximize their chances of response [62,87]. This involves steering conversations towards topics that men consider reflective of attractive qualities, such as topics that have garnered responses from previous message partners [62,89]. Other men in online dating have reported randomly changing their messaging topics in hopes of increasing their response rates; some of these topics range from poems to intentionally

demeaning content [89]. Some also copy-and-paste messages written by other people, such as those found on dating advice websites or purchased from dating coaches [87].

A consequence of this impression management prioritization, and related user tactics, is an obfuscation of women's capacity to gather information pertinent to face-to-face meetings.

3 THE PROMPTED DISCUSSION INTERFACE

We designed the prompted discussion interface (Figure 1 on the next page) as a tool to explore ways that messaging interaction could improve women's face-to-face meeting decision capabilities. The interface reflects known user tactics about impression management in online dating [62,87,89], gender differences in evolutionary psychology [18,57,83] that may predispose men to underemphasizing the role of messaging interaction for evaluation, and socio-ecological factors that emphasize power and control [4,55].

In typical messaging interface designs, users are free to discuss whatever they would like. This gives men the opportunity to assert control and steer the conversation towards topics conducive to their impression management [62,87], which can mislead or provide moot value to women's face-to-face meeting decisions [68,89,90]. Our interface aims to alleviate the notion of conversational control and stimulate conversations informative to face-to-face meeting decisions in three ways.

1) *Provide a conversation topic to users as soon as messaging interaction begins* (Figure 1, component 1).

2) *Provide topics intended to be more conducive to user evaluation* (Figure 1, component 2). The interface prompts two users to discuss a dating-conflict story: a vignette that describes a conflict that occurs during a first date between two online daters. The notion of stories as discussion prompts is partially inspired by vignettes of marital conflict used to spark discussion and reflection on compatibility in marriage therapy [65]. We developed vignettes around first-date conflicts because first dates are a story context that online daters should be inherently interested in discussing, and because a primary purpose of messaging interaction for women is to inform first-date (or first face-to-face meeting) decisions. See section 3.1 for details about first-date conflict stories included in the interface.

3) *Maintain user attention on evaluation, or understanding, of their partner* (Figure 1, component 3). The interface displays each user's opinion choice regarding the story, which users would have provided prior to accessing the messaging interface (this prevents them from picking an opinion based on their partner's answer). We intended the visibility of the opinion choices to center the user's attention on understanding or exploring the reasons behind their partner's opinion, and the conversational dynamics that may emerge through that process.

3.1 First-Date Conflict Stories

The prompted discussion interface featured four different first-date conflict stories. A series of 36 stories were initially created based on anecdotes from participants in prior online dating studies, and also based on personal experiences of friends and colleagues. Each story depicted a 70-80 word scenario concerning a first date and ended by asking the reader to provide their opinion regarding the actions of one of the daters in the scenario.

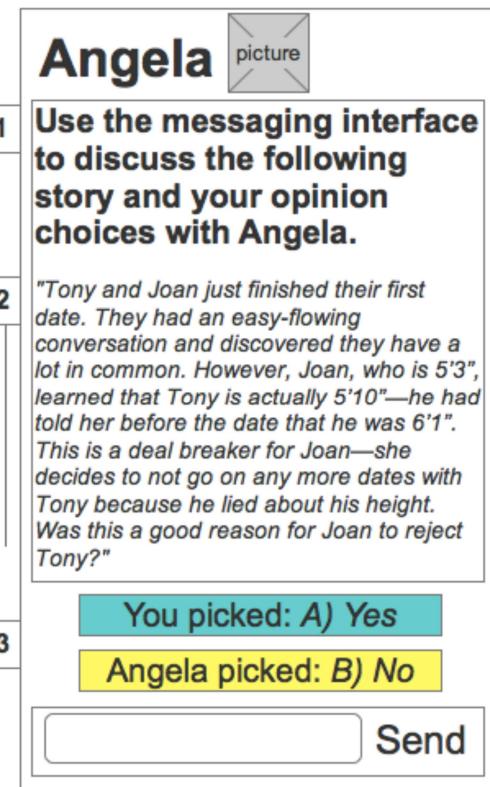


Fig. 1. A mockup of the prompted discussion interface.

Two opinion choices were provided for each story. A survey study using Amazon Mechanical Turk was conducted to identify a set of first-date conflict stories that satisfied the following criteria:

Split of opinion choices should be as close to 50/50 as possible to ensure that there is no “socially appropriate” answer. First-date conflict stories were considered appropriate for the interface if there was a split of opinion no more disproportionate than 59%/41%.

People should be willing to discuss the story with a potential meeting partner. This was assessed through a five-point Likert-scale survey question: “I would be willing to discuss this story with a potential/current romantic partner, regardless of their opinion choice.” Stories with average answers between 3 – neutral and 5 – strongly agree were considered appropriate for the interface.

People should not disqualify someone as a potential meeting partner simply for holding an opposing opinion. This was assessed through a five-point Likert-scale survey question, “I could not date someone that picked the opposite opinion choice for this story.” Stories with average answers between 1 – strongly disagree and 3 – neutral were considered appropriate for the interface.

The 36 first-date conflict stories were split into four surveys to avoid respondent fatigue, which received a total of 275 responses (52.75% women, 47.25% men, average age 35). Of the 36 first-date conflict stories, eight satisfied the above criteria. Four scenarios were incorporated into the prompted discussion interface (the ones closest to a 50%/50% split of opinion). Those stories were:

- 1) Tony and Joan just finished their first date. They had an easy-flowing conversation and discovered they have a lot in common. However, Joan, who is 5'3", learned that Tony is actually 5'10"—he had told her before the date that he was 6'1". This is a deal breaker for Joan—she decides to not go on any more dates with Tony because he lied about his height. Was this a good reason for Joan to reject Tony?
 - a. Yes, Tony's dishonesty about his height was a good reason for Joan to reject Tony
 - b. No, Tony's dishonesty about his height was not a good reason for Joan to reject Tony
- 2) Harry and Danielle just finished their first date. They had an easy-flowing conversation and discovered they have a lot of things in common. However, Harry learned that Danielle is friends with his ex-girlfriend who he's no longer on speaking terms with. This is a deal breaker for Harry—he decides not to go on any more dates with Danielle because she's friends with his ex. Was this a good reason for Harry to reject Danielle?
 - a. Yes, Danielle being friends with his ex was a good reason for Harry to reject Danielle
 - b. No, Danielle being friends with his ex was not a good reason for Harry to reject Danielle
- 3) Annabelle and Donald are at a bar/restaurant for their first date. They are having an easy-flowing conversation and they discovered that they have a lot in common. They both had one beer so far. Donald gets up to order more drinks at the bar and says, "the next one is on me." He returns with a beer for Annabelle and a Sprite for himself. Annabelle is bothered by this. Is her reaction to Donald's behavior justified?
 - a. Yes, Annabelle should be bothered by Donald returning with a beer for her and a Sprite for him
 - b. No, Annabelle should not be bothered by Donald returning with a beer for her and a Sprite for him
- 4) Brian and Nancy are at a bar/restaurant for their first date. They are having an easy-flowing conversation and they discovered that they have a lot in common. While Nancy is telling a funny story about her job she hears a beep and takes her phone out of her purse to check a new text message she just received. Brian is bothered by this. Is his reaction to Nancy's behavior justified?
 - a. Yes, Brian should be bothered by Nancy checking her new message
 - b. No, Brian should not be bothered by Nancy checking her new message

4 ASSESSMENT OF THE INTERFACE

Through a mixed methods field study, the prompted discussion interface underwent quantitative and qualitative assessment. These assessments involved three messaging interface variations.

1. Prompted-disagreement interface (PDI): Two users are prompted to discuss a first-date conflict story that they initially disagreed on. See Figure 1.

2. Prompted-agreement interface (PAI): Two users are prompted to discuss a first-date conflict story that they agreed on (picked the same opinion choice). This variation was included to differentiate the effects from prompting users to discuss a first-date conflict story (regardless of opinion choices) and effects from prompting users to discuss a story that they specifically disagreed on. See Figure 2.

3. "Open" messaging interface: Users are prompted to discuss whatever topic they want. This resembles the typical messaging interface in online dating systems today. See Figure 3.

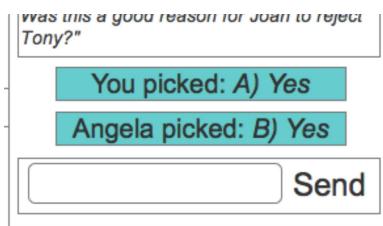


Fig. 2. The prompted discussion interface with an emphasized agreement of opinion.



Fig. 3. The “open” messaging interface.

4.1 Quantitative Assessment of the Interface

The intent of the prompted discussion interface is to improve women’s face-to-face meeting decisions. We further define that improvement as evaluations of a dating partner after messaging interaction more closely matching evaluations of the partner after face-to-face interaction. This is based on the supposition that women want their evaluations of daters to remain consistent across online and offline modalities because they are using messaging interaction to judge the value—and relative risk—of future interactions.

We used two variables to consolidate changes in the evaluation of a partner between messaging and face-to-face interaction: 1) difference in desire for a face-to-face meeting and 2) difference in enjoyment of interaction.

Difference in desire for a face-to-face meeting refers to the difference in a user’s desire to meet an online dater face-to-face after a messaging interaction, and desire to meet them again after the initial face-to-face meeting. Difference in enjoyment of interaction refers to the difference between enjoyment of a messaging interaction with an online dater and enjoyment of an initial face-to-face interaction with that same online dater. These variable choices are informed by prior qualitative research indicating the important role of messaging interaction in informing face-to-face meeting decisions [43], and struggles with using messaging to inform face-to-face meeting decisions [68,89].

For women, we expected that both variations of the prompted discussion interface would produce smaller differences in desire for a face-to-face meeting and enjoyment of interaction compared to the open messaging interface. This is because conversations resulting from the prompted discussion topics would presumably be more informative or predictive of face-to-face interaction than the impression management-motived topics typically posed by men in open messaging [62,65,87]. We hypothesized:

H1A: For women, the prompted-agreement interface (PAI) will produce smaller differences in desire for a face-to-face meeting than the open messaging interface.

H1B: For women, the **prompted-disagreement interface (PDI)** will produce smaller differences in desire for a face-to-face meeting than the open messaging interface.

H2A: For women, the **prompted-agreement interface (PAI)** will produce smaller differences in enjoyment of interaction than the open messaging interface.

H2B: For women, the **prompted-disagreement interface (PDI)** will produce smaller differences in enjoyment of interaction than the open messaging interface.

For men, the literature is ambiguous regarding the utility of messaging interaction for informing their decisions to meet women from online dating. Men have expressed frustration with the outcomes of their face-to-face meeting decisions and with their messaging conversations [37,89]. Yet there is also indication of men framing success with messaging through the lens of impression management (attracting women) rather than impression formation, and purposely expediting messaging interaction to get to a face-to-face meeting faster [87]. Furthermore, the evolutionary psychology literature emphasizes physical attractiveness in men's evaluations of mating partners [29]. This raises the question of the importance of interaction for men relative to physical appearance when making decisions of whether to meet a user face-to-face, let alone engage in sexual or romantic activity. As such, we asked:

RQ1: For men, do the messaging interfaces vary in terms of differences in desire for a face-to-face meeting or enjoyment of interaction? If so, how?

4.2 Qualitative Assessment of the Interface

Qualitative assessment was used to explore users' reactions to the interface variations as well as to provide explanations for quantitative findings. We were particularly interested in users' willingness to use the prompted discussion interface were it to be implemented in a live online dating system, and explanations of how they would utilize the interface in pursuit of their online dating goals. Our research questions were:

RQ2: How do users anticipate the prompted discussion interface impacting their user evaluations and face-to-face meeting decisions?

RQ3: Would online daters be willing to discuss first-date conflict stories if a messaging interface prompted them to do so?

RQ4: Would users prefer the prompted discussion interface over an open messaging interface in online dating systems that they use?

5 METHOD

Quantitative assessment involved daters using the interface variations to interact with potential date partners online and then meeting those partners for short face-to-face interactions. Qualitative assessment involved focus groups using mockups of the interface variations to guide discussion.

Speed dating events [32] were used as a way to recruit daters and as a setting for both the quantitative and qualitative assessments for the interface. Speed dating events have been commonly used in psychology research as an ecologically valid context for studying romantic attraction influences (e.g., [25,35,53,59]), although they are relatively rare in HCI [28,37]. There are several advantages to utilizing speed dating events in our method. For one, using speed dating events to recruit participants is an effective way to ensure that they are indeed actively seeking a dating partner. Furthermore, our hypotheses necessitated a method that enables data

collection at multiple points in the online dating process to assess how user evaluation changes, and without being biased by what happens at later points in evaluation. Retrospective methods—such as semi-structured interviews and surveys about past online dating experiences—are inappropriate because of recollection bias. Speed dating events enable us to collect data in the moment at multiple points through the online dating process (e.g., profile evaluation, messaging, and face-to-face meeting). In addition, retrospective study designs usually provide data from only one side of a dating dyad (only one of the two people involved in an interaction). A speed dating study design gathers input from both sides of an online dating experience, which enables exploration of how men and women may be impacted differently by interface design.

5.1 The Daters

Daters in the study included heterosexual single men and women who self-identified as actively looking for a partner to enjoy a romantic relationship with in the physical world. We held a total of 4 speed dating events, for which a total of 128 daters completed an online sign-up process, and a total of 85 daters attended (44 men, 41 women). Total attendance at each speed dating event ranged from 17-26. Of the 85 attendees, 48 (24 men, 24 women) used the messaging interface variations to interact with potential partners before meeting those partners face-to-face. The other 37 attendees (20 men, 17 women) participated in the qualitative component of the study (focus groups about the interface variations). Ages ranged from 21-35 in both components of the study. Participants in the quantitative component had a mean age of 27 for men and 28 for women; for the focus groups it was 27 for men and 26 for women. Education levels ranged from a high school diploma to a doctoral degree, with a Bachelors degree being the most common across both quantitative and qualitative components. All but two daters had prior experience using an online dating system, ranging from one month to over one year of system-use.

5.2 Recruiting Daters

For each of the four speed dating events, an advertisement was posted on Facebook that targeted single men and women in the New York City area between the ages of 21 and 35. Content of the ad included a title (“Dating for Science”) and a tagline (“FREE dating event and dating technology demo”). Clicking the Facebook ad would bring the user to an Eventbrite.com page for the respective speed dating event, which enabled them to reserve a spot at the event and prompted them to complete a sign-up survey. The Eventbrite.com page emphasized to daters that they would be exposed to new “online dating technology” as well as engage in typical speed dates. The page did not detail what the “online dating technology” was, how exposure to the technology would occur, or how it would play a role in their face-to-face speed dates. The Eventbrite.com page also advertised that every dater would receive \$20 for attending the speed dating event. The sign-up survey gathered demographic information, a picture of the dater, and opinion choices for the first-date conflict stories. The survey instructed daters to pick opinion choices for the first-date conflict stories honestly, but it did not explain the purpose or role of the stories in the speed dating event. Regarding pictures of the dater, the survey specified that the dater should upload a picture that accurately portrays what they look like, and that the picture would be seen by other daters attending the event. Sign-ups for each of the four speed dating events were capped at 16 men and 16 women, with an expectation that at least eight men

and eight women would attend. Target attendance was eight men and eight women as to guarantee there was enough time in the event for a given dater to have a messaging conversation and face-to-face conversation with each of their dating partners without becoming exhausted.

5.3 Arriving at the Speed Dating Event

The speed dating events were hosted at a reserved meeting space in New York City. The space included a foyer (we called this the “greeting area”), two rooms each capable of holding 10-20 people (“focus group rooms”), and a larger room with a curtain that enabled the room to be separated into two sections (“computer room for men” and “computer room for women”). Upon arrival, each dater was given a \$20 payment for attendance, a name tag, and a consent form to sign. If the dater was one of the first eight of their gender to arrive, they were designated to participate in the quantitative component of the study and escorted to the computer rooms. Once situated, the dater was provided with a Chromebook computer and was logged into our private dating website. The speed dating event officially began once eight men and eight women were in attendance and logged into the dating website. Excess daters that arrived were designated to participate in the qualitative component of the study and escorted by a research assistant to one of the focus group rooms (they still participated in speed dates at the conclusion of the quantitative component of the study).

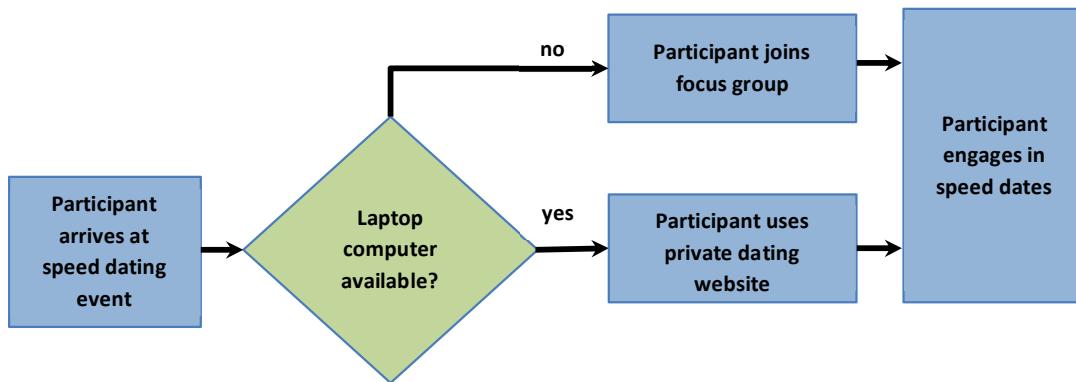


Fig. 4. Speed daters were assigned to quantitative or qualitative assessment of the interface based on when they arrived at the event.

5.4 Focus Group Protocol

Focus groups were conducted in separate rooms for men and women at all speed dating events to avoid hesitancy to discuss online dating with potential dating partners present. Each focus group had a research assistant of the same gender to guide the discussion. They explained to the focus group participants that the daters would be experiencing the “online dating technology” mentioned in the speed dating event advertisement in different ways—some by using the system directly, while others would engage in discussion about their reactions to the system. It was emphasized to the focus group participants that they would still engage in speed dates after the focus group. Participants were then told that the discussion would be audio-recorded, to which all agreed.

The focus group discussions centered on the following scenario: “Imagine you just matched with a man/woman in a popular online dating system. You liked each other’s profile page and the online dating system brings you to this messaging interface to start a conversation. What are your reactions?” This scenario was given three times with different messaging interface variations: 1) an “open” messaging interface with no discussion prompts (i.e., the typical interface in online dating systems); 2) the prompted discussion interface with verbal instructions to imagine that they and the matched user had disagreed on the respective story; and 3) the prompted discussion interface with verbal instructions to imagine that they had agreed on the story. The first-date conflict story exhibited in the mockups was the same as in Figure 1 (“Tony and Joan”).

5.5 Evaluating Daters Online

Daters in the quantitative component of the study were informed that they would first evaluate eight opposite-gender daters using the private dating website. This would involve looking at a picture of each dater and then having a conversation with each dater using a messaging interface. They would then meet those opposite-gender partners for short face-to-face interactions. (Daters participating in the focus groups at the respective event were not discoverable in the dating website.)

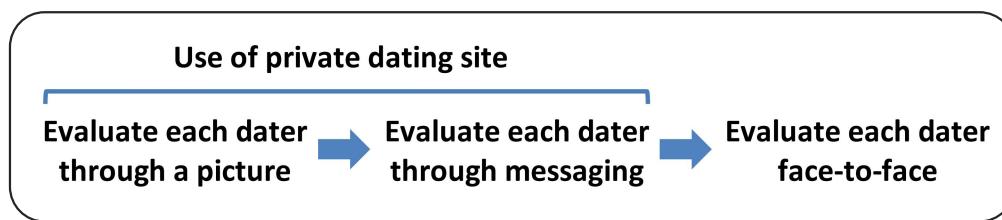


Fig. 5. The process of dater evaluation during the quantitative component of the study.

Daters viewed the pictures (with names) of their eight opposite-gender partners one at a time and in randomized order. After viewing each person, the dater filled out a “post-profile picture evaluation” survey, which consisted of a question gauging their desire to go on a regular date with the potential romantic partner. It was explained to the daters that questions about the decision to go on a date pertained to face-to-face meetings outside of the study, and not the face-to-face interaction that they would have at the end of the speed dating event. The purpose of this step was to expose users to the physical appearance of their potential romantic partners before interacting with them. Since physical attractiveness would unavoidably factor into evaluations of potential partners face-to-face, it was important to introduce this effect early so it would not confound comparisons between online and face-to-face evaluations.

After all daters completed picture evaluation it was explained that they would have a messaging interaction with each opposite-gender dater. Before each round it was explained that the messaging conversation would last for four minutes and the daters were asked to continue exchanging messages for the entire four minutes if possible. Daters were also given 30 seconds before each round to familiarize themselves with the instructions in the messaging interface, which they were told could change with each round. After each messaging conversation, the

daters filled out a survey regarding their messaging partner (“post-messaging evaluation” survey).

In all, every dater engaged in eight rounds of messaging conversation because there were eight daters of each gender. A counterbalanced order was used to ensure that every dater was exposed to each of the opposite-gender daters exactly once and it also ensured that every dater was exposed to the open messaging interface four times and the prompted discussion interface four times without ever discussing the same first-date conflict story more than once. In order to minimize the number of different first-date conflict stories used in the study (which represent potential confounders), the counterbalanced order did not deliberately assign a prompted disagreement or agreement. Opinion choices previously selected by each dater while signing up for the speed dating event determined whether an agreement or disagreement was shown when a dater-pair was assigned the prompted discussion interface. All but one subject across all speed dating events were exposed to a prompted disagreement and a prompted agreement at least once due to the selected stories garnering a split of opinion that was close to 50/50 across all study participants.

5.6 Evaluating Daters through Face-to-Face Interaction

Once messaging conversation concluded, daters were prepared for the face-to-face interaction (speed date) phase. Daters in the quantitative and qualitative components engaged in separate speed dating sessions in their respective rooms/areas until all daters from the quantitative component met each other (they were not made aware of, or interacted with, daters from the qualitative component until they had completed all phases of quantitative data collection).

Speed dates were face-to-face, one-on-one interactions during which daters could discuss whatever they wanted. After each 4-minute speed date, the men would move one seat to the left and all daters would fill out a “post-speed dating evaluation survey” for the dater they had just finished interacting with. This was identical to the survey after messaging interactions, but with a question asking the dater if they wished to exchange contact information with their interaction partner.

6 OPERATIONALIZING THE DEPENDENT VARIABLES

Desire for a face-to-face meeting (H1A,B) was operationalized with a seven-point Likert-scale question in the post-messaging evaluation survey and the post-speed date evaluation survey: *“If I had to make a choice right now, I would choose to go on a date with this person.”* (It was explained to daters that “go on a date” pertained to a face-to-face meeting outside of the context of the study).

Enjoyment of interaction (for H2A,B) was operationalized in the post-messaging evaluation survey and the post-speed date evaluation survey with the enjoyment of interaction index from the Rochester Interaction Record/RIR [69,79]. This includes four Likert-scale questions (7-points each) about quality of an interaction, degree of closeness/camaraderie during an interaction, level of satisfaction with an interaction, and satisfaction with an interaction relative to expectations.

7 RESULTS FROM QUANTITATIVE ASSESSMENT OF THE INTERFACE

Of the 48 users (24 men, 24 women) of the messaging interface variations, 47 were included in quantitative analysis. One woman was removed from analysis because she was not exposed to the PAI. This section is structured as follows. First we present some descriptive statistics to give a broad representation of the dataset. We then test potential confounding effects, followed by testing of hypotheses and research questions.

7.1 Overview of the dataset

A broad overview of the data are featured in Table 1 (next page), and are intended to give the reader a broad glimpse at the dataset before we delve into analysis pertinent to the hypotheses and research questions. The data pertains to the variables of enjoyment of messaging interaction (in general, and not specific to any one interface variant), enjoyment of speed dating/face-to-face interaction, and desire for a date outside the context of the study.

Variable	Mean (overall)	Mean (Men)	Mean (Women)	Median (overall)	SD (overall)
Enjoyment of messaging interaction (RIR [63] out of 28 points)	15.143	17.083	13.117	17	5.5297
Enjoyment of face-to-face speed date interaction (RIR)	17.8803	19.953	15.7173	18	5.2113
Difference between enjoyment of messaging interaction and speed date interaction (RIR – out of 28 points)	+1.396	+1.588	+1.195	2	6.2425
Difference between enjoyment of messaging interaction and face-to-face interaction (RIR - out of 28 points, independent of direction of change)	5.1477	4.9074	5.3985	4	3.9510
Desire for face-to-face meeting after messaging (out of 7 points)	4.1412	4.8321	3.4202	4	1.6611
Desire for face-to-face meeting after face-to-face speed date	4.117	5.0416	3.1521	5	1.8409
Change in desire for face-to-face meeting between messaging and face-to-face speed date (out of 7 points)	+0.087	+0.218	-0.0489	0	1.7923
Change in desire for face-to-face meeting between messaging and face-to-face speed date (out of 7 points, independent of direction of change)	1.2263	1.0659	1.3937	1	1.1570

Table 1. Daters' enjoyment of interactions and desire for dates.

Outcome	Mean (overall)	Mean (Men)	Mean (Women)
# of requests to exchange contact info (out of 8 daters)	3.4680	4.7916	2.0869
# of matches per user	1.3829	1.4583	1.3043
% of contact info requests reciprocated	0.4159	0.3156	0.53125
Couples confirmed as dating after study	3 (total)		

Table 2. Outcomes of the speed dating events.

From the table we can see that both men and women found face-to-face interaction during speed dates to be more enjoyable than messaging interaction on average. Women generally exhibited less desire for a face-to-face meeting outside the context of the study, which is in line with evolutionary theory [18,83]. Women's desires for face-to-face meetings outside of the study also tended to go down after a face-to-face speed date, whereas men's desires went up on average. Women also experienced larger changes than men in their desires for face-to-face meetings between messaging and speed date interaction.

Table 2 summarizes information about outcomes of the speed dating events that are unrelated to the hypotheses and research questions. This includes requests to exchange contact information with other daters (mutual requests were called matches). We can see that men tended to make more than double the number of contact information requests as women, but were less likely than women to have their contact information requests reciprocated.

7.2 Testing for Potential Confounders

The data were analyzed for the following potential confounding effects:

Opinion choice - Can enjoyment of interaction and desire for a face-to-face meeting be predicted simply by the opinion choices picked for the first-date conflict stories, regardless if users were made aware of those opinion choices in the messaging interface? To test for this, the open messaging interface was treated as two interfaces: an open-agreement interface (two users agreed on the story assigned to the respective messaging conversation round, unbeknownst to them) and an open-disagreement interface (two users disagreed on the story assigned to that round, unbeknownst to them). Significant differences between these two interfaces would give evidence to this confounding effect. A Wilcoxon signed-rank test was used to explore differences between these two messaging interface conditions in regards to each dependent variable. The dependent variables were operationalized in two ways: as rank orders to reduce variation caused by having a different interaction partner in each messaging round (i.e., ranking the two interfaces as 1 or 2 based on which had the smallest difference/confidence), and as raw scores/actual values for the variables. None elicited a statistically significant difference.

Order effects - Did the order in which users were exposed to each messaging interface change their evaluations of potential romantic partners? A Spearman's rank-order correlation was run with the first variable being the order in which a user was exposed to the prompted-disagreement interface (1st, 2nd, or 3rd out of the three messaging interface variations) and the second variable being the prompted-disagreement interface's a) raw score/actual value and b) rank (out of the three interface variations) for each of the dependent variables per user. There were no statistically significant correlations.

Story effect - Did any of the four first-date conflict stories perform better than the others in terms of the dependent variables? Since all users were prompted to discuss each of the four dating stories, a Friedman test was run for each dependent variable to test for significant differences in the four stories. The Friedman tests were not statistically significant.

7.3 Testing the Hypotheses

To explain the tests used to explore the hypotheses, two decisions must be clarified. First, rank orders for the three interface variations were used for analysis of each dependent variable as opposed to raw scores/actual values. This was to control for variance and extreme outliers in survey data caused by having a different interaction partner in every messaging round and a relatively small sample size [75,85].

Second, non-parametric tests were used to address the hypotheses. There are two reasons for this. One, the dependent variables were operationalized with Likert scales (ordinal data). Parametric tests, which assume continuous data, would thus not be appropriate. Non-parametric tests, on the other hand, can handle ordinal data [58,85]. Two, the median rankings better represent the center of the distribution for a given dependent variable than the mean in this study. For reasons similar to why rank orders of the interfaces were used in analysis instead of raw scores/actual values, variance caused by interacting with a different dating partner in each messaging round and the relatively small sample size can strongly affect the mean for a dependent variable. Median data points are not as sensitive to these circumstances and would thus be a better measure of central tendency [42,75]. Non-parametric tests are appropriate here because they analyze differences in median rankings, while parametric tests are based on group means.

To test the hypotheses, first a Friedman test was performed to indicate if there was a significant difference in the ranks between the interfaces overall. If so, a Wilcoxon signed-rank test was run to detect which interfaces significantly differed from one another. A Holm-Bonferroni adjustment was applied to the results of the Wilcoxon signed-rank tests to control against Type I error [52].

7.4 Results for Differences in Desire for a Face-to-Face Meeting (H1A, H1B, RQ1)

Differences in desire for a face-to-face meeting after messaging interaction and after subsequent “speed date” interaction were computed as the absolute value of the difference between scores in order to accommodate rank ordering. When rank ordering the messaging interfaces for each user, the interface that yielded the smallest difference in desire for a face-to-face meeting was ranked #1, and the interface yielding the largest difference was ranked last.

Women (H1A, H1B): The PAI had a median rank of 1 for women, the PDI had a median rank of 2, and the open messaging interface had a median rank of 3. According to the Friedman test for women, there was a statistically significant difference in this variable depending on which messaging interface was used, $\chi^2(2) = 9.596$, $p = 0.008$. Since the Friedman test was significant, Wilcoxon signed-ranked tests were conducted to test H1A and H1B. According to the Wilcoxon signed-rank tests, the PAI produced a significantly higher median rank than the open messaging interface ($Z = -2.691$, $p = .007$), having produced smaller differences in desire for a face-to-face meeting for 18 out of the 23 women. This provides support for H1A.

Differences between the PDI and open messaging interface were not significant, meaning H1B was not supported. See Table 3 for a summary of results.

Men (RQ1): The open messaging interface had a median rank of 1.5, while the PDI and PAI both had a median rank of 2. The Friedman test for differentials in desire for a regular date after messaging and after a face-to-face speed date indicated a statistically significant difference depending on which messaging interface was used, $\chi^2(2) = 6.418$, $p = 0.040$. Since the Friedman test was significant, Wilcoxon signed-ranked tests were conducted to explore RQ1. According to the Wilcoxon signed-rank tests, the open messaging interface produced a significantly higher median rank than the PAI ($Z = -2.618$, $p = .009$), having produced smaller differences in desires for a face-to-face meeting for 17 of the 24 men in the study. Differences between the PDI and open messaging interface were not significant. See Table 4 for a summary of results.

Table 3. Results of H1 for women (desire for a date).

RQ1 (men)	Difference in desire for a date after messaging and FtoF interaction
Ranks (smallest difference)	Open messaging < Prompted-disagreement = Prompted-agreement (median rank: 1.5) (median rank: 2) (median rank: 2)
PAI vs open messaging	Open messaging produced smaller differences than PAI ($Z = -2.618, p = .009$)
PDI vs open messaging	No significant difference ($Z = -1.377, p = .168$)

Table 4. Results of RQ1 for men (desire for a date).

7.5 Results for Differences in Enjoyment of Interaction (H2A, H2B, RQ1)

Differences in enjoyment of messaging interaction and subsequent face-to-face speed-date interaction were computed as the absolute value of the difference between scores in order to accommodate rank ordering. When rank ordering the messaging interfaces for each user, the interface that yielded the smallest difference in enjoyment of interactions was ranked #1, and the interface yielding the largest difference was ranked last.

Women (H2A, H2B): The PAI had a median rank of 1 for women, while the PDI and the open messaging interface both had a median rank of 2. According to the Friedman test, there was a statistically significant difference in the ranks for “enjoyment of interaction” (between messaging interaction and face-to-face speed date interaction) depending on which messaging

interface was used, $\chi^2(2) = 6.422$, $p = 0.040$. Since the Friedman test was significant, Wilcoxon signed-ranked tests were conducted to test H2A and H2B.

According to the Wilcox signed-rank tests, the PAI produced a significantly higher median rank than the open messaging interface ($Z = -3.154$, $p = .002$), having produced smaller differences in enjoyment of interaction for 19 of the 23 women. This provides support for H2A. Differences between the PDI and open messaging interface were not significant, meaning H2B was not supported. See Table 5 for a summary of results.

Men (RQ1): All of the messaging interface variations had a median rank of 2 for men. A Friedman test did not indicate a statistically significant difference in the ranks for “enjoyment of interaction” (between messaging interaction and face-to-face speed date interaction) depending on which messaging interface was used, $\chi^2(2) = .568$, $p = .753$. Hence Wilcoxon signed-ranked tests were not conducted.

H2 (women)	Difference in enjoyment of messaging and FtoF interaction		
Ranks (smallest difference)	Prompted-agreement < Prompted-disagreement = Open messaging (median rank: 1)	(median rank: 2)	(median rank: 2)
H2A	PAI will produce smaller differences than open messaging		
Supported?	Yes		
Results	$Z = -3.154$, $p = .002$		
H2B	PDI will produce smaller differences than open messaging		
Supported?	No		
Results	$Z = -1.575$, $p = .115$		

Table 5. Results of H2 for women (enjoyment of interaction).

7.6 Summary of Quantitative Results

Hypotheses regarding the prompted-agreement interface (PAI) were supported, providing evidence that the PAI improves women’s capacity to make informed face-to-face meeting decisions relative to the standard open messaging interface. Supported hypotheses include H1A (for women, the PAI will produce smaller differences in desire for a face-to-face meeting than the open messaging interface), and H2A (for women, the PAI will produce smaller differences in enjoyment of interaction than the open messaging interface).

Hypotheses regarding the prompted-disagreement interface (PDI) were not supported, meaning the study did not find support that the PDI improves women’s capacity to make informed face-to-face meeting decisions. Unsupported hypotheses include H1B (For women, the PDI will produce smaller differences in enjoyment of interaction than the open messaging interface) and H2B (For women, the PDI will produce smaller differences in enjoyment of interaction than the open messaging interface).

RQ1 asked: for men, do the messaging interfaces vary in terms of differences in desire for a face-to-face meeting or enjoyment of interaction? Results indicate that the messaging interfaces do not vary in terms of differences in enjoyment of interaction. In regard to decisions to meet face-to-face, results indicate that the PAI yielded *worse* face-to-face meeting decisions after messaging interaction than the open messaging interface. This means that the PAI had the opposite effect on men as it had on women.

7.7 Limitations of the Quantitative Interface Assessment

There are some limitations to our method that potentially affect generalizability. For one, due to the way in which daters were designated to participate in the quantitative or qualitative component of the study (based on arrival time), participants in the quantitative component may have been more conscientious than the typical online dater based on their tendency to arrive at the speed dating event earlier. In addition, users of our online dating site were aware that they were being monitored by research assistants. This may have produced behavior during messaging that could vary from how users may have used the interfaces in an unmonitored setting.

Other limitations have potential implications on the results. For one, users engaged in messaging interactions with—and subsequently met face-to-face with—potential romantic partners that they may have rejected earlier if they had a choice, particularly those with profile pictures they considered unattractive. If users had mentally “written off” a potential partner based on their physical appearance, they could have put less effort into evaluating their partner over messaging, therefore potentially degrading their assessments of desire for a date in ways unrelated to the messaging interface used. In addition, profile page content in this study’s online dating system was quite sparse (just a picture) compared to typical profile pages “in the wild.” Users in this study who rely on profile content for generating messaging conversation ideas may have been unable to enact a strategy they were most accustomed to using in an open messaging interface. This could have potentially limited evaluation capabilities through open messaging in ways that would not exist in a fully ecologically valid context. Relatedly, messaging interactions in this study were largely synchronous; there were no extended delays between messages during which users could have strategized their message content. As such, the amount of time users took to deliberate and decide on their message responses in this study was likely much shorter than the time they typically take to decide on message content “in the wild” where they do not have time constraints. This could have potentially improved evaluation capabilities through open messaging for women because men would have been less able to implement carefully deliberated impression management strategies. Despite this, results still positioned the prompted-agreement interface as superior to the open messaging interface for women, which makes the prompted-agreement interface arguably more impressive.

8 FINDINGS FROM QUALITATIVE ASSESSMENT OF THE INTERFACE

All focus groups were voice recorded, and later transcribed and analyzed using line-by-line coding according to Strauss and Corbin [76] and iteratively reviewed to refine emerging categories. Analysis resulted in a selective code around gender differences, and axial codes pertaining to willingness to use the prompted discussion interface, plans to use the interface, and interface preference. Participant names have been changed in representative quotes for anonymity.

8.1 Women were wary of arguments through the prompted-disagreement interface

When comparing the two variations of the prompted discussion interface, women largely preferred the prompted-agreement variation (PAI) over the prompted-disagreement variation (PDI). Some were hesitant about “*awkward*” (Ella) or “*uncomfortable*” (Rebecca) discussions

stemming from prompted disagreements, and admitted they likely would not use the prompted-disagreement variant if they had a choice.

Rebecca: “I would feel uncomfortable. Usually I try to avoid negative topics like that [in messaging conversations]. [...] It’s not a positive vibe. And sometimes a guy will get mad if you try to say he’s wrong about something.”

Sarah: “Like, would I have to talk about [the disagreement]? I guess it would be ok, but I [probably would not choose to discuss the disagreement] if I had the option.”

Some women mentioned open messaging interactions they had in online dating systems in the past in which men reacted poorly to disagreements that occurred. They expected similar negative reactions from men in the prompted-disagreement interface.

Tonya (discussing a prior online dating experience): “This one guy, right. He was talking about some restaurant we both know and I said it’s pretty overrated. A tourist spot. He freaked out at me! Saying I have no taste and all that. Well excuse me for having a different opinion. [...] I wouldn’t want to get into a lot of those conversations. So me, personally, I’m fine with the guy picking a different opinion choice from me. Would he be okay though? If you could somehow check that, to make sure the guy wouldn’t freak out that I disagreed, this would probably be a great, great feature to have.”

8.2 Women anticipated informative conversations with the prompted-agreement interface

While the PDI drew hesitant reactions, women in the focus groups were excited about the PAI due to an expectation that the resulting conversations would be more stimulating and informative than the topics that men typically start conversations with in open messaging. For this reason they largely preferred the PAI over the standard open messaging interface.

Harriett: “Oh this would be fun. [...] I’d rather talk about this than the same old stuff like ‘hey how is your day?’”

Jessica: “I wish I had this on Tinder. We get so many ‘hey’ messages that don’t go nowhere. Guys don’t know what they’re doing. [...] Most of my chats [in open messaging interfaces] totally suck and my [mindset before dates is] like ok, hoping for the best. [...] Would this new messaging feature [the prompted-agreement interface] help me see their conversation skills earlier? Yeah I think so. I’d want to try it out.”

Kristen: “There are only so many different ways they can start [a messaging interaction] with me. It’s either Game of Thrones because that’s in my profile, or my looks, or just ‘hey how are you.’ [...] I’d get a lot more information about us as a potential couple with these [first-date conflict stories].”

Joann: “Yes, yes, yes. Messaging is my least favorite part of online dating. I could show you some of the messages I get. They are just so bad and you can’t get a conversation started from any of that. I think it would be a lot of fun to talk about these scenarios, ones like this. [...] I bet it would save me from going on a lot of bad dates.”

Despite finding conversation topics chosen by men to help little with face-to-face meeting decisions, women in the focus groups indicated rarely trying to change or pose new topics for messaging. Yet some participants said they would be willing to send the first message in the PAI because the prompt itself could be interpreted as a message to “kickstart” (Emma) the interaction.

Vivian: “I wouldn’t even wait for the guy [to send the first message]. The site is asking us to talk about [this first-date conflict story], so I don’t feel like I’m really making the first move here.”

It's not like I'm starting the conversation out of nowhere. [...] The way I see it, the app is doing that."

Ella: "Well I would ask [the man I matched with] why he picked that [opinion] choice. So he would be the one to really start talking about the story first because I'd want to get his take on it before I start explaining myself. [...] Actually I'd probably prefer to send the first message so I can get him to start explaining his opinion first [laughter.]"

8.3 Men valued both prompted discussion interface variants for saving time

Men generally preferred the prompted messaging interfaces over the open messaging interface. They considered the story prompt to alleviate the need to create one's own conversation topics, which was a common source of frustration and something they lamented spending a lot of time on.

Robert: "It saves me a bit of work. [...] What should I talk about? With this, I don't have to think about it."

Jason: "I think it would make it a bit easier. I just say 'hi' [in the online dating systems that I currently use] because what else are you supposed to do?"

Bill: "So I looked up some stuff online. People have tips for what to say in your messages. How to get the girl to like you. They don't always work and [...] I put more time into that than anything. [...] I'd go with this [prompted interface] for that reason alone. Time."

Mike: "Yeah like I wouldn't be worrying like am I saying the right thing. I'm just doing what the app is telling me to do. I'll follow [the interface's] lead. [...] As long as I don't say something stupid, screw it up, I'm probably going to get the date."

8.4 Men interpreted a prompted agreement as a signal of compatibility and attractiveness

Like women, men tended to prefer the PAI over the PDI, albeit for a different reason. For men, the preference stemmed from a perceived "advantage" (Zack) that the prompted agreements gave them for self-presentation. This was due to an interpretation that the visualized agreement was emphasizing compatibility akin to a "match" (Hank) computed by an algorithm. Under this interpretation, the conversation prompt was seen as the online dating system's way of helping men showcase compatibility, and therefore attractiveness, and avoid "stupid" messaging moves (Jack).

Bart: "The site is helping me out here, huh? Like 'hey, talk about this thing you have in common.'"

Jack: "I'm guessing you made this [prompted-agreement interface] to help guys. You're like making sure we don't say anything stupid by giving us something to talk about with the girl. And it's a positive thing, something we see eye to eye on. [...] Yeah, I would no longer have to worry about what to type."

Most men in the focus groups thought the agreements of opinion would be a "safe bet" (Greg) to use as conversation topics, and some imagined out loud how these messaging conversations would go.

Ray: "I'd be like 'hey you seeing we think the same right?' [laughter]. Like reminding her that I'm a good guy."

Barry: “Since I know the girl already agrees with me, I’d dig in a little more. Probably talk about why I didn’t pick the other choice. Maybe I’d even say I wouldn’t like girls that picked the other choice because that would look like I had standards. I don’t just pick any girl and I’m not all about looks. I value their opinions and views and this kind of feature [the prompted-agreement interface] helps me show that. I want to show the girl that I put thought into [my opinions about] these stories. I’m a thinker, man.”

Not all men preferred the prompted interfaces for self-presentation however. A few liked the open messaging interface best because they considered it an opportunity to distinguish themselves from the men who do not know how to attract women through messaging conversations. Prompted messaging interfaces could potentially remove that advantage or “level the playing field.”

Roger: “I have my routine. [...] I sense things in the profile and I talk about how we have those things in common. It’s better than what you guys are doing I think [referencing other men in the focus group who admitted that they seldom receive a response to their introductory messages]. [...] If you have this app telling you what to talk about, damn.”

8.5 Men were curious about the prompted-disagreement interface for user evaluation

While most comments from men in the focus groups about the prompted discussion interfaces pertained to self-presentation strategies, a few exhibited interest in evaluating women through interaction. This desire was voiced mostly with the PDI. For example, Eddy considered the interface valuable for identifying likely sources of conflict in future interactions that would make women undesirable for a face-to-face date (or “weed out the crazies” as he described).

Some men also seemed genuinely curious about the basis for disagreements of opinion. Daniel said: “Well I kind of want to know. Why did you pick [that opinion choice]? [...] Even if it doesn’t work out between us, I could learn something.” Given the emphasis on self-presentation throughout the focus groups with men, this curiosity over opposing opinion choices may have been due to a desire to use this understanding to improve impression management capabilities (i.e., altering opinion choices for future interactions, or preparing explanations for opinion choices, that are more likely to be found attractive by women).

8.6 Summary of Qualitative Findings

The focus groups intended to explore three research questions about online daters’ reactions to the prompted discussion interface variants. We summarize our findings here based on those research questions.

RQ2: How do users anticipate the prompted discussion interface impacting their user evaluations and face-to-face meeting decisions?

Women expected that conversations stemming from the prompted-agreement variant (PAI) would be more stimulating and informative than the topics that men typically start conversations with in open messaging interfaces. This excitement did not translate to the prompted-disagreement variant (PDI), however, due to an expectation that prompted disagreements would lead to arguments.

Conversely, some men considered the PDI as valuable for user evaluation, particularly for avoiding unpleasant face-to-face encounters. Anticipated use of the PAI by men, however, revolved mostly around self-presentation benefits rather than user evaluation, due to an

interpretation by men that the visualized agreement of opinion was a signal of compatibility, which could boost their attractiveness.

RQ3: Would online daters be willing to discuss first-date conflict stories if a messaging interface prompted them to do so?

Women were enthusiastic about discussing first-date conflict stories that were prompted with an agreement of opinion. But some women were uncomfortable about using the PDI because of anticipated arguments as previously mentioned. Men indicated willingness to use both the PAI and PDI because the conversation prompt alleviated the need to come up with their own conversation topic, which was a common point of frustration.

RQ4: Would users prefer the prompted discussion interface over an open messaging interface in online dating systems that they use?

Both women and men preferred the PAI over the PDI and the standard open messaging interface, albeit for different reasons. Women believed conversations sparked by the prompted agreements would be more informative to face-to-face meeting decisions. Men expected the prompted agreements to benefit their self-presentation.

8.7 Limitations of the Qualitative Interface Assessment

There are some limitations to the focus group portion of the study that should be noted. For one, daters self-selected for the study based on recruitment materials that indicated they would be exposed to new online dating features. It is unknown if the findings would generalize to other online daters, particularly those that are shy or reluctant to try new interfaces. Future work could consider ways to involve users with varied personalities or social tendencies.

Participants' answers in focus groups could have been influenced by other participants, meaning the opinions of the most vocal participants could have been overemphasized in analysis. Furthermore, participants often brought up negative past online dating experiences, and frustrations with the standard open messaging interface could have inclined them to respond favorably to any alternative interface. In addition, participants in the focus groups did not know ahead of time that they would be discussing online dating interfaces at the speed dating events. While no participant declined to be a part of a focus group, their capacity to reflect critically on the prototypical interfaces and discuss their prior online dating experiences could have been improved with anticipation of the focus group. Lastly, the participants were likely able to discern that the new messaging interface variations (the PAI and PDI) were created by the research team. This may have led them to attenuate criticism of the prompted discussion interfaces.

In regards to using the qualitative findings to lend explanations to the quantitative results (to which we delve into in the Discussion section next), there is a limitation in that there were different participants in each component of the study. It is possible that participants who used the prompted discussion interfaces first-hand during the quantitative component may have had different reactions to the interfaces. It is also possible that focus group participants' expectations of how they would use the interface, or how it may help them, could fail to match reality in live-use situations.

9 DISCUSSION

The prompted discussion interface was designed as a messaging tool to explore how women's face-to-face meeting decisions in online dating could be improved, and therefore their capacity to manage the risks of face-to-face meetings. Some of our results from a mixed methods assessment utilizing speed dating events are promising: a variation of the interface (the PAI) statistically improved women's face-to-face meeting decisions and was preferred by women over the traditional "open" messaging interface. The inclusion of men in the study also proved valuable for identifying unanticipated new risks to women that are introduced through misinterpretation of the interface's content by men.

In this section we first reflect on the quantitative and qualitative insight collectively. We then consider the implications of this work on future research and design seeking to mitigate gendered risks of online dating and social matching systems when transitioning interactions to face-to-face encounters. Ideas for revisions to the prompted discussion interface, and future work extending our studies, are also provided.

9.1 Reflecting on the Quantitative and Qualitative Results Collectively

A benefit of using speed dating events in our method was that we were able to collect data at multiple points in the online dating process to assess how user evaluation changes, and without being biased by what happens at later points in evaluation. Mixed methods assessment involved two variations of the prompted discussion interface. The prompted-agreement interface (PAI) variation prompted users to discuss a "first date conflict story" that they both shared an opinion choice on, whereas the prompted-disagreement interface (PDI) variation prompted users to discuss a story that they disagreed on. Quantitative assessment involved daters having messaging conversations with potential date partners through one of the prompted discussion interfaces or the standard "open" messaging interface typical of today's online dating systems, followed by a face-to-face "speed date" interaction. Enjoyment of interaction and desire for a date outside of the study were recorded through surveys after both messaging and speed date interaction to assess how these assessments changed across modalities. The PAI and PDI were both intended to reduce these differences in assessment across modalities, therefore enabling women to better use messaging interaction to inform who they would enjoy face-to-face interaction with. Qualitative assessment involved focus groups with a different set of participants discussing their opinions of, and plans to use, the prompted discussion interfaces. Insight from both studies reinforce stark gender differences in online dating [2] and extend our understanding of how these differences are reflected in system-use.

Results indicate that the PAI is a superior interface for women compared to the standard "open" messaging interface. Their enjoyment of interaction, as well as desire for a date outside of the study, were statistically more consistent between messaging and face-to-face interaction when using the PAI. This suggests that the PAI can improve women's safety by way of yielding messaging interactions that give a better indication of what face-to-face interaction would be like with a given partner. Qualitative assessment further supports the PAI: women in the focus groups preferred the PAI over open messaging, and they anticipated more informative interactions through the PAI than those through open messaging, which are commonly impression management-minded conversation topics chosen by men [87,89]. In addition, some women reported a willingness to send the first message in conversations through the PAI—this runs counter to prior research into the open messaging interface, which indicated that women seldom initiate messaging conversations [33].

However, results indicated no statistical difference between the PDI and open messaging. Qualitative assessment suggests this could be due to discomfort with the PDI. Women in the focus groups did not want to use the PDI because they anticipated such interactions being awkward and potentially triggering of arguments. Research into online and sexual harassment [39,70], including in the online dating context [5], lends credibility to this concern. It is further supported by research into negativity bias, or the tendency for negative information to have a greater effect on one's psychological state than neutral or positive information [9]. Given an emphasis on impression management during online dating [26,27,81], it is understandable that the perceptually negative implication of a prompted disagreement would carry extra weight on users' expectations of their messaging partners.

For men, neither the PDI or PAI were a statistical improvement over open messaging for evaluating a potential dating partner. The qualitative assessment suggests that this could be due to men's emphasis on impression management over impression formation during messaging. Men in the focus groups talked primarily about using the PDI and PAI to improve their attractiveness to women, and they valued the prompts regardless of agreement/disagreement for alleviating the anxiety associated with deciding on a conversation topic. This aligns with prior research exploring men's strategies for using messaging interfaces, particularly their search for messaging content that would solicit attraction from women [87].

Despite favorable opinions of both prompted interface variations in the qualitative study, men's face-to-face meet decisions were actually worsened by the PAI compared to open messaging in quantitative assessment. A possible explanation for this result is misinterpretation of the interface. Men in the focus groups commonly interpreted the matching opinion choices in the PAI (see Figure 2 for reference) as a signal of compatibility similar to a match computed by an algorithm. They anticipated that conversations based on prompted agreements would therefore elevate their attractiveness to women (this interpretation was not echoed by women however). This misinterpretation of interface content aligns with research in psychology regarding sexual overperception bias: a tendency of men to overperceive sexual interest so as to maximize their opportunities for sex [49]. If men in the quantitative study similarly interpreted matching opinions as beneficial to their attractiveness, it could have (mis-)led them to expect a certain level of attraction and therefore influenced their desire for a face-to-face date during messaging (research indicates that men are more likely to be attracted to women that they think are attracted to them [40]).

9.2 Mediating—and Introducing—Risk through Design

The prompted discussion interface was intended to help women mitigate risk of going on undesirable face-to-face dates by way of better informing their face-to-face meeting decisions. While the PAI variation, in particular, did yield success towards this risk mitigation, it inadvertently created a different risk. Men had an opposite experience with the PAI: it statistically worsened their face-to-face meeting decisions, which may be due to misinterpretation of prompted agreements as signals of compatibility and therefore misassumed attractiveness in the eyes of their messaging partner. Such misinterpretation could lead to misaligned expectations for face-to-face meetings, and therefore undesirable dates and outcomes for both partners.

The discovery of this inadvertent risk, while concerning, does provide value to future HCI research into risk mitigation. If men were not included in data collection—which was a plausible

option given the intention of the interface was to support women—this inadvertent risk would not have been identified and the PAI would have seemed a clearly advisable addition to online dating interfaces. This discovery demonstrates that, **in order to fully understand the expected and unexpected implications of a new risk-conscious design, user demographics other than those that assume the risk must be included in the research, most notably, those that pose a risk.**

Towards improving our interface and risk-conscious design more broadly, we should also consider *when* varied user demographics should participate. The feminist HCI principle of participation [7] emphasizes “valuing participatory processes that lead to the creation and evaluation of design prototypes.” While women and men were involved in the evaluation of our prototypes, we must wonder if the issues uncovered during evaluation—namely, women’s hesitation to discuss prompted disagreements, and men’s misinterpretation of prompted agreements—could have been addressed earlier if end-users were involved in creation or ideation of the prototypes as well. There are several ways that we can use participatory processes to revise the design of our prompted discussion interface. For one, men can inform ways to present opinion choices that limit misinterpretation as signals of compatibility and attraction. They can also provide insight into how other features in online dating systems may impact use of the prompted discussion interface “in the wild” (e.g., if/how they attempt to leverage a woman’s profile content to craft ideas for rationalizing their opinion choices over messaging that would be considered attractive).

We can further leverage participatory processes to address design limitations around scalability and generalizability. Our interface featured only four discussion prompts; this leaves a question of how to generate prompts at scale. Similar to OkCupid’s approach, we could crowdsource user-generated discussion vignettes, and also crowdsource validation of these vignettes as appropriate and informative discussion topics in ways similar to our MTurk study (see section 3.1). Furthermore, our discussion prompts pertained to a narrow demographic (heterosexual men and women) and a narrow context of discussion (first dates). Such a design may not apply to other user goals (e.g., friendship, professional connections, and casual sex [11,12,54,64,77]) and user demographics (especially marginalized populations [30,67]). Participatory processes with other user demographics could lead to discussion vignettes more reflective of their experience, and could be combined with the aforementioned crowdsourcing approach for scalability.

9.3 The Feasibility of Pluralist Design

We would be remiss not to emphasize the promise that both of our interface variations show for intentionally designing for at-risk or non-majority user demographics. Online dating systems have been criticized for designs that assume a universal user [48], and some attempts to design for particular user demographics are almost comically exclusive (e.g., Farmers Only). It is tempting to reach the conclusion that pluralist designs of online dating systems—or designs that “resist any single, totalizing, or universal point of view” [7]—are impractical without creating entirely separate applications tailored to marginalized, non-dominant experiences. This, of course, is a suboptimal solution because it reinforces the marginalized status of these user groups and formalizes a separation from broader online dating userbases. **Our study is evidence that pluralist design [7] for online dating systems is feasible without being exclusionary.** The prompted discussion interface intended to support the needs of women, but

men in our study were receptive to, and even enthusiastic about, using it (despite quantitative results indicating that it does not give them the intended benefit). This suggests that designs for women and marginalized groups can be considered valuable to majority users as well—a sign that may make designers more willing to address the needs of at-risk and non-majority users.

10 CONCLUSION

In this paper we presented the prompted discussion interface; a messaging interface for online dating systems intended to help women inform their face-to-face meeting decisions and therefore better manage the gendered risks of meeting new dating partners. The interface prompts users to discuss their pre-selected opinions about a first-date conflict scenario (e.g., a woman realizes her date lied about his real height in his profile; should she stop dating him?). Results from a mixed methods study indicate that the variant of the interface that prompts users to discuss an agreement of opinion did improve women's face-to-face meeting decisions, yet men's decisions were worsened by the same interface variant, potentially due to a misinterpretation of a visualized agreement as a signal of compatibility. So while risks to women in regards to poorly informed face-to-face meeting decisions seemed to be mitigated, the interface inadvertently introduced a new risk by way of potentially misleading men about attraction or compatibility due to their misunderstanding of interface content. The results ultimately stress the importance of including user demographics that pose risk into research and design of interfaces for risk mitigation in order to identify unanticipated implications.

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