

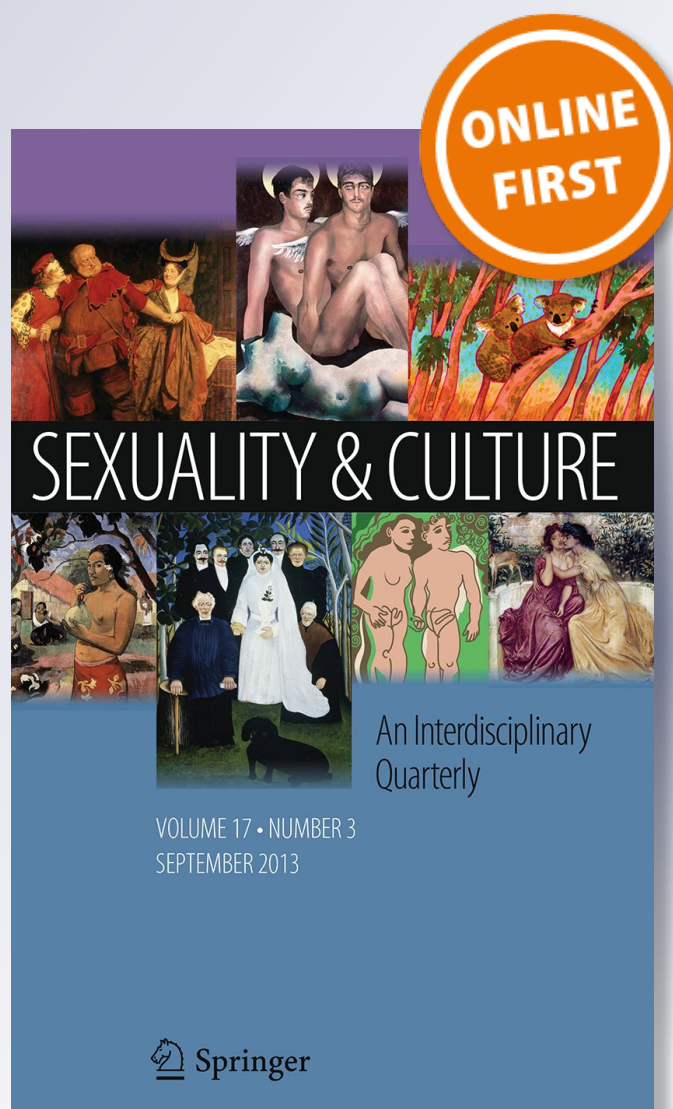
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Smartphone Battery Levels and Sexual Decision-Making Among Men Who Have Sex with Men

Alex Lopes¹ · Kaylee Skoda¹ · Cory L. Pedersen¹ 

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Abstract

Smartphone-dating and hook-up apps are undeniable factors in the modern landscape of sexuality. In particular, gay and bisexual men have bridged social and societal barriers for connection by using these apps. Despite advantages afforded by such technological advancements, when individuals are faced with a low phone battery, a sense of urgency may be experienced, which can increase risk-taking behaviours to accommodate an impending phone “death”. The purpose of this study was to determine whether a draining smartphone battery would facilitate a greater likelihood of agreeing to a hookup encounter. Participants were randomly assigned to one of three battery life condition groups (5%, 20%, 100%) and were asked how likely they were to agree to a hookup with a simulated potential sexual partner. We discovered that, relative to a full battery condition, participants were more likely to agree to a hookup in the lowest battery condition. Additionally, men who reported a greater likelihood of agreeing to a hookup also endorsed a greater propensity for sensation seeking, regardless of the battery condition. These findings have practical implications for educating smartphone users who utilize dating and hookup apps about how scarcity decision-making and sensation-seeking can impact the ability to practice safe sexual behaviours.

Keywords Hookups · Dating applications · MSM · Decision-making · Smartphones

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Introduction

The ever-increasing sophistication of technology and its seamless applicability to daily modern life has forever changed the way members of society interact with one another. One may meet, correspond, and cooperate with any individual possessing access to the online world. A fascinating consequence of such advancements is the changing landscape of romantic and sexual relationships. An individual seeking a potential sex partner need no longer venture to clubs or bars when one can easily submit a personal ad to Craigslist or install an application for dating or sexual encounters on a smartphone. Truly, the advancements of technology have permanently changed how we approach sex and sexuality in the twenty-first century (Rosenbaum et al. 2013).

The smartphone is an important example of technology's powerful impact on how modern individuals approach sex and sexuality (Rosenbaum et al. 2013). Of particular relevance are location-based, real-time dating applications. In such applications, users are gathered into a single virtual space and can access both the profiles and location of other users (Blackwell et al. 2015). In essence, these applications serve as virtual singles bars, save for some marked differences such as control over self-presentation and the anonymity provided by this control. This anonymity makes these applications—and Internet-mediated sexual encounters more generally—invaluable for sexual minorities, specifically gay men and gay youth (Pingel et al. 2013).

Given that heterosexuality continues to be presented as the societal norm, sexual minorities must exert greater effort to access information regarding their sexuality while also reconciling the stigma associated with their orientation. Not only do sexual minorities face the same obstacles that others—regardless of orientation—consider while exploring their sexuality, sexual minorities must also consider issues such as coming out safely and finding a same-sex partner (Dubois et al. 2015). Online applications represent important platforms for sexual minorities to facilitate the exploration of sexual desires and partnerships for which they may be otherwise stigmatized if sought publicly (Pingel et al. 2013; Paul et al. 2010). Moreover, unlike for heterosexuals, sexual minorities are often not afforded adequate sources of information concerning their sexuality. Of note is that even the scholarly literature on dating and hookups are largely heteronormative (Watson et al. 2017). Consequently, sexual minorities must seek alternative sources of information, ranging from Internet forums to trial-and-error (Mcdavitt and Mutchler 2014).

Given limited access to information and potential sexual partners, as well as the potential for public stigmatization, it is perhaps unsurprising that gay persons are often motivated to conduct their sexual pursuits in the virtual realm. Internet-mediated sexual encounter websites and applications (such as Grindr or Scruff) present users with a mode of exploring and embracing their sexuality and are more prevalent among sexual minority men and youth than any other group (Chan et al. 2016; Smith et al. 2018). Online dating profiles typically consist of the user's posted pictures and descriptions that include information such

as height, weight, body type, interests, and self-described personal characteristics (Miller 2015; Wu and Ward 2018). This curated and intentional nature of online self-presentation differs markedly from traditional, in-person forms of mate-seeking and affords users of these apps a greater amount of control over their image, while also improving the efficiency of assessing partner compatibility. Where once one had to approach potential partners and converse at length to determine compatibility and interest, now one need only scroll through the list of geographically viable partners; the immediacy of acquiring relevant information about potential partners is an efficiency unparalleled in face-to-face encounters.

Furthermore, the relative anonymity of Internet-based dating alters the dynamics of traditional partner hunting. Indeed, anonymity is one of the greatest appeals of application and Internet-mediated sexual encounters, though it is also one of the greatest risk factors associated with their use (Rosenbaum et al. 2013). Upon finding a profile of interest, one can directly and privately message that user. Unlike approaching potential partners face-to-face, during which sexual desires may remain undisclosed for some time, anonymous messaging on such applications affords users the opportunity to speak openly about their sexual desires—including those casual in nature—prior to meeting with potential partners. Indeed, recent research has confirmed casual sex encounters as the primary motivation for online application use (Carpenter and McEwan 2016; Gatter and Hodkinson 2016; Licoppe et al. 2016). This level of directness is not typical in traditional, in-person forms of mate-seeking, especially with novel acquaintances (Blackwell et al. 2015; Miller 2015) and reflects a phenomenon known as the online disinhibition effect; when an individual speaks or acts in a manner online not otherwise done in person (Miller 2015). Online disinhibition can be a tremendous advantage for sexual minorities, as such transparency may mediate open discussion of casual sexual intentions, sexual history, HIV status, and STI testing. However, disadvantages to online disinhibition exist as well. In some cases, aggressive behaviour or online bullying can occur (Miller 2015). Moreover, for sexually inexperienced youth, the prospect of unfamiliar persons making overt, sexual advances online can be jarring (Dubois et al. 2015). Finally, the desire to present oneself in a positive light may inhibit meaningful and honest conversation.

Clearly then, there are advantages and disadvantages to online dating and sexual-encounter applications. Internet-mediated interactions with potential partners are notably different when carried out online relative to a face-to-face setting. Of consequence to this study, however, are the ways in which these differences affect the decision-making process with respect to choosing a partner.

Existing Research on Scarcity and Decision-Making

Numerous factors influence how one chooses a potential sexual partner while using an online application to mediate sexual encounters. As noted, obvious factors include the physical appearance of and physical attraction to the potential partner (Blackwell et al. 2015). However, some of the most powerful motivators in sexual partner selection are less obvious. A myriad of subtle factors may influence the perception of the

availability—or scarcity—of a satisfactory choice. While there may be plenty of fish in the sea, not all fish are worth catching.

To illustrate, a user may be presented with a list of a hundred possible romantic or sexual partners. After a brief scan, the user may decide that twenty of the possibilities are attractive enough to be worth pursuing. However, the user may find that only ten of these matches are within a reasonable distance to travel. Perhaps five of the ten potential partners decide there is a mutual attraction and send a message in return. After some early correspondence between the user and the five potential partners, the user may decide only one or two of these individuals is a safe choice. Thus, the pool of potential partners has diminished from a list of a hundred to one or two. Without a doubt, the user will highly value these two potential partners after such a lengthy process of elimination, as the pool of potential partners has become scarce. Indeed, the scarcity principle often increases the value of an object or person limited in number (Cialdini 2007; Lynn 1991). Additionally, this illustration occurs under conditions in which the user is under no time constraints. In typical circumstances however, time exerts a tremendous effect on the process of partner selection (Reynolds-Tylus et al. 2015). Research evidence has shown that when someone feels pressure to decide (in this case pressure exerted by time) the number of factors they are able to consider diminishes (Iyer 1989; Godinho et al. 2016). In these time-constrained situations, the factors used for decision making are often the most salient and easily evaluated (Lenton and Francesconi 2010; Godinho et al. 2016).

Another interesting way that time influences partner selection during the use of such applications is the battery life of the smartphone the user operates. While objective time progresses in a linear manner and in constant units, the way in which time is perceived is based on subjective experience (Bar-Haim et al. 2010). The speed with which one experiences objective time varies based on the context of the stimuli within one's sensory field (Murai and Yotsumoto 2016). This progression of time via one's smartphone battery life has been shown to have an effect on decision-making in previous research—in 2016, the ride-sharing app Uber released a statement regarding “surge” prices. As the app runs directly from users' smartphones, Uber has access to the battery life of clients; the company reported that low battery status was the strongest predictor of client willingness to pay higher rates—up to two times the standard fare rate—during peak driver demand (Withnall 2016).

Given such findings, it is reasonable to assume that rash decision-making related to battery life may be applicable to sexual applications as well. Of concern, decreased numbers of available partners coupled with time constraints have been found to decrease the likelihood that discussions of safe sex before sexual encounters will occur (Reynolds-Tylus et al. 2015). In these ways, the pressure of finding a partner, compounded by decreasing battery life, may impair one's ability to make safe decisions regarding sex (Reynolds-Tylus et al. 2015).

Relevance of the Present Study

It follows that in the modern context, a unique concern related to time constraints arises: The battery life of one's phone. Decreasing battery life may influence an individual's partner selection process (Reynolds-Tylus et al. 2015). Given the myriad of challenges when choosing a potential sexual partner using online applications, the purpose of the present study was therefore to investigate whether impending battery "death" would influence sexual decision-making. The extent to which a diminishing phone battery might have an effect on decision-making of any kind is extremely under-researched. Considering that a mobile phone can be used to facilitate an anonymous sexual encounter, we investigated whether a declining phone battery would influence sexual decision-making. We also examined the relationship of hook-up likelihood to variables of interest such as sensation-seeking and age. Research on these topics may provide meaningful data on factors that influence individual's online partner selection process and sexual health decisions.

Thus, in line with current research, our study made the following two hypotheses: First, that participants exposed to imminent battery failure would be more likely to engage in a dating application sexual hook-up than participants not exposed to such a condition. Second, that participants who scored higher on a sensation-seeking scale would be more likely to hook-up with a potential partner overall, regardless of condition, relative to those who scored lower in sensation-seeking.

Methodology

Design

This study involved a single-factor (battery condition; 5%, 20%, 100%) randomized, between-group, experimental design.

Participants

The sample comprised 262 men who have sex with men between the ages of 18 and 67 years ($M_{\text{age}} = 31.12$; $SD_{\text{age}} = 12.35$). Participants were recruited from the research participant pool at a sizeable Western Canadian university and via snowball sampling through several online forums, including Reddit (through the sub-reddits *r/academicpsychology*, *r/samplesize*, *r/gaybros*, *r/gaymers*, and *r/gay*), Twitter, Facebook, lehmilller.com/sex-studies/, callforparticipants.com, and orgasmresearchlab.com/participate/. Eligible participants included men who have sex with men currently using smartphone dating applications (e.g., Tinder, Grindr) once a week at minimum, with previous sexual experiences involving at least one interaction with another person.

Table 1 illustrates the distribution of participants by battery life condition, mean age, and demographic characteristics. An independent samples ANOVA

Table 1 Distribution of demographic characteristics by condition

	5% Battery condition <i>n</i> = 86	20% Battery condition <i>n</i> = 87	100% Battery condition <i>n</i> = 89
Age	<i>M</i> = 31.51 (<i>SD</i> = 12.24)	<i>M</i> = 29.42 (<i>SD</i> = 12.11)	<i>M</i> = 32.40 (<i>SD</i> = 12.65)
Relationship status			
Single	44 (51.2%)	48 (55.2%)	40 (44.9%)
Casually dating	15 (17.4%)	16 (18.4%)	13 (14.6%)
Non-marital committed	13 (15.1%)	8 (9.2%)	16 (18.0%)
Common-law union	2 (2.3%)	3 (3.4%)	10 (11.2%)
Married	12 (14.0%)	12 (13.8%)	10 (11.2%)
Ethnicity			
Caucasian	56 (65.1%)	61 (70.2%)	66 (74.2%)
Indian/South Asian/Middle Eastern	7 (8.1%)	8 (9.2%)	7 (7.9%)
Asian/Pacific Islander	10 (11.6%)	7 (8.0%)	7 (7.9%)
Black	1 (1.2%)	3 (3.4%)	2 (2.2%)
Hispanic	7 (8.1%)	4 (4.6%)	6 (6.7%)
First Nations/Aboriginal	1 (1.2%)	2 (2.3%)	1 (1.1%)
Other identification	4 (4.7%)	2 (2.3%)	0 (0%)
Education			
Some High School	1 (1.2%)	2 (2.3%)	1 (1.1%)
Completed High School	7 (8.1%)	14 (16.1%)	10 (11.2%)
Some Undergraduate	35 (40.7%)	32 (36.8%)	25 (28.1%)
Completed Undergraduate	21 (24.4%)	20 (23.0%)	29 (32.6%)
Vocational degree/certificate	5 (5.8%)	3 (3.4%)	9 (10.1%)
Graduate School or above	17 (19.8%)	16 (18.4%)	15 (16.9%)

revealed no significant age differences across conditions, $F(2, 257) = 1.33$, $p = .266$ and Chi square analyses revealed no significant differences across conditions in participant relationship status, $\chi^2(8, N = 261) = 11.65$, $p = .167$, ethnicity, $\chi^2(12, N = 262) = 7.95$, $p = .789$, or highest level of completed education, $\chi^2(10, N = 262) = 10.02$, $p = .439$.

Measures

Demographic information Participants were asked to respond to a four-item questionnaire regarding their sexual orientation (to ensure eligibility requirements), age, ethnicity, relationship status, and highest level of completed education.

Independent variable: Hook-up vignette and battery conditions Participants were asked to imagine themselves as part of a short vignette describing a fictional, flirtatious, text messaging scenario (i.e., “sexting”; see “Appendix A”). The vignette was designed for the current study to evoke a sexually charged situation—the potential for an imminent sexual encounter—with someone who had been met several days previously through a dating app (e.g., Grindr). Upon reviewing the vignette, participants were randomly assigned to one of three sexual proposition scenarios presented in the form of a smartphone chat screenshot and asked to respond to a single question inquiring how likely they were to “hook-up” with the person, on a Likert scale ranging from 1 (*extremely unlikely*) to 7 (*extremely likely*).

The sexual proposition scenarios in each of the three screenshots were identical except for the independent variable—the smartphone battery life varying across conditions. Specifically, the first condition presented a screenshot with battery life indicated at only 5% remaining (see example; “Appendix B”), the second condition at 20% battery life remaining, and the control condition with 100% battery life remaining. In the two experimental conditions, participants were alerted to the imminent battery death with a warning indicating that the battery was about to die, and a hook-up decision needed to be made soon. All conditions had a 40 s time restriction, after which the survey moved on to the next series of questions.

Sensation Seeking Scale Form-V (SSS-V; Zuckerman et al. 1978). The SSS-V is a 40-item, forced choice inventory comprising four separate subscales developed to measure individual differences in stimulation and arousal needs (Roberti et al. 2003). Given the purpose of the present study, only the Disinhibition (DIS) subscale was used. The DIS subscale measures the desire for social and sexual disinhibition as expressed in social drinking, partying, and variety in sexual partners (e.g., “A person should have considerable sexual experiences before settling down”). Scoring involves one point for each chosen item corresponding to sensation seeking to a maximum of 10, where higher scores reflect greater endorsement of the subscale construct. The reliability and construct validity for the SSS-V instrument has been well established (see Roberti et al. 2003; Zuckerman 1994) with subscale coefficient alphas in the .70 s and .80 s. In the present study, the SSS-V produced a Cronbach’s alpha of $\alpha = .72$ for the DIS subscale.

Procedures

This study was presented to participants as an assessment of factors that influence ratings of attractiveness toward romantic and sexual partners. Participants were directed to an online survey site (qualtrics.com), where informed consent was obtained, and anonymity assured. Completed response rate to the survey was calculated at 95%. All participants were presented with site content in the same order. Study information and consent were presented first, followed by demographics, the descriptive vignette and randomized battery condition, the hook-up likelihood question, and the disinhibition subscale of the sensation-seeking questionnaire. A debriefing page was presented last. University student participants completed the survey in exchange for course credit in specified psychology classes. Non-university student participants were not provided any incentive to participate.

Results

This study employed a one-way analysis of covariance to explore the effect of three different battery conditions on the dependent variable of hook-up likelihood. Zero-order correlations examined how the sensation-seeking variable of disinhibition related to hook-up likelihood endorsement and provided a statistical rationale for controlling for sensation seeking in the subsequent ANCOVA.

Zero-Order Correlations

Results of the correlational analysis presented in Table 2 illustrate that the dependent variable of hook-up likelihood was significantly positively related to the sensation-seeking variable of disinhibition across all groups. Of note, age did not significantly relate to either hook-up likelihood or to the sensation-seeking variable of disinhibition.

Analyses of Differences among Battery Life Conditions

A one-way analysis of covariance—controlling for disinhibition—examined differences between the three battery life conditions of 5%, 20%, and 100% on the dependent variable of hook-up likelihood. As expected, a statistically significant effect of condition was found for hook-up likelihood, $F(2, 259) = 6.97$, $p < .05$, *partial* $\eta^2 = .04$. Post hoc pairwise comparisons with a Bonferroni corrected alpha of .01

Table 2 Correlations among age, disinhibition, and hook-up likelihood

Measures	1	2	3
1. Age	–		
2. Disinhibition	.05	–	
3. Hook-up Likelihood	.12	.39**	–

** $p \leq .001$

Table 3 Mean scores of hook-up likelihood across battery life conditions

	<i>M</i>	<i>SE</i>	95% CI	
			Lower	Upper
Battery condition				
5%	5.46 _a	.179	5.11	5.81
20%	5.19 _a	.178	4.84	5.54
100%	4.55 _b	.176	4.20	4.89

Higher scores indicate greater endorsement of hooking-up. Means with different subscripts differed significantly, $p < .01$

indicated significant differences between the lowest ($M = 5.46$, $SE = .18$) and highest ($M = 4.55$; $SE = .18$) battery life conditions, indicating greater endorsement for hooking up among participants exposed to imminent battery death. There was also a significant difference between the moderate battery life condition ($M = 5.19$; $SE = .18$) and highest battery life condition. No significant difference was found between the lowest and moderate level battery life conditions (see Table 3).

Discussion

The intentions of the present study were two-fold: First, to determine whether the pressure of having a low cellphone battery would facilitate greater hook-up likelihood decision-making when using an app for Internet-mediated sexual encounters, and secondly, to investigate the relationship between likelihood to agree to a hook-up encounter and the disinhibition element of sensation-seeking. Regarding our first investigation, it was hypothesized that exposure to a low battery condition would increase participant likelihood to hook-up relative to medium and full battery conditions. Results confirmed that when exposed to a low battery scenario, participants did endorse greater hook-up likelihood relative to participants in a full battery condition. Indeed, the increasing trend to engage in a hook-up from the lowest to highest battery life conditions suggest that imminent battery death was the principle motive in hook-up likelihood. Additionally, we hypothesized that higher endorsement of disinhibited sensation-seeking would correlate with greater hook-up likelihood regardless of battery life condition. Results provide support for this second hypothesis as well, suggesting that the sensation-seeking variable of disinhibition is relevant in the likelihood to make hook-up decisions.

To our knowledge, this study is among the first to examine the relationship between smartphone battery life and sexual decision-making among men who have sex with men. The results offer insight into how something apparently inconsequential, such as a cellphone battery, can impair decision-making about something of far greater consequence—in this case, the decision to engage in an online sexual encounter. The pressure and anxiety exerted by a phone battery, however, is not something intrinsic to human nature. Rather, it is the governing principle represented by a dying phone battery—the concept of scarcity—that is an omnipresent aspect of human life (Lynn 1991). A key

aspect of the principle of scarcity is commodity theory which states that “any commodity will be valued to the extent that it is unavailable” (Brock 1968, p. 246). This concept was exposed by the ride-share company Uber, who reported that users with a low battery-life were more likely to pay surge pricing compared to those with a full battery life (Withnall 2016). It was this principle that initiated our investigation in the realm of sexually-mediated hook-up apps. Among men who have sex with men, specifically while attempting to engage in a sexual encounter using a largely anonymous Internet-mediated phone application, this idea has particular relevance for two reasons: First, the potential scarcity of suitable partners one can find on such applications, and second, the limited amount of time the phone battery will sustain the duration of the search. When presented with a situation wherein the individual is offered a very limited amount of *time* (battery) to make a choice about what appears to be a promising sexual *partner* (limited in number), it is reasonable to expect a greater likelihood that this person will choose to take the chance (even with a less than ideal partner) before the battery dies, and the opportunity along with it. Indeed, these findings are aligned with previous research (Reynolds-Tylus et al. 2015) examining the decreased likelihood that discussions about safe sex will occur when time constraints are coupled with decreased partner availability.

Lastly, participants who scored high on social and sexual disinhibition (e.g., preferring a variety of sexual partners) were more likely to endorse a hook-up decision regardless of battery condition, suggesting that sensation-seeking is a variable that may contribute to sexual decision-making. This aligns with previous research on risky sexual decision-making, noting an association with personality traits such as excitement-seeking and impulsivity. Thus, as risky sexual behaviour has previously been associated with dimensions of disinhibited personality traits (Justus et al. 2000), these findings are concurrent with recent literature. That is, our evidence indicates a sensation-seeking personality may further the propensity for risky sexual decision-making.

Limitations and Future Directions

This study is limited in respect to lacking some degree of external validity. Being presented with static battery life is not the same as watching the battery drain. Indeed, the minor effect of our battery-life condition—only 4% of the variance in hook-up likelihood was explained by varying battery death—we might reasonably conclude that the stress experienced by watching a battery drain, and the stress experienced when presented with a static low battery image, are not considered with a same level of urgency. Conversely, this minor effect size may have indicated that participants did not perceive 20% battery—or even 5% battery—as “imminent” battery-death. Further, it is difficult to simulate sexual desire for a vignette character in an experiment, where participants know they are part of an experiment. Moreover, as this simulated experience is hypothetical, participants responded with the knowledge that there was no real risk involved. The vignette itself presented participants with a scenario where they had been talking to the potential partner “over the past few days”. While some users of hook-up apps may view this as an appropriate amount of time before agreeing to a hook-up, others may have found it too short a time or an unusually long period. Finally, as with any online study, results may have

been influenced by the online disinhibition effect. When participating in research online, participants may feel inclined to report more intensely or act differently than they would otherwise act in real-life situations (Miller 2015; Suler 2004). Thus, while participants may have agreed to a hook-up for the purposes of our study, in reality they may not have gone through with that decision.

Future research may inquire as to the limits of the scarcity principle to influence decision-making in a sexual encounter. For example, researchers may increase the sense of urgency while making a sense of risk more salient to further observe at what point the sense of risk becomes great enough to defy the urgency of finding a partner in a scarcity situation. This research could also be expanded to include both men and women of various orientations—our primary interest in this study lay in examining men who have sex with men but is easily replicable across other sexual identities. As well, given enough technological expertise, it may be possible to eventually conduct this study in a real-time setting to better simulate an in-person sense of urgency.

Conclusions

The present study is the first, to our knowledge, to investigate the relationship between battery life and sexual decision-making in men who have sex with men. Our findings supported the hypothesis that a lower battery life condition impacted sexual decision-making such that there was a greater likelihood of agreeing to an Internet-mediated sexual encounter. Further, the present study provides evidence that sensation-seeking relates to greater endorsement of hook-ups via dating apps overall. These results may contribute to our understanding of sexual decision-making in smartphone app users and help determine additional factors for potentially risky sexual decision-making. As these apps provide men who have sex with men the valuable ability to screen would-be sexual partners in an anonymous environment, understanding all potential risks involved can be of great benefit to those who use these applications.

Ultimately, as dating apps become more popular in today's technological world, further research is needed to better understand how they affect our personal and sexual health. The results from this study are but one contributing step forward into making sense of various factors that play a role in the use of dating apps that can affect the decision-making, including the effect of a dying phone battery. Ultimately, such findings have practical application in sexual education by enabling smartphone users to consider the possible risk of scarcity driven decisions in sexual decision-making.

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Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

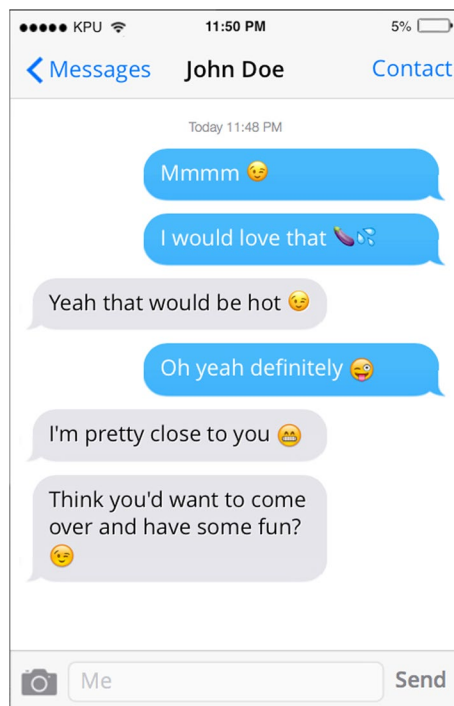
Appendix A

Independent Variable: Hook-Up Vignette

Over the past few days, you've been messaging a man you met through a dating app on your phone. You find him very attractive. He's exactly the kind of guy you're attracted to. While chatting with him, he's been flirtatious and expressed sexual interest. Late one evening, while messaging him on your phone, you both begin to chat sexually with each other about the many sexual things you would like to do together. You both express being very aroused by the conversation.

Appendix B

Independent Variable: Screenshot with 5% Battery-Life Remaining



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