

# Social Consequences of Grindr Use: Extending the Internet-Enhanced Self-Disclosure Hypothesis

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## ABSTRACT

Grindr, a location-based real-time dating application, provides sexual-minority men (SMM) a space through which they can identify, access, and communicate with one another. Although previous research has examined user motivations and public self-disclosure patterns on Grindr, we investigate the effects intimate self-disclosure and sexting via the application's private messaging on internalized homophobia and loneliness. Using the Internet-enhanced self-disclosure hypothesis (ISDH) as a framework, we conducted an online survey of 274 Grindr users. Serial mediation analysis showed support for the ISDH, suggesting that Grindr use was negatively associated with loneliness. Intimate self-disclosure and internalized homophobia mediated the relationship between Grindr use and loneliness, but sexting had no relationship with internalized homophobia or loneliness. We discuss implications for the ISDH, Grindr, self-disclosure, and sexting.

## Author Keywords

Grindr; self-disclosure; sexting; loneliness; internalized homophobia

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI); Miscellaneous;

## INTRODUCTION

Throughout history, sexual-minority men (SMM) — a population including gay, bisexual, queer, and questioning men — have experienced discrimination, violence, and social marginalization prompting them to create private social networks that precede today's social networking websites [19,34]. For example, in the 1990s, many SMM were “early adopters” of Internet technologies, which provided a safe, accessible, and anonymous avenue for discussing homosexuality and creating social and sexual

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connections that were either policed or restricted by a broader heteronormative society [36,61]. Today, not only do 70 percent of same-sex couples meet online, but SMM rely on communication and information technologies more than other populations to create friendships and find potential romantic partners [1,20,28,34,60,65]. With the proliferation of mobile devices with locative services, many SMM have adopted location-based real-time dating (LBRTD) applications to meet others, form relationships, or engage in sexual encounters [37].

Grindr, a LBRTD application for SMM, launched in 2009 and has over two million active daily users in 196 countries worldwide [32]. Upon opening the application, users see a grid of profile thumbnails, sorted in order of geographic proximity [81]. Users create public profiles that include a profile picture, personal and demographic information (e.g. age, height, ethnicity), and an about me section. In addition to creating public profiles, Grindr users can send private messages, images, and location information to other users. Unlike Tinder and some other LBRTD applications that require mutual interest before communicating, Grindr affords users the ability to send private messages with any nearby, available user. Geo-location social networking applications, such as Grindr, provide unique social opportunities for SMM.

Previous research has examined how the co-situation of SMM influenced by LBRTD applications like Grindr complicates the boundaries between online and offline spaces and introduces tensions in users' self-presentation and impression formation [10]. Unpacking the uses and gratifications of Grindr, scholars have noted the motivations users fulfill with the application, ranging from “killing time” and making friends to dating and finding people to have sex with, each of which prompt varying levels of self-disclosure [58,75]. Despite the unique and pervasive reliance of SMM on Grindr, little is known about how use of Grindr affects SMM's well-being.

Over the past decade, public discourse has experienced tremendous social change as it pertains to the acceptance of LGBTQ people and issues; notwithstanding, contemporary clinical research continues to raise concern regarding LGBT youth mental health [63]. Research finds that LGBT youth continue to face numerous mental health disparities

compared to their heterosexual peers, including increased rates of depressive symptoms, suicide, self-harm, and hopelessness, [4,11] in addition to alcohol and substance abuse [59,67]. Recent reports establish the extent of these disparities and encourage further research into interpersonal experiences and intrapersonal resources as possible sources of both resilience and risk for LGBT individuals [42, 63]. As such, research into how technologies like Grindr may mitigate these outcomes and impact individual mental health and well-being is both critical and warranted.

The objective of this study was to investigate the social consequences of Grindr use for SMM. The Internet-enhanced self-disclosure hypothesis (ISDH) is used to understand how Grindr may impact a user's well-being. We theoretically extend the hypothesis to include sexting and internalized homophobia, given the context of SMM communication on Grindr. Using an online survey of Grindr users, we test our hypotheses that self-disclosure, sexting, and internalized homophobia mediate the relationship between Grindr use and loneliness. Our results find that intimate self-disclosure happening on Grindr is associated with less loneliness among Grindr users because of the reduction in internalized homophobia associated with intimate self-disclosure on the application. Sexting did not predict users' internalized homophobia or loneliness.

#### **INTERNET-ENHANCED SELF-DISCLOSURE HYPOTHESIS**

The general question of whether frequent Internet use makes people feel more or less lonely has been a fundamental question driving research on information and communication technologies for several decades, but research often produces conflicting findings about whether using the Internet increases or decreases loneliness [45,46,70]. Loneliness refers to the negative emotional response that results from when a person perceives that he or she lacks personal relationships [39] and is positively correlated with depression symptoms and negatively associated with life satisfaction [62].

Human-computer interaction and related fields have often addressed the link between communication technologies and loneliness through a social capital framework. Bonding capital provides emotional support and a sense of belonging while bridging capital gives access to new information and perspectives [66]. Bonding capital may be particularly useful in reducing loneliness. Facebook use was initially linked to bonding capital [23], but subsequent research failed to replicate this link [14,77]. However, there is a positive association between frequency of Facebook use and bridging capital [66].

Scholars of social media and well-being have differentiated various types of social media use within the same platform. Burke, Marlow, and Lento [17] argue that two types of communication on Facebook influence well-being: directed communication with other Facebook users and consumption of others' posts. Directed communication refers to one-to-

one online interactions happening between people (e.g. private messages, comments). Consumption communication refers to the passive viewing of content shared online (e.g. browsing Facebook newsfeed or subreddits). On Grindr, private messaging would represent directed communication; whereas, browsing Grindr profiles would represent consumption.

Burke et al. [17] found that directed communication is negatively associated with loneliness; while consumption of others' posts was positively associated with loneliness. Follow-up studies found that directed communication on Facebook with strong ties, but not weak ties, improves psychological well-being, but Facebook consumption was not associated with well-being [15]. Other studies have replicated these findings about directed and consumption communication via Facebook suggesting the directed communication fosters well-being but consumption has deleterious outcomes for personal well-being [47,76].

ISDH provides a framework for explaining how online directed communication can alter loneliness. The hypothesis suggests that the underlying communication processes associated with directed interactions are the mechanisms linking time spent online and well-being. At the center of the hypothesis is self-disclosure, or "the act sharing of personal information to others" [44, p. 2]. Self-disclosure research tends to focus on the sharing of intimate topics such as worries, emotions, fears, and secrets [4]. First, the hypothesis argues that frequent use of computer-mediated communication (CMC) stimulates intimate self-disclosure in directed channels. Intimate self-disclosure is stimulated because of the limited cues available on the technology create an environment that encourages people to share more personal information than they do in face-to-face interactions [69,78].

Second, ISDH predicts that, as in offline communication, intimate self-disclosure will increase the quality of interpersonal relationships. Third, the hypothesis posits that the quality relationships are positively associated with well-being. Overall, the impact of frequent technology use on users' loneliness and well-being is mediated by the processes of self-disclosure and consequent relationship development. ISDH proposes a serial mediation between time spent online and well-being: One must account for both self-disclosure and relationship development, not just one or the other.

Initial tests of the hypothesis found that online chat communication within existing friendships predicted greater well-being among teens, but interactions with strangers in chat rooms did not influence well-being [71], similar to recent findings about Facebook communication [15]. A longitudinal study of adolescent instant messaging use among existing friendships affirmed that the direct effect between instant message use and friendship quality was explained by online self-disclosure [73]. Together, these studies suggest support for the serial mediation proposed in the hypothesis; however, studies have not empirically tested

the serial mediation of the ISDH. Research applying the hypothesis to other communication technology is needed to test the durability of the predictions across platforms [71,73].

Grindr serves the niche audience of adult SMM who are interacting with other men in a similar geo-location. Although research has not supported the idea that directed interactions with strangers is good for well-being [e.g. 15], Valkenburg and Peter [74] suggested that online communication among LGBTQ individuals may have positive impacts on SMM individuals' well-being and sexual identity because it provides a space for them to talk about issues specific to the gay community and reduce feelings of stigma. Therefore, to extend this hypothesis to the effects of Grindr use, we argue that an examination of the communication processes of self-disclosure and sexting as well as their link to internalized homophobia are necessary.

## COMMUNICATION ON GRINDR

### Self-Disclosure

There are two types of directed communication happening on Grindr that we focus on in this paper: self-disclosure and sexting. First, self-disclosure on Grindr is determined by individuals' motivations for use. Men looking for social interaction or dates on the application report higher frequency of self-disclosure compared to other Grindr users [75]. People looking for romance or dates are more likely to be honest in their self-disclosures, but men motivated to find sex or social inclusion through Grindr disclose less honest information [75]. Furthermore, individuals using Grindr to find friends or relationships are more likely to show their face in a profile picture than other users [24]. Users report engaging in selective self-disclosure to keep their identity concealed and to telegraph to other men their motivations for using the application [10]. Unlike the progression of disclosure in online gay chat rooms [43], public profiles on Grindr reveal substantial information about the user, such as affiliations indicating physical characteristics (e.g. "bear," "twink"), location information, and sexual preferences [9]. In addition, users leverage euphemistic language (e.g. "fun," "play") to manage stigma around casual sex.

Research on Grindr has primarily focused on self-disclosure on the public profile, but many interactions between SMM on Grindr happen in the private messaging function. Research has demonstrated that people share more intimate information and emotions on private communication channels than public communication [7,8]. Thus, the affordances of private chat on Grindr should increase the overall intimacy of interaction. Applying the first tenet of the ISDH to Grindr, individuals who use Grindr more frequently should have discussions over private messaging that result in the sharing of intimate topics. Therefore, we present the following hypothesis:

*H1a: Frequent use of Grindr is positively associated with the intimacy of self-disclosure that occurs in Grindr's private messaging.*

### Sexting

Given Grindr's status as a dating and hookup application, sexting is an important communicative process to consider when examining Grindr's impact upon users. Sexting is a specific type of disclosure that refers to the sharing of sexually suggestive or explicit photos and messages via cell phones or other mobile media [18]. We argue that sexting should operate as a second communication process in the ISDH that can impact SMM's feelings of loneliness. Previous studies demonstrate that sexting is pervasive among young adults [48]. Albury and Byron's [2] interviews with same-sex-attracted youth in Australia attest to the ubiquity of sexting on gay dating/hookup applications, with many participants noting sexting as the norm. Although a recent large scale study of sexting among young adults found no correlation between sexting and psychological well-being [30], Mowlabocus [54] argues that sexting plays a unique and important role for gay men communicating online. Picture trading practices involve the exchange of trust between individuals as well as a type of identity formation, which is important to consider given the historical inability of SMM to access spaces for social interaction and personal development. The ISDH predicts that the use of communication technology stimulates communication between users. Due to the sexualized nature of the application and the normative practices regarding sexting on Grindr [81], people who use Grindr more often are likely also engaging in more sexting. Therefore, we present the following hypothesis:

*H1b: Frequent use of Grindr is positively associated with the amount of sexting that occurs in Grindr's private messaging.*

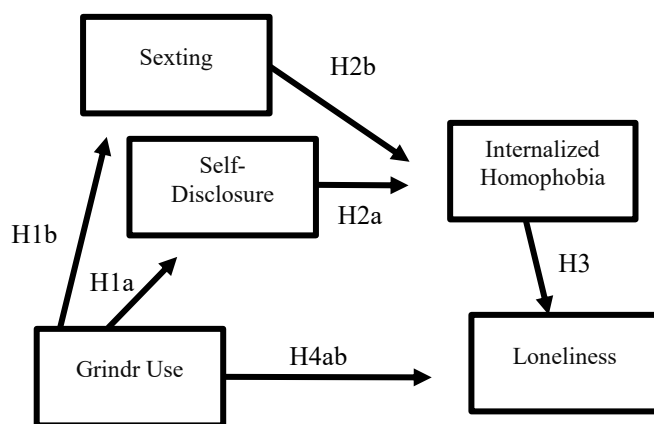
### INTERNALIZED HOMOPHOBIA

Accounting for sexual minority mental health disparities, foundational research posits that sexual minorities experience unique, chronic stressors as a result of their stigmatized identities [42]. The internalization of negative social attitudes about one's sexual orientation — often referred to as internalized homophobia — has been identified as a key proximal stress process and risk factor for poor mental health among LGBTQ youth and adults [41,51]. The role and prevention of internalized homophobia is a focus of sexual orientation research as multiple studies demonstrate its numerous negative intrapersonal and interpersonal outcomes for sexual minorities, such as its direct relationship to depression among LGBTQ adults [25,29].

HCI research has found that individuals experiencing stigma leverage the affordances of communication technologies to help manage the effects of the stigma [5]. Following similar logic, Valkenburg and Peter [74] argued LGBTQ individuals can use online communication to develop their sexual identity and manage stigma about their sexual orientation. Stigma management represents a second way of understanding the effects of communication technologies on well-being. Therefore, applying the ISDH to Grindr warrants an investigation into how SMM manage internalized

homophobia through their use of Grindr, rather than a focus on maintaining quality relationships.

Sharing intimate topics online help people manage their stigma among marginalized groups. Since CMC affords fewer social cues, online support groups allow individuals with similar experiences to offer support to one another when support is lacking from customary sources [79]. For example, Mo and Coulson's [53] study of online HIV/AIDS support groups found that members provided each other social and emotional support and offered a productive space for members to discuss the negative feelings and emotions related to and resulting from their stigmatization. Therefore, managing stigma represents a critical aspect of online interaction; accordingly, we extend ISDH by considering the role of stigma among minority groups (Figure 1).



**Figure 1. Conceptual model of the social consequences of Grindr use.**

LGBTQ youth use CMC to engage and understand their queer identity [31]. Self-disclosure via Grindr can involve communicating information regarding one's sexual orientation/identity and preferences, health status (e.g., HIV), secrets, and even fears or worries. These areas of increased intimacy of self-disclosure represent an important outlet for members of a sexual minority community who have historically faced stigmatization that deprived them of the ability to discuss intimate topics about themselves. Given the multifaceted uses of Grindr, the application may enable SMM to discuss stigmatized topics and provide users an accessible space to negotiate their identities as well as form connections with other SMM [10,21,75]. By providing an opportunity for users to engage with their SMM identity as well as a range of other personal topics, we argue that increased intimacy of self-disclosure can reduce internalized homophobia. Therefore, we present the following hypothesis:

*H2a: Grindr users' participation in intimate self-disclosure practices on Grindr's private messaging is negatively associated with their internalized homophobia.*

Sexting may operate as a second communication mechanism impacting feelings of stigma among Grindr users. Among Grindr users, sexting is frequent and examining its effects is critical for knowledge about the application [81]. Sexting is a form of sexual expression that helps people navigate their sexual identities [1,16,38]. For SMM, especially those who are new to or uncomfortable with their status as SMM, sexting provides an outlet to express and communicate their social and sexual desires. For users who internalize negative beliefs and stigma about their sexual orientation, sexting can provide an opportunity to negotiate one's sexual desires and identities. Sexting may work to demystify SMM activities and identities, and thereby may function to reduce internalized homophobia. Therefore, we present the following hypothesis:

*H2b: Grindr users' participation in sexting practices on Grindr's private messaging is negatively associated with their internalized homophobia.*

Experiencing internalized homophobia has deleterious consequences for SMM. Multiple studies have demonstrated that internalized homophobia leads to loneliness and distrust [17,71]; difficulties in intimate relationships [52]; high-risk sexual behavior [56,64]; depression [57]; and suicide [50]. Recently, a study of Grindr users found that stigmatizing experiences predicted more depressive symptoms [27]. Given these findings, we hypothesize the following:

*H3: Grindr users' internalized homophobia is positively associated with their loneliness.*

Applying the ISDH to Grindr can test whether Grindr use predicts a decrease in loneliness among SMM [72]. If disclosing intimate information about oneself or participation in sexting practices on Grindr reduces internalized homophobia, such processes and internalized homophobia could explain how Grindr use affects one's loneliness (See Figure 1). By using the application frequently to connect with other SMM, users are afforded the opportunity to better understand and engage with their own identities as SMM individuals, which should in turn reduce loneliness. Together, we argue that Grindr may reduce users' loneliness because of the self-disclosure and sexting happening on the application, which should reduce internalized homophobia. Less internalized homophobia should reduce loneliness [64]. To examine this model, we propose the following final hypotheses:

*H4a: The relationship between frequency of Grindr use and loneliness is mediated by increased self-disclosure and reduced internalized homophobia.*

*H4b: The relationship between frequency of Grindr use and loneliness is mediated by increased sexting and reduced internalized homophobia.*

**METHOD**

**Procedures and Participants**

Our study consisted of 274 self-identified Grindr users, who were recruited through social networking websites, including Facebook, Twitter, and Reddit, to participate in an online survey. To gather participants, we posted links to the survey on our personal Facebook and Twitter accounts. To open up recruitment outside of our personal networks, we posted on LGBTQ-specific Facebook groups (such as, but not limited to, “Gay San Francisco,” “Gorgeous, Gay, and Twenty-Something,” and “Gay Geeks”) and Reddit “subreddits” (e.g. /r/lolgrindr and /r/gaybros), similar to other studies of Grindr users [e.g., 22, 75]. Additionally, we emailed LGBT resource centers and undergraduate LGBTQ organizations at universities and colleges across the United States with the survey link. We collected data between November 2015 and February 2016.

Upon opening the survey and after indicating their informed consent, participants were directed to an online survey asking them about their Grindr use and well-being. Participants then established whether they were over the age of 18 and whether they had a Grindr account. If participants were underage or did not have a Grindr account, they were dismissed from further data collection.

Participants’ ages ranged from 18 to 49 years, with a mean of 24 (*SD* = 5.73). Most participants (74.8%) identified as Caucasian, while 11.3% identified as Hispanic, 5% mixed race, 4% Asian, and 1.4% African American, with 2.7% identifying as other or did not indicate ethnicity. In regards to sexual orientation, 84.3% of participants said they were gay, 9.5% bisexual, 5.8% other, and 0.4% did not respond. Most participants (80.7%) had a Grindr account for over a year, while 46.7% reported using Grindr for more than 50 minutes each day. Overall, 45.2% of participants described their location as “Urban,” whereas 40.8% responded “Suburban” and 13.8% “Rural.” Participants indicated that 35.4% completed a bachelor’s degree, 38.7% completed some college, and 8.4% completed high school or have a GED equivalent.

**Measures**

*Frequency of Grindr use*

We adapted the Facebook Intensity Scale [23] to create the “Grindr Intensity Scale.” The Facebook Intensity Scale was designed to establish a more reliable scale of media use frequency on social network sites, and Burke et al. [17] confirmed that this self-report operationalization of Facebook use correlates well with actual behavior. Following this scale, participants were asked the average number of minutes they used the Grindr application each day, the average number of interactions they had with men on a given week, and six questions about the importance of Grindr in their lives. Table 1 contains each item on the scale as well as descriptive statistics for each question. Scores were then averaged together to indicate frequency of Grindr use:  $\alpha = 0.79$ ,  $M = 2.34$ ,  $SD = 0.75$ .

Individual Items and Scales <sup>1</sup>	Mean	S.D.
In the past week, on average, approximately how many minutes per day have you spent on Grindr? <i>1 = 50 or fewer minutes, 2 = 51 to 150 minutes, 3 = 151 to 250 minutes, 4 = 251 to 400 minutes, 5 = More than 400 Minutes</i>	1.78	1.05
In an average week, approximately how many men do you interact with on Grindr? <i>1 = 10 or fewer men, 2 = 11 to 20 men, 3 = 21 to 30 men, 4 = 31 to 40 men, 5 = More than 40 men</i>	1.64	1.02
Grindr is part of my everyday activity.	2.98	1.34
I am proud to tell people I’m on Grindr.	2.26	1.05
Grindr has become part of my daily routine.	3.04	1.31
I feel out of touch when I haven’t logged into Grindr for a while.	2.14	1.19
I feel I am part of the Grindr community.	2.14	1.08
I would sorry if Grindr shut down.	2.76	1.33
<b>Total Grindr Intensity (Cronbach’s alpha = 0.79)</b>	<b>2.34</b>	<b>0.75</b>
Note: <sup>1</sup> Unless provided, response categories ranged from 1 = strongly disagree to 5 = strongly agree.		

**Table 1. Summary of Grindr Intensity Scale**

*Intimate self-disclosure on Grindr*

Valkenburg and Peter’s [73] intimate self-disclosure scale was used to operationalize how often people disclosed personal information topics on private message in Grindr. The instrument contains five questions about intimate topics (e.g. “personal feelings,” “moments in your life you are ashamed of”). Questions were anchored from (1) *I tell nothing about this* to (5) *I tell everything about this*. The measure demonstrated acceptable reliability:  $\alpha = 0.79$ ,  $M = 2.13$ ,  $SD = 0.78$ .

*Sexting*

McDaniel and Drouin’s [48] three-item, nine-point scale was used to measure participant’s sexting activity in the messaging function of Grindr. Questions asked participants how often on Grindr they sent “sexy messages,” “talk sex or intimacy,” and “send nude or semi-nude photos,” on a scale from “never” to “almost hourly.” Due to high correlation between the text and photograph dimensions of the scale, the scores from each of these questions were then averaged together. This scale demonstrated excellent reliability:  $\alpha = 0.94$ ,  $M = 4.19$ ,  $SD = 1.80$ .

*Internalized homophobia*

The Short Internalized Homonegativity Scale [22] was used to measure participant’s feelings of internalized homophobia. Participants were asked how much they agreed or disagreed with a series of statements falling into three

factors: “Public Identification as Gay,” “Social Comfort With Gay Men,” and “Sexual Comfort With Gay Men.” Scores were then averaged, with a higher composite score indicating higher internalized homophobia. This scale demonstrated acceptable reliability:  $\alpha = 0.81$ ,  $M = 3.36$ ,  $SD = 0.98$ .

**Loneliness**

We utilized the UCLA loneliness scale [62] to examine participant’s loneliness levels and the frequency of which — from “never” to “always” — they felt “alone,” “isolated,” and “lacking companionship.” Higher scores of the average of the three items indicate greater loneliness. This scale demonstrated excellent reliability:  $\alpha = 0.90$ ,  $M = 2.76$ ,  $SD = 1.08$ .

**Covariates**

**Outness**

Participants’ level of outness was measured using the Nebraska Outness Scale [49], which consists of two subscales that measure concealment of one’s sexuality and disclosure to others. In measuring concealment, participants indicated the percentage of groups of people, (e.g. immediate family and friends) that the participant thinks knows his sexual orientation. They then ranked on an 11-point scale from “Never,” “Half of the time,” to “Always” on how often topics regarding sexual orientation are avoided with those groups. The scores for concealment were then reverse-coded and averaged with the disclosure subscale to yield the outness score, with higher scores indicating greater levels of outness,  $\alpha = 0.83$ ,  $M = 6.97$ ,  $SD = 2.10$ .

	1	2	3	4	5
1. Grindr Use	-				
2. Sexting	.55**	-			
3. Self-Disclosure	.17**	-.02	-		
4. Stigma	-.09	-.04	-.13*	-	
5. Loneliness	-.01	-.02	.03	.38**	-
6. Outness	.09	-.07	.06	-.46**	-.14*

**Table 2. Descriptive statistics and product-moment correlations.**

**Grindr motivation**

Rice et al.’s [58] scale on motivations for using Grindr was used to determine the main reason the participant used the application. Participants were asked to identify their number one motivation using Grindr. Options included the following: “to make new friends,” “to meet people to have sex/hook up with,” “to find someone to date,” “to ‘kill time,’” “to connect with the gay community,” and “to find people to drink/use drugs with.”

**RESULTS**

Table 2 presents the descriptive statistics and correlations for variables utilized in our analysis. Intimate self-disclosure and sexting, the two proposed communication mediators in our model, were not correlated with one another. Thus, self-disclosure and sexting should represent separate mechanisms

	Grindr Self-Disclosure			Grindr Sexting			Internalized Homophobia		
	B	SE	t	B	SE	t	B	SE	t
Intercept	1.80	0.34	5.33***	-0.04	0.68	-0.06	5.18	0.41	12.60***
<b>Orientation</b>									
Bi-Sexual	0.04	0.16	0.26	0.07	0.31	0.22	-0.14	.19	-.72
Other Orientation	0.17	0.21	0.81	0.99	0.75	1.32	0.12	.24	.51
<b>Motivation</b>									
Hook-Up	-0.48	0.13	-3.81***	0.79	0.25	3.21**	-0.36	.15	-2.36*
Friendship	0.01	0.18	0.03	-0.23	0.34	-0.67	-0.25	0.21	-1.23
Kill Time	-0.10	0.15	-0.71	0.05	0.28	0.17	-0.27	0.17	-1.62
Community	0.41	0.26	1.55	-0.23	0.51	-0.47	-0.46	0.31	-1.51
<b>Time on Grindr</b>	-0.16	0.44	-0.36	2.04	0.84	2.42*	0.25	0.51	0.49
<b>Location</b>									
Suburban	-0.00	0.10	-0.02	-0.14	0.19	-0.73	0.25	0.12	2.15*
Rural	0.12	0.14	0.82	-0.36	0.27	-1.32	0.36	0.16	2.22*
<b>Outness</b>	0.02	0.02	0.91	0.01	0.04	0.31	-0.21	.03	-7.86***

**Table 3. Covariates Predicting Self-Disclosure, Sexting, and Internalized Homophobia on Grindr. \* p<.05, \*\* p<.01, \*\*\*p<.001**

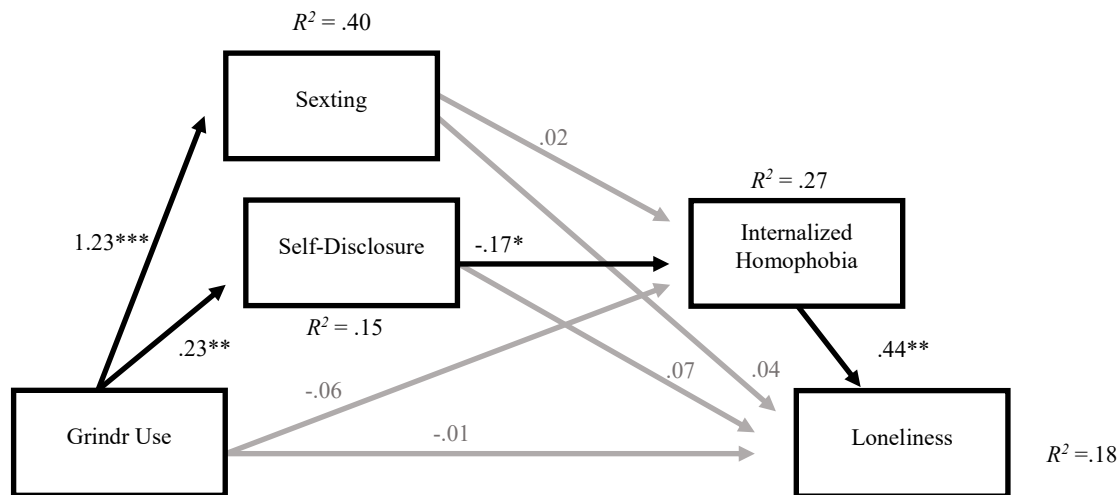


Figure 2. Serial mediation of the social consequences of Grindr use. Nonsignificant paths are colored in grey.

Covariates are not depicted. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

in our analysis. Descriptive analysis found a variety of motivations for using the application.

43.8% of participants stated that their primary reason for using Grindr was to find a hook-up, 21.9% were on Grindr to kill time, 19.3% were looking for a date, 9.9% were seeking friendship, 3.6% were interested in connecting to the gay community, and 1.5% did not report a main motivation for Grindr use. Motivation for using Grindr, community type (e.g. urban, rural, or suburban), degree of outness, sexual orientation, and a log transformation of the time since creating a Grindr account were entered in as covariates in all models. All categorical variables were dummy coded. For our substantive analysis, we conducted a regression-based PROCESS analysis of our hypotheses [40]. First, we report the multiple regression analysis for each of the hypothesized associations. Second, we test the indirect effect of Grindr use on loneliness using a serial mediation model.

Several covariates in our model significantly predict several outcomes in our model (see Table 3). Individuals looking for a hook-up reported less self-disclosure on Grindr than individuals looking for dates,  $B = -.48$  [95% CI =  $-.73$ -. $23$ ],  $SE = .12$ ,  $\beta = -.31$ ,  $p < .001$ . Contrariwise, men looking for a hook-up on Grindr reported higher amounts of sexting than men looking for dates on the application,  $B = .79$  [95% CI =  $.31$ -. $1.28$ ],  $SE = .25$ ,  $\beta = .22$ ,  $p < .01$ , and participants who had used Grindr for more months also reported more frequent sexting,  $B = 2.04$  [95% CI =  $.39$ -. $3.69$ ],  $SE = .84$ ,  $\beta = .12$ ,  $p < .05$ . Participants reported less internalized homophobia, if they were motivated to find a hook-up on Grindr,  $B = -.36$  [95% CI =  $-.65$ -. $0.06$ ],  $SE = .15$ ,  $\beta = -.18$ ,  $p < .05$ .

Men from suburban,  $B = .25$  [95% CI =  $-.02$ -. $0.48$ ],  $SE = .12$ ,  $\beta = .13$ ,  $p < .05$ , and rural,  $B = .36$  [95% CI =  $0.04$ -. $0.69$ ],  $SE = .16$ ,  $\beta = .13$ ,  $p < .05$ , communities reported more internalized homophobia about their sexuality than men in urban areas. Internalized homophobia also shared a negative relationship

with degree of outness,  $B = -.21$  [95% CI =  $-.26$ -. $0.16$ ],  $SE = .03$ ,  $\beta = -.45$ ,  $p < .001$ . People who were less out felt more internalized homophobia. No covariates significantly predicted loneliness.

As shown in Figure 2, frequency of Grindr use predicted greater amounts of intimate self-disclosure (H1a),  $B = .23$  [95% CI =  $0.08$ -. $0.37$ ],  $SE = .07$ ,  $\beta = .22$ ,  $p < .01$ , and sexting (H1b),  $B = 1.23$  [95% CI =  $0.99$ -. $1.48$ ],  $SE = .12$ ,  $\beta = .51$ ,  $p < .001$ . Our predictors accounted for 15% of the variance in self-disclosure behaviors and 40% of the variance sexting. Intimate self-disclosure was associated with lower levels of internalized stigma about homosexual identity,  $B = -.17$  [95% CI =  $-.31$ -. $0.02$ ],  $SE = .07$ ,  $\beta = -.14$ ,  $p < .05$ . There was no association between sexting and internalized homophobia,  $B = .02$  [95% CI =  $-.05$ -. $0.09$ ],  $SE = .04$ ,  $\beta = 0.04$ ,  $p > .05$ .

The variance explained for internalized homophobia equaled 27%. Participants who engaged in more intimate self-disclosure on Grindr reported less internalized homophobia than participants who did not self-disclose much intimate information on Grindr. Sexting was not predictive of internalized homophobia. Therefore, H2a was supported but H2b was not.

Confirming H3, internalized homophobia positively predicted loneliness,  $B = .44$  [95% CI =  $0.30$ -. $0.59$ ],  $SE = .07$ ,  $\beta = .40$ ,  $p < .01$ . Individuals with higher feelings of internalized homophobia reported greater loneliness than individuals who feel minimal internalized stigma about their sexual identity. Neither self-disclosure,  $B = .07$  [95% CI =  $0.10$ -. $0.24$ ],  $SE = .09$ ,  $\beta = .05$ ,  $p > .05$ , or sexting,  $B = .04$  [95% CI =  $-.05$ -. $0.12$ ],  $SE = .04$ ,  $\beta = .07$ ,  $p > .05$ , had a direct effect on loneliness. There was a modest effect size for loneliness,  $R^2 = .18$ .

To test the indirect effect of Grindr use on loneliness (see Figure 2), we performed a serial multiple mediation model with a 5,000 bootstrapped resamples using the PROCESS macro for SPSS [40].

	Loneliness		
	<i>Effect</i>	<i>SE</i>	CI (lower, upper)
<b>Direct Effect</b>			
1. use →	-.010	.103	(-.212, .192)
<b>Indirect Effects</b>			
<i>Self-Disclosure</i>			
1. use → disclosure →	.016	.022	(-.114, .056)
2. use → disclosure → stigma	-.017	.009	(-.046, -.003)
3. use → stigma →	-.025	.040	(-.111, .046)
<i>Sexting</i>			
1. use → sexting →	.046	.056	(-.063, .156)
2. use → sexting → stigma	.011	.020	(-.027, .054)
3. use → stigma →	-.025	.040	(-.111, .046)

**Table 4. Indirect effects of Grindr Use on Loneliness through Self-Disclosure and Sexting.**

The serial multiple mediation model positioned self-disclosure, sexting, and stigma as mediators and calculated mediation paths for each of the variables separately as well as in combination. Sexting was controlled in the self-disclosure indirect effect test and vice versa. A significant indirect effect for intensity of Grindr use on loneliness was found between intimate self-disclosure and internalized homophobia (see Table 4). The direct effect between Grindr use and loneliness was non-significant,  $B = -.01$  [ $95\% \text{ CI} = -.022; .019$ ],  $SE = .10$ ,  $\beta = -.01$ ,  $p > .05$ , but there was a significant indirect effect of Grindr use on loneliness was negative through the mediators of intimate self-disclosure and internalized homophobia. This significant indirect effect supports H4a.

Controlling for covariates, men who use Grindr frequently were less likely to feel lonely after using the application because they are more likely to engage in intimate self-disclosure, and intimate self-disclosure was associated with less internalized homophobia. In turn, men who have less internalized homophobia reported less loneliness. No alternative indirect effects through self-disclosure or internalized homophobia were significant (see Table 4).

Given the lack of association between sexting and internalized homophobia, no support for serial mediation was found (see Table 4). In addition, sexting did not mediate the relationship between Grindr use and loneliness. There was no evidence that sexting on Grindr was associated with internalized homophobia or loneliness. H4b was not supported.

### Post Hoc Analysis

Hayes [40] argues that one way to strengthen arguments of the causal order of indirect effects is to reorder variables and run an alternative indirect effects model. In our model, we reordered the order of stigma, intimate self-disclosure, and intensity of Grindr use to predict loneliness. We ran two models testing alternative indirect effects. First, an indirect model with intimate self-disclosure and intensity of Grindr use as mediators of internalized homophobia did not produce a significant result, *indirect effect* = .002 [ $95\% \text{ CI} = -.004; .006$ ]. Second, a serial mediation of internalized homophobia to intensity of Grindr use and then intimate self-disclosure was not significant, *indirect effect* = .001 [ $95\% \text{ CI} = -.007; .006$ ]. This analysis increases confidence of the direction posited in Figure 2 but does not confirm causality.

### DISCUSSION

The main goal of this paper was to study the association between frequent Grindr use on SMM's loneliness. Guided by ISDH, two serial mediation hypotheses were proposed regarding self-disclosure and sexting as two mechanisms impacting loneliness because of their association with internalized homophobia (see Figure 1). Overall, our results suggest that intimate self-disclosure happening on Grindr predicts reduced levels of loneliness among Grindr users because of the reduction in internalized homophobia associated with intimate self-disclosure on the application. However, sexting was not associated with users' internalized homophobia or loneliness. Below we discuss the implications of this research on the ISDH, self-disclosure, sexting, and Grindr.

These findings contribute to the long-standing question of how Internet use impacts loneliness by examining directed communication happening between SMM on Grindr [36, 17]. Rather than a direct effect of Grindr use on loneliness, our findings suggest that the communication processes happening on Grindr matter. The results presented in this paper have implications for contentions of the ISDH [72]. Consistent with ISDH, we found that frequent use of Grindr predicted more self-disclosure on Grindr's private messaging system. We argued that, rather than maintaining quality relationships, on Grindr a critical part of interacting with others is helping users feel more comfortable about their sexual identity. Consistent with our predictions, we found that frequent intimate self-disclosure on Grindr was associated with less internalized homophobia. In turn, people who felt less internalized homophobia were less likely to report being lonely. Therefore, we demonstrate that frequent Grindr use can improve user's well-being because frequent Grindr use is associated with more frequent intimate self-disclosure on directed communication channels in Grindr and that intimate self-disclosure is correlated with less internalized homophobia. Other studies have found that men who are using the application for social interactions and dates are most likely to share information about their life with other Grindr users, and our work suggests that these men are likely to receive the most psychosocial benefits from



using the application [75]. These findings suggest that intimate self-disclosure may be one mechanism explaining the positive relationship between directed communication and well-being [15, 17].

This extension to internalized homophobia, or stigma more generally, represents a significant departure from youth instant messaging behaviors originally proposed in the ISDH, but our findings show support for the serial mediation model proposed by Valkenburg and Peter [72]. Previous studies have found that online directed communication is only beneficial to well-being when the interactions happen between close relational partners [15, 71]. However, we show that one-to-one interactions with strangers on Grindr may improve SMM's well-being, if the interactions on the application reduced their feelings of internalized homophobia. Communication between online-only contacts may improve well-being in minority populations, when the communication helps them feel less stigma about their identity. This connection to stigma mirrors computer-mediated communication research that has found that online interactions helps people manage their stigma and that gay youth use the Internet for identity and sexual development [12, 31, 53].

Valkenburg and Peter [72] advocated that research consider the underlying processes happening when people go online to explain how the Internet affects well-being. Our findings suggest that stigma management represents an additional mechanism for the ISDH, particularly among minority populations interacting online. These findings need to be replicated on Grindr as well as outside of Grindr to confirm our extension of ISDH. Furthermore, other studies have found that online disclosure of queer identity can create stress because of the visibility of the disclosure [35]. Technological affordances appear to stimulate decreased or increased stigma, and researchers should continue to study what is associated with the increase or decrease of stigma on various information and communication technologies.

Although intimate self-disclosure on Grindr was negatively associated with loneliness, sexting was not correlated with the loneliness reported among Grindr users. For our sample, sexting on Grindr was a common practice, but sexting was not connected with Grindr users' loneliness. Other studies investigating sexting have documented similar null effects for sexting on people's well-being [30]. This finding also bolsters the claim of the ISDH that self-disclosure is central to understanding the connection between Grindr use and well-being because self-disclosure, rather than sexting, displayed an indirect effect on participants' well-being. Given that the high frequency of sexting reported on Grindr did not connect to less loneliness or internalized homophobia in our sample, this finding prompts future research about why people sext on Grindr and the effects of sexting on Grindr.

Other scholars have argued that sexting is a form of sexual expression and identity development, but these results

suggest that the sexting on Grindr may not have an influence user's internalized homophobia or loneliness [1, 16, 38]. Our results suggest that engaging in sexting on Grindr may not help men remove stigma associated with their homosexuality. Notably, sexting and intimate self-disclosure were not correlated with each other in our study, but sex is often one of the most intimate topics of communication [68]. The lack of correlation between the two variables may suggest that sexting is a non-intimate practice on Grindr, likely explained by the sexual norms of the space. If sexting is not correlated with intimacy, then sexting is likely not aiding SMM in sharing about their sexual identity or feelings of internalized homophobia. Without a connection to intimate, deep personal feelings, it is reasonable that sexting is not associated with internalized homophobia or loneliness.

No association between sexting and loneliness or internalized homophobia suggests that there are other functions sexting may serve that were not captured in this study. More explicit measuring of sexual expression or identity development could explain the effects of sexting on Grindr more clearly. Furthermore, qualitative studies have found that sexual communication on Grindr promotes the objectification of men [13], and public health research may benefit from finding associations between sexting and sexually transmitted disease. Moving the research about sexting into these new unexplored areas is promising, given the frequency of sexting on Grindr.

Grindr is known as a sex/hookup app, but these findings demonstrate that the directed communication on Grindr may provide social value to SMM. The intimate self-disclosure in the private messaging application might play an important function among our Grindr users, especially those experiencing internalized homophobia. Specifically, private messaging on Grindr can provide an avenue for SMM to reduce internalized homophobia and loneliness. Focusing only on the sexting happening on Grindr misses this association. Other scholars have demonstrated that Grindr is a multifaceted application that serves many functions beyond facilitating sexual encounters [21, 75]. The multidimensional uses of Grindr may explain why the application maintains popularity among SMM even beyond those individuals who are not necessarily looking to have sex [81]. In our study, as well as other Grindr studies, what brings people to Grindr often determines how they use the application, and the frequency of these non-sexual motivations were relevantly high. The complex goals, motivations and uses of Grindr warrants further elaboration of the social consequences of the application.

#### Limitations and Further Research

Although this study represents one of the first projects to investigate the effects of Grindr use on SMM's well-being, the results of the study are limited. Our data is cross sectional, and the findings of this paper are limited to the sampled population and cannot indicate any causal relationships. By promoting recruitment for our survey on

LGBTQ-specific websites, we were able to get a broader sample of participants, but our sample is disproportionately Caucasian and educated, limiting the generalizability of our findings. Certain types of Grindr users may have been more likely to take the survey, leading to a potential for sample bias in our results. Our sample is not representative of the larger Grindr user base or SMM individuals more broadly, and these results should not be generalized to the entire SMM population. Because participants volunteered to participate, we were limited in our ability to contact Grindr users who may have higher amounts of internalized homophobia and were not out. These populations of Grindr users are perhaps the most critical to study in terms of intervention, and future research should consider ways of reaching out to more SMM that fall into these categories.

There is also potential for self-report bias in our survey questionnaire about Grindr use. Participants may have had difficulty reflecting on much time spend on Grindr because the application is on a mobile device and is potentially always with them and always on. The intensity of use scale helps overcome the limitation of reporting on amount of time spent using an application because of the additional questions added into the measure. However, smartphones complicate understanding of what it means to use an application and the scale points used on the survey may have lead participants to misrepresent the amount of time they spend on Grindr [33]. Future uses of the scale may need to adapt to reflect the mobility of the application and reduce the scale points on the number of minutes spent on Grindr each day. Finally, the indirect effect of frequent Grindr use on loneliness was small; therefore, going on Grindr may not dramatically reduce loneliness. Rather, Grindr use may offer a small buffer against loneliness when used as a way engage in self-disclosure with other SMM.

The proposed extension to ISDH needs further support outside of Grindr to determine whether interactions among strangers online can have positive impacts on well-being, if interactions help them feel less stigma. Research could expand the hypothesis to other marginalized populations that experience stigma. Our hypotheses focused on the directed communication happening on Grindr, but we did not address the question of consumption on Grindr [17]. A next step to understand the effects of Grindr on well-being would include exploring how browsing profiles of various SMM in the nearby area influences the well-being or internalized homophobia of users. Future work on Grindr should consider how disclosure on Grindr extends into how users disclose about their sexual identity in their daily experiences on other social network sites as well as face-to-face with their friends and family.

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#### REFERENCES

1. Julie M. Albright. 2008. Sex in America online: An exploration of sex, marital status, and sexual identity in Internet sex seeking and its impacts. *J Sex Res* 45, 2: 175–186.
2. Kath Albury and Paul Byron. 2014. Queering sexting and sexualization. *Media Internat Australia* 153: 138–147.
3. Kath Albury and Kate Crawford. 2012. Sexting, consent and young people’s ethics: Beyond *Megan’s Story*. *Continuum: Journal of Media & Cultural Studies* 26, 3: 463–473.
4. Joanna Almeida, Renee M. Johnson, Heather L. Corliss, Beth E. Molnar, Deborah Azrael. 2009. Emotional distress among LGBT youth: The influence of perceived discrimination based on sexual orientation. *J Youth Adolesc* 38: 1001–1014
5. Nazanin Andalibi, Oliver L. Haimson, Munmun De Choudhury, and Andrea Forte. 2016. Understanding social media disclosures of sexual abuse through the lenses of support seeking and anonymity. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (CHI ’16) 3906–3918.
6. Leslie A. Baxter. 1979. Self-disclosure as a relationship disengagement strategy: An exploratory investigation. *Hum Commun Res* 5, 3: 215–222.
7. Natalya N. Bazarova and Yoon H. Choi. 2014. Self-disclosure in social media: Extending the functional approach to disclosure motivations and characteristics on social network sites. *J Commun* 41, 4: 480–500.
8. Natalya N. Bazarova, Yoon H. Choi, Victoria S. Sosik, Daniel Cosley, and Janis L. Whitlock. 2015. Social sharing of emotions on Facebook: Channel differences, satisfaction, and replies. In *Proceedings of the 18<sup>th</sup> ACM Conference on Computer-Supported Cooperative Work and Social Computing* (CSCW ’15).
9. Jeremy Birnholtz, Colin Fitzpatrick, Mark Handel, and Jed R. Brubaker. 2014. Identity, identification and identifiability: The language of self-presentation on a location-based mobile dating app. In *Proceedings of the 16th international conference on Human-computer interaction with mobile devices & services (MobileHCI ’14)*.
10. Courtney Blackwell, Jeremy Birnholtz, and Charles Abbott. 2015. Seeing and being seen: Co-situation and impression formation using Grindr, a location-aware gay dating app. *New Media Soc* 17, 7: 1117–1136.
11. Wendy B. Bostwick, Illan Meyer, Frances Aranda, Stephen Russell, Tonda Hughes, Michelle Birkett, Brian Mustanski. 2014. Mental health and suicidality

- among racially/ethnically diverse sexual minority youths. *Am J Public Health* 104: 1129–1136.
12. Dawn O. Braithwaite, Vincent R. Waldron, and Jerry Finn. 1999. Communication of social support in computer-mediated groups for people with disabilities. *Health Commun* 11, 2: 123-151.
  13. Jed R. Brubaker, Mike Ananny, and Kate Crawford. 2014. Departing glances: A sociotechnical account of ‘leaving’ Grindr. *New Media Soc* 18: 373-390. doi: 10.1177/1461444814542311
  14. Moira Burke, and Robert E. Kraut. 2014. Growing closer on Facebook: changes in tie strength through social network site use. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14), 4187-4196.
  15. Moira Burke and Robert E. Kraut. 2016. The relationship between Facebook use and well-being depends on communication type and tie strength. *J Comput Mediat Commun* 21, 4: 265-281.
  16. Moira Burke, Robert E. Kraut, and Cameron Marlow. 2011. Social capital on Facebook: Differentiating uses and users. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '11), 571-580.
  17. Moira Burke, Cameron Marlow, and Thomas Lento. 2010. Social network activity and social well-being. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10), 1909-1912.
  18. Richard Chalfen. 2009. ‘It’s only a picture’: Sexting, ‘smutty’ snapshots and felony charges. *Visual Stud* 24, 3: 258-268.
  19. George Chauncey. 1995. *Gay New York: Gender, Urban Culture, and the Making of the World, 1890-1940*. Basic Books, New York, NY.
  20. Al Cooper, David L. Delmonico, and Ron Burg. 2000. Cybersex users, abusers, and compulsives: New findings and implications. *Sex Add Compuls* 7: 5-29.
  21. Elena F. Corriero and Stephanie T. Tong. 2016. Managing uncertainty in mobile dating applications: Goals, concerns of use, and information seeking in Grindr. *Mobile Media Commun* 4, 1: 121-141.
  22. Matthew R. Currie, Everarda G. Cunningham, and Bruce M Findlay. 2004. The short internalized homophobia scale: Examination of the factorial structure of a new measure of internalized homophobia. *Educ Psychol Meas* 64, 6: 1053-1067.
  23. Nicole B Ellison, Charles Steinfield, and Cliff Lampe. 2007. The benefits of Facebook “friends:” Social capital and college students’ use of online social network sites. *J Comput-Mediat Commun* 12, 4: 1143-1168.
  24. Colin Fitzpatrick, Jeremy Birnholtz, and Jed R Brubaker. 2015. Social and personal disclosure in a location-based real time dating app. In *48th Hawaii International Conference on Social Sciences* (HICSS '15).
  25. David M. Frost and Illan H. Meyer. 2009. Internalized homophobia and relationship quality among lesbians, gay men, and bisexuals. *J Couns Psychol* 56, 97–109.
  26. Linda Garnets, Gregory M. Herek, and Barrie Levy. Violence and victimization of lesbians and gay men: Mental health consequences. 2003. In *Psychological perspectives on lesbian, gay, and bisexual experiences* (2nd ed.), Linda Garnets and Douglas Kimmel (eds.). Columbia University Press
  27. Jeremy J. Gibbs and Eric Rice. 2016. The social context of depression symptomatology in sexual minority male youth: Determinants of depression in a sample of Grindr users. *J Homosexual* 63, 2: 278-299.
  28. Philip Gnilka and Brian J. Dew. 2009. An Internet-based examination of sexual behaviors and marital adjustment among self-identified gay and bisexual heterosexually married male users of online chat rooms. *J LGBT Iss Counsel* 3,1: 2-20.
  29. Abbie E. Goldberg, Julianna Z. Smith. 2011. Stigma, social context, and mental health: Lesbian and gay couples across the transition to adoptive parenthood. *J Couns Psychol* 58, 139–150.
  30. Deborah Gordon-Messer, Jose A Bauermeister, Alison Grodzinski, and Marc Zimmerman. 2013. Sexting among young adults. *J Adolescent Health* 52, 3: 301-306.
  31. Mary L Gray. 2009. *Out in the Country: Youth, Media, and Queer Visibility in Rural America*. NYU Press, New York, NY.
  32. Grindr. Press & Media. 2015. Retrieved August 28, 2016 from <http://www.grindr.com/press/>
  33. Robert M. Groves, Floyd J. Fowler, Mick P. Couper, James M. Lepkowski, Eleanor Singer, and Roger Tourangeau. 2009. *Survey methodology*. Wiley Interscience.
  34. David Gudelunas. 2012. There’s an app for that: The uses and gratifications of online social networks for gay men. *Sexuality & Culture* 16, 4: 347-365.
  35. Oliver L. Haimson, Jed R. Brubaker, Lynn Dombrowski, and Gillian R. Hayes. Disclosure, stress, and support during gender transition on Facebook. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*, 1176-1190.
  36. Phillip L. Hammack and Bertram J. Cohler. 2009. *The story of sexual identity: Narrative perspectives on the gay and lesbian life course*. Oxford University Press.

37. Mark J. Handel and Irina Shklovski. 2012. Disclosure, ambiguity and risk reduction in real-time dating sites. In *Proceedings of the 17th ACM international conference on Supporting group work (GROUP '12)*.
38. Amy A. Hasinoff. 2012. Sexting as media production: Rethinking social media and sexuality. *New Media Soc* 15, 4: 449-465.
39. Louise C. Hawkley and John T. Cacioppo. 2010. Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Ann Behav Med* 40, 2: 218-227.
40. Andrew F. Hayes. 2013. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. Guilford Press.
41. Karine Igartua, Kathryn Gill, and Richard Montoro. 2003. Internalized homophobia: A factor in depression, anxiety, and suicide in the gay and lesbian population. *Can J Community Ment Health* 22, 2: 15–30.
42. Institute of Medicine. 2011. *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding*. The National Academies Press.
43. Rodney H. Jones. 2005. ‘You show me yours, I’ll show you mine’: The negotiation of shifts from textual to visual modes in computer-mediated interaction among gay men. *Vis Commun* 4, 1: 69-92.
44. Sidney M. Jourard. 1971. *Self-disclosure: An experimental analysis of the transparent self*. Wiley-Interscience.
45. Robert Kraut, Michael Patterson, Vicki Lundmark, Sara Kiesler, Tridas Mukophadhyay, and William Scherlis. 1998. Internet-paradox: A social technology that reduces social involvement and psychological well-being? *Am Psychol* 53, 9: 1017-1031.
46. Robert Kraut, Sara Kiesler, Bonka Boneva, Jonathon Cummings, Vicki Helgeson, Anne Crawford. 2002. Internet paradox revisited. *J Soc Issues* 58, 1: 49-74.
47. Ethan Kross, Philippe Verduyn, Emre Demiralp, Jiyoung Park, David Seungjae Lee, Natalie Lin, Holly Shablack, John Jonides, and Oscar Ybarra. 2013. Facebook use predicts declines in subjective well-being in young adults. *PloS one* 8, 8: e69841.
48. Brandon T. McDaniel and Michelle Drouin. 2015. Sexting among married couples: Who is doing it, and are they more satisfied? *Cyberpsychol Behav* 18, 11: 628-634.
49. Peter C. Meidlinger and Debra A. Hope. 2014. Differentiating disclosure and concealment in measurement of outness for sexual minorities: The Nebraska outness scale. *Psychol Sex Orient Gender Divers* 1, 4: 489-497.
50. Ilan H. Meyer. 1995. Minority stress and mental health in gay men. *J Health Soc Behav* 36, 1: 38-56.
51. Ilan H. Meyer. 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Bull* 129: 674–97
52. Ilan H. Meyer and Laura Dean. 1998. Internalized homophobia, intimacy, and sexual behavior among gay and bisexual men. In *Stigma and Sexual Orientation: Understanding Prejudice Against Lesbians, Gay Men, and Bisexuals*, Gregory M Herek (ed.). SAGE Publications, Thousand Oaks, CA, 160-186.
53. Phoenix K. H. Mo and Neil S. Coulson. 2008. Exploring the communication of social support within virtual communities: A content analysis of messages posted to an online HIV/AIDS support group. *CyberPsychol Behav* 11, 3: 371-374.
54. Sharif Mowlabocus. 2010. *Gaydar Culture: Gay Men, Technology and Embodiment in the Digital Age*. Ashgate Publishing, Burlington, VT.
55. Michael E. Newcomb, Adrienne J. Heinz, Brian Mustanski. 2012. Examining risk and protective factors for alcohol use in lesbian, gay, bisexual, and transgender youth: A longitudinal multilevel analysis. *J Stud Alcohol Drugs* 73: 783–793.
56. William D. Nicholson and Bonita C. Long. 1990. Self-esteem, social support, internalized homophobia, and coping strategies of HIV+ gay men. *J Consult Clin Psych* 58, 6: 873-876.
57. Melanie D. Otis and William F. Skinner. 1996. The prevalence of victimization and its effect on mental well-being among lesbian and gay people. *J Homosexual* 30, 3: 93-121.
58. Eric Rice, Ian Holloway, Hailey Winetrobe, Harmony Rhoades, Anamika Barman-Adhikari, et al. 2012. Sex risk among young men who have sex with men who use Grindr, a smartphone geosocial networking application. *J AIDS Clinic Res* 4: 005.
59. Margaret Rosario, Heather L. Corliss, Bethany G. Everett, Stephen T. Russell, Francisco O. Buchting, Michelle A. Birkett. 2014. Mediation by peer violence victimization of sexual orientation disparities in cancer-related tobacco, alcohol, and sexual risk behaviors: pooled Youth Risk Behavior Surveys. *Am J Public Health* 104: 1113–1123.
60. Michael J. Rosenfeld and Reuben J. Thomas. 2012. Searching for a mate: The rise of the internet as a social intermediary. *Am Sociol Rev* 77, 4: 523-547.
61. Simon B. R. Rosser, Michael J. Wilkerson, Kerek J. Smolinski, Michael J. Oakes, et al. 2011. The future of Internet-based HIV prevention: A report on key findings from the men’s INternet (MINTS-I, II) sex studies. *AIDS Beh* 15: S91-S100.

62. Daniel W. Russell. 1996. UCLA loneliness scale (version 3): Reliability, validity, and factor structure. *J Pers Assess* 66, 1: 20-40.
63. Stephen T. Russell and Jessica N. Fish. 2016. Mental health in lesbian, gay, bisexual, and transgender (lgbt) youth. *Annu Rev Clin. Psychol* 12: 465-487.
64. Ariel Shidlo. 1994. Internalized homophobia: Conceptual and empirical issues in measurement. In *Lesbian and Gay Psychology: Theory, Research and Clinical Applications*, Beverly A Greene and Gregory M Herek (eds.). SAGE Publications, Thousand Oaks, CA, 176-205.
65. Mark F. Shwartz and Stephen Southern. 2000. Compulsive cybersex: The new tea room. *Sex Add Compuls* 7: 127-144.
66. Charles Steinfield, Nicole B. Ellison, and Cliff Lampe. 2008. Social capital, self-esteem, and use of online social network sites: A longitudinal analysis. *J Appl Dev Psychol* 29, 6: 434-445.
67. Amelia E. Talley, Tonda L. Hughes, Frances Aranda, Michelle A. Birkett, Michael P. Marshal. 2014. Exploring alcohol-use behaviors among heterosexual and sexual minority adolescents: Intersections with sex, age, and race/ethnicity. *Am J Public Health* 104: 295–303.
68. Nu Tang, Lisamarie Bensman, and Elaine Hatfield. 2013. Culture and sexual self-disclosure in intimate relationships. *Interpersona: Int J Pers Relat* 7, 2: 227-245.
69. Lisa C. Tidwell and Joseph B. Walther. 2002. Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Hum Commun Res* 28, 3: 317-348.
70. Robert S Tokunaga. 2016. An examination of functional difficulties from Internet use: Media habit and displacement theory explanations. *Hum Commun Res* 42, 3: 339-370.
71. Patti M Valkenburg and Jochen Peter. 2007. Online communication and adolescent well-being: Testing the stimulation versus the displacement hypothesis. *J Comput-Mediat Commun* 12, 4: 1169-1182.
72. Patti M Valkenburg and Jochen Peter. 2009a. Social consequence of the Internet for adolescents: A decade of research. *Curr Dir Psychol Sci* 18, 1: 1-5.
73. Patti M Valkenburg and Jochen Peter. 2009b. The effects of instant messaging on the quality of adolescents' existing friendships: A longitudinal study. *J Commun* 59, 1: 79-97.
74. Patti M Valkenburg and Jochen Peter. 2011. Online communication among adolescents: An integrated model of its attraction, opportunities, and risks. *J Adolescent Health* 48, 2: 121-127.
75. Chad Van De Wiele and Stephanie T Tong. 2014. Breaking boundaries: The uses & gratifications of Grindr. In *Proceedings of the 2014 ACM international conference on Pervasive and ubiquitous computing (UbiComp '14)*.
76. Philippe Verduyn, David Seungjae Lee, Jiyoung Park, Holly Shablack, Ariana Orvell, Joseph Bayer, Oscar Ybarra, John Jonides, and Ethan Kross. 2015. Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *J Exp Psychol* 144, 2: 480.
77. Jessica Vitak, Nicole B. Ellison, and Charles Steinfield. 2011. The ties that bond: Re-examining the relationship between Facebook use and bonding social capital. In *System Sciences (HICSS), 2011 44th Hawaii International Conference on*, pp. 1-10.
78. Joseph B Walther. 1996. Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Commun Res* 23, 1: 3-43.
79. Kevin B Wright and Sally B Bell. 2003. Health-related support groups on the Internet: Linking empirical findings to social support and computer-mediated communication theory. *J Health Psychol* 8, 1: 39-54.
80. Richard J. Wolitski, Ron Stall, and Ronald O. Valdiserri. 2008. *Unequal opportunity: health disparities affecting gay and bisexual men in the United States*. Oxford University Press.
81. Jaime Woo. 2013. *Meet Grindr*. Jaime Woo, Canada