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# Data cultures of mobile dating and hook-up apps: Emerging issues for critical social science research

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**Abstract**

The ethical and social implications of data mining, algorithmic curation and automation in the context of social media have been of heightened concern for a range of researchers with interests in digital media in recent years, with particular concerns about privacy arising in the context of mobile and locative media. Despite their wide adoption and economic importance, mobile dating apps have received little scholarly attention from this perspective – but they are intense sites of data generation, algorithmic processing, and cross-platform data-sharing; bound up with competing cultures of production, exploitation and use. In this paper, we describe the ways various forms of data are incorporated into, and emerge from, hook-up apps' business logics, socio-technical arrangements, and cultures of use to produce multiple and intersecting *data cultures*. We propose a multi-layered research agenda for critical and empirical inquiry into this field, and suggest appropriate conceptual and methodological frameworks for exploring the social and political challenges of data cultures.

**Keywords**

Online dating, apps, mobile media, geo-location, sexuality, data culture

## Introduction

The practice of everyday life is entangled with digital media, especially mobile media (Goggin, 2006), and this extends to sex and intimate relationships (Light, 2014). Dating sites and apps – services that support the search for romantic and sexual partners are increasingly developed for mobile devices. Indeed mobile dating apps – including mobile versions of pre-existing dating sites – are a very substantial subsector of the burgeoning 'app economy' (Goldsmith, 2014).

The boom in dating apps over the past three years has fuelled both industry hype and social anxiety in the mainstream media and technology press (Holmes, 2015; Marinos, 2014; Riley, 2015; Stampler, 2014), while the ethics and politics of apps like Tinder and Grindr are regular topics of discussion in popular digital media fora. With a few notable exceptions (e.g. Ellison et al., 2006, 2012; Gibbs et al., 2011), dating and hook-up websites and apps have, until recently, been studied mainly with regard to specific aspects and particular demographics, especially gay men (Blackwell et al., 2015; Brubaker et al., 2016; Gudelunas, 2012; Light, 2016a; Light et al., 2008; Mowlabocus, 2010; Race, 2010, 2015). However, the sharp increase in media coverage over the past five years indicates a moment of mass take-up. These developments are bringing renewed popular and mainstream scholarly attention to the technological mediation of sexuality

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and romantic relationships, leading to a small but growing sub-field of research focused on mobile dating and hook-up apps (Albury and Byron, 2016; David and Cambre, 2016; Duguay, 2017; Ranzini and Lutz, 2016).

Mobile dating apps bring into sharp relief the emerging sociocultural implications of mobile and locative media more broadly, particularly around intimacy and privacy (Goggin, 2006; Hjorth and Lim, 2012; Light, 2016a). The convergence of public and private life associated with mobile social media means that the technologies that mediate dating, relationships and sex are connected to other aspects of our lives and identities in new ways.

Meanwhile, issues like 'Big Data' and algorithmic curation are of central concern to critical social science research in the field of digital media and communication (Boyd and Crawford, 2012), especially with respect to the governance of and regulation by social media platforms (Gillespie, 2017). In this field, increasing critical and empirical attention is being paid to the ways that seemingly mundane technical features of digital media platforms, apps and devices mediate among the competing interests of the corporations providing the platforms, the advertisers and dataminers who exploit the data generated by users, and diverse communities of users themselves – see for example Gerlitz and Helmond's (2013) work on the Facebook 'like' button. Online and mobile dating sites and apps are complex and data-intensive, and they mediate, shape and are shaped by cultures of gender and sexuality. This makes them particularly interesting sites of exploration for how various forms of intimate personal and social data are mined and exploited by corporations, and lived with and negotiated by users – in other words, for diverse, multiple and intersecting *data cultures*.

## Data cultures

The term 'data cultures' is intended to be generative and dynamic. It picks up on the very rich, complex and multivalent history of the concept of 'culture' (Williams, 1976) to tease out the complexity of data within digitally mediated dating and hookup cultures, and to move beyond simplistic 'top-down, bottom-up' understandings of data power. We use the term in four main ways, with empirical and analytical implications as well as metaphorical ones. First, and most familiarly, we use 'data cultures' to refer to what we might call dating and hook-up apps' *cultures of production* – the institutionalized routines, habits and knowledge practices of the app publishers with respect to data in dating apps. In turn, these cultures of production are often (but not always – see Light, 2016a) a complex articulation of Silicon Valley's individualistic and libertarian ideologies (Marwick, 2017), with existing social media business models. It is these cultures of production that give us the generic conventions of social media profiles – headshot, age (usually binary), gender, location – which are persistent and interoperable data points that can be used to link data sets across platforms and social media apps, shaping our identities within and experiences of the social activities they mediate.

Second, 'data cultures' refers to the various ways that *data are cultivated* – as we know, there is no such thing as raw data that can be 'mined' – despite the dominant metaphors of Big Data (Puschmann and Burgess, 2014), 'raw data is an oxymoron' (Gitelman, 2013). Rather, in dating and hook-up apps various forms of data are created, cleaned, ordered, harvested, and cross-fertilised – by multiple and distributed but connected actors, including corporations, governments, developers, advertisers and users.

Third, we can use 'data cultures' to mean *the datification of culture*, via the algorithmic logics of digital media like mobile dating and hook-up apps, and their integration into the broader 'social media logics' that van Dijck and Poell (2013) argue are shaping society. In this sense, we talk about the 'datification' of dating and sexual cultures, and the turn to logics of 'data science' by both corporate and individual participants.

Finally, we are concerned with the articulation of data with dating apps' *cultures of use* – how data structures and processes are encountered, experienced, exploited and resisted by users who encounter them in the practice of everyday life, and how vernacular norms and practices for data ethics and safety are being managed and contested within user communities.

In this paper, we explore the data cultures of mobile dating apps across a number of distinct areas. First, we provide a brief overview of the various kinds of data generation, cultivation and use that emerge and intersect around dating and hook-up apps. Second, we discuss the specific new challenges that emerge at the intersection of dating apps, geo-location and the cultural economy of mobile data (that is, the cross-platform *cultivation* of data). We cover the ongoing historical articulation of information cultures such as 'data science' with matchmaking and dating; and the vernacular appropriation of these information cultures by certain gender-based identity cultures in their use of what we call 'vernacular data science' (the *datafication* of dating and sexual cultures). We address the complexity of data security, safety and ethics in mobile dating's *cultures of use*; and, finally, we explore the implications of the datafication of dating cultures for health and wellbeing. In each of these sections, the various aspects of 'data cultures' intersect. Throughout, we are

particularly concerned to ground data cultures in everyday practices and ordinary experiences, and hence consider user agency and creativity alongside issues of corporate exploitation, privacy, and risk.

## The datafication of dating cultures

Romantic and sexual encounters – including but preceding the modern phenomenon of 'dating' – have always been mediated via the technologies of the day. In the twentieth century alone, one might think of cinema, personal newspaper and magazine advertisements, video dating and the use of filing systems by dating agencies as dating technologies (Beauman, 2011; Phua et al., 2002; Woll, 1986). While chat rooms and bulletin boards played a role in matching and meeting up from the earliest days of computer-mediated communication and the internet (Livia, 2002), towards the end of the 1990s websites like Gaydar and Match.com emerged, taking dating towards a 'self service', database-driven model (Gibbs et al., 2006, Light et al., 2008). Companies such as eHarmony also began to make use of psychologically informed algorithms by deploying profiling questionnaires, referencing the dating agencies they sought to supplant. Data relating to location has always been crucial for such online dating systems, albeit in the early years of the web, often in the form of manually entered postcodes (Light, 2016a; Light et al., 2008).

Alongside most other uses of the web and social media, online dating has migrated to the mobile. In mobile dating apps, the broader availability of GPS and other 'passive' geolocative technologies, such as 'postcode' and 'hometown fields', combined with sophisticated calculative and ordering algorithms, represents a step-change in digital cultures of dating. A wide range of user data types and formats are collected and connected in the process of using mobile dating apps, by a range of corporate and private actors. Moreover, data collection can begin as early as sign up, and, for example, where this process is delegated to another platform, as in Tinder's integration of Facebook for identity verification, this may also bring a user's contact list, photographs, work history, educational background, and so on, into the mix, as well as enforcing the norms of one platform in another. Once the user is signed up and is using the app, where cross platform connectivity is built in, data relating to their personal profile and preference information specific to the dating app is accumulated, as well as photographs uploaded or linked to via the integration of other platforms like Instagram. A second order of data collection comes in the form of user activity on the platform – all the interactions each user has with other users, every time they swipe right or left, the length of time between viewing a profile and initiating contact, and so on. These data are used by the app developers or publishers to optimize the user experience and enhance the opportunity to monetize that experience, and to learn how to improve the app.

For example, the lesbians-only dating app Dattch (originally pitched as the Grindr for same-sex attracted women) was redesigned with a focus on longer-term social interaction and culture, rather than short-term attraction based on geographic proximity, and eventually rebranded (as HER) – largely as a result of insights into user behaviour generated through the use of data analytics (Murray and Sapnar Ankerson, 2016). This is an example of the use of data combined with user engagement strategies to ensure a fit between the data cultures and sociotechnical features of an app, and the sexual cultures whose needs it aims to serve. But, user data from dating and hook-up apps, like all social media data, can be and are perhaps primarily used for targeted behavioural advertising, and, in a further layer, for secondary and tertiary analytics purposes. The issues related to privacy, especially where cross-platform data sharing and integration are involved, are therefore of heightened concern in the context of mobile dating apps.

## Geo-location and the cultural economy of user data

Location-based services, which are heavily reliant on mobile broadband, constitute an important and rapidly expanding segment of the global ICT market. It has recently been estimated that revenues from context-aware smartphone apps will hit €30.6 billion by 2019 (European Global Navigation Satellite Systems Agency, 2017). With the rise of smartphone use, 'unlocated information will cease to be the norm' (Gordon and de Souza e Silva, 2011: 19) and location will become a 'near universal search string for the world's data' (20), with information 'increasingly about where you are' (McCullough, 2006: 26). Dating and hook-up apps are significant in this context because geolocative information is often crucial to user experience and to the software's background operations. And, yet, despite their wider adoption and economic importance, dating apps have received less attention in communication, media and cultural studies compared to other facets of mobile location-based communications.

Given the centrality of geolocation to Grindr and other hook-up apps, Brubaker et al. (2016: 5) suggest that we must pay careful attention to the ways that 'location and interactions are figured by the platform and experienced by its users'. Prior research on hook-up apps reveals the multiple, subtle and intricate engagements with and uses of the geolocation features

of these services. While noting the 'specific one-click affordances' of the mobile chat features of Grindr, which include the sending of pictures and one's location, Licoppe et al. (2016) report on how, for French Grindr users, these functions, 'which are part of standard [conversational] openings' in Grindr, 'become specifically multimodal' (10–11) and part of specific textual performances – what they call 'insulation work' – that is done in order to keep interactions uncomplicated and restricted to the arrangement of hook-ups (6). Licoppe et al. (2016) also observe how the recording of location can, if the distance between users is perceived to be too far, become a barrier to hooking up. In a study reporting on the switching of users between services, Brubaker et al. (2016) comment that hook-up apps with geolocational functionality are not only about 'finding the ''right kind of person'' but also about categorising and structuring *yourself* in spaces where others can find you' (7). They go on to argue that such activities can involve the temporary or longer term leaving of an app, dependent on time, physical situation, and other contextual factors (e.g. joining or leaving while on vacation, in a small town, etc.).

Location disclosure via mobile applications can also be viewed as a significant regulatory issue, especially in the context of wider public debate over and anxiety around privacy. As Adriana de Souza e Silva and Jordan Frith (2012: 118) write, once a social network platform user's location 'becomes a crucial determinant of the type of data accessed', then, 'consequently, privacy issues become more directly interconnected with location'. De Souza e Silva and Frith argue that transparency, and exclusion and aggregation, are key issues attending the disclosing of location data in social media. With respect to the first of these, their argument is that the privacy policies of popular location-based services 'rarely delineate if they share location information with third parties, how they share the information, or if location information is stored' (128). With respect to the second interrelated concerns of exclusion and aggregation, the issue here, they suggest, is that, 'as companies collect more and more data to build increasingly robust profiles, people have little recourse to access what information has been collected or whether that information is correct [... and consequently] they have little control over what is done with their own locational information' (128–129).

De Souza e Silva and Frith (2012: 119) go on to make the important point that, ultimately, 'locational privacy needs to be understood contextually'. Location information is not inherently private. Indeed, as Greg Elmer (2010) has argued, all location-based social media platforms operate around a tension, continuously negotiated by their users, between 'finding' and 'being found', and this is particularly so with dating and hook-up apps. Given this, de Souza e Silva and Frith (2012: 119–120) suggest that 'the loss of privacy occurs when the context shifts away from how the information was originally intended'. It is also worth stressing here that locational privacy must be understood as medium specific, shifting between different platforms. Thus the key issue, de Souza e Silva and Frith argue, is that users' negotiations of locational privacy is, and ought to be, 'intimately related to the ability to control the context in which one shares locational information' (129).

In light of the above considerations of locational privacy, it is worth briefly considering Grindr's and Tinder's privacy policies. In terms of user ability to control the context in which location information is shared, neither service provides especially detailed instructions for users, although Grindr does detail how users can disable persistent cookies. In terms of what locational information is stored and why, the information collection and use section of Grindr's privacy policy states the following: 'When you use the Grindr App, we will collect your location to determine your distance from other users... through the GPS, Wi-Fi, and/or cellular technology in your Device... Your last known location is stored on our servers for the purpose of calculating Distance between you and other users.' Meanwhile, Tinder's Privacy Policy states: 'We automatically collect information from your browser or device when you visit our Service. This information could include your IP address, device ID and type, your browser type and language, the operating system used by your device, access times, your mobile device's geographic location while our application is actively running, and the referring website address.' The privacy policies of both services also provide lengthy, if somewhat general, information on the sharing of user data, including with service providers (e.g. Apple), partner firms (in Tinder's case, this includes explicit mention of Facebook and other companies controlled by Tinder's parent company; in Grindr's case, this includes explicit mention of Google Analytics, Flurry Analytics, MoPub, JumpTap, and Millennial Media), and other third parties (especially advertisers).

For the companies involved, location disclosure enabled by their app is significant because the accumulation of geocoded information generates an information rich data pool. Here we have, then, an emerging portrait of 'user activity made possible by ubiquitous [social media based] interactivity [... that is] increasingly detailed and fine-grained, thanks to an unprecedented ability to capture and store patterns of interaction, movement, transaction, and communication' (Andrejevic, 2007: 296). What is produced via such arrangements, Carlos Barreneche (2012) argues,

are sophisticated forms of 'geodemographic profiling' whereby data aggregation is used to segment users and enable inferences about them. This data carries immense potential commercial value, most obviously in relation to possibilities for location-aware advertising and data analytics. How this process works in relation to hook-up apps becomes clearer when we consider the revenue models of Grindr and Tinder.

Grindr is unusual for a technology startup insofar as it is independently run and, to date, has received no outside venture capital investment. Grindr relies on two main revenue sources: subscriptions to its premium service (Grindr Xtra), which account for 75% of revenue; and, advertising accompanying Grindr Free (sold in-house by Grindr staff, and by mobile-ad networks such as Millennial Media), which account for the remaining 25% of revenue. Tinder is somewhat different in that it is a subsidiary of a larger publicly listed parent company, IAC, which owns a suite of dating sites, including Match, Chemistry, OkCupid, People Media, Meetic, and others. In its earnings report for Q1, 2017, IAC reported revenue of US$298.8 million from its Match Group, which includes Tinder and the aforementioned and additional services. In addition to the earnings IAC draws from Tinder, its real value lies in the user data it generates. This is because IAC operates according to a model of economic 'enclosure' which emphasises 'the ongoing importance of structures of ownership and control over productive resources' (Andrejevic, 2007: 299). This arrangement is made explicit in Tinder's Privacy Policy, where it is stated that 'we may share information we collect, including your profile and personal information such as your name and contact information, photos, interests, activities and transactions on our Service with other Match Group companies'. The difficulty of this for users of Tinder is that their data are in continual movement: data created through one social media application, shifts and thus is stored across multiple proprietary servers, and, increasingly, move outside of end-user control (Coté, 2014: 123).

## Dating as data science

The most famous extended use of dating data is the work undertaken by OK Cupid's Christian Rudder (2014). While no doubt exploring patterns in user profile, matching and behavioural data for commercial purposes, Rudder also published a series of blog posts (then book) extrapolating from these patterns to reveal demographic 'truths'. By implication, the data science of dating, because of its combination of user-contributed and naturalistic data, OK Cupid's Christian Rudder (2014) argues, can be considered as 'the new demography'. Data mined from the incidental behavioural traces we leave behind when doing other things – including intensely personal things like romantic or sexual partner-seeking – transparently reveal our 'real' desires, preferences and prejudices, or so the argument goes. Rudder insistently frames this approach as human-centred or even humanistic in contrast to corporate and government uses of 'Big Data'.

Reflecting a now familiar argument about the wider social benefit of Big Data, Rudder is at pains to differentiate his work from surveillance, saying that while 'the public discussion of data has focused primarily on two things: government spying and commercial opportunity', and if 'Big Data's two running stories have been surveillance and money, for the last three years I've been working on a third: the human story' (Rudder, 2014: 2). Through a range of technical examples, the data science in the book is also presented as being of benefit to users, because, by understanding it, they can optimize their activities on dating sites (Rudder, 2014: 70).

While Rudder exemplifies a by-now extensively critiqued model of 'Big Data' as a transparent window or powerful scientific instrument that allows us to neutrally observe social behaviour (Boyd and Crawford, 2012), the role of the platform's data operations and data cultures in such issues is more opaque. There are further, unanswered questions around whether the matching algorithms of dating apps like Tinder exacerbate or mitigate against the kinds of romantic racism and other forms of prejudice that occur in the context of online dating, and that Rudder claimed to reveal through the analysis of 'naturalistic' behavioural data generated on OK Cupid.

Much discussion of 'Big Data' still implies a one-way relationship between corporate and institutionalized 'Big Data' and individual users who lack technical mastery and power over the data that their activities generate, and who are primarily acted *upon* by data cultures. But, in the context of mobile dating and hook-up apps, 'Big Data' is also being acted upon by users. Ordinary users get to know the data structures and sociotechnical operations of the apps they use, in some cases to generate workarounds or resist the app's intended uses, and other times to 'game' the app's implicit rules of fair play. Within certain subcultures, the use of data science, as well as hacks and plugins for dating sites, have created new kinds of vernacular data science.

There are a number of examples of users working out how to 'win' at OK Cupid through data analytics and even the generation of side businesses like Tinder Hacks. This subculture has its own web presence, and even an e-book. *Optimal Cupid: Mastering the Hidden Logic of OK Cupid* was written and self-published by former 'ordinary user' Christopher

McKinlay (2013), who deployed his machine learning expertise to optimize his dating profile, improving the notoriously poor odds of men receiving replies from women on dating sites and, crucially, finding true love in the process.

Similarly, developer and power OK Cupid user Ben Jaffe produced and published a plugin for the Chrome browser called 'OK Cupid (for the non-mainstream user)' which promises to enable the user to optimize their user experience by integrating an additional layer of data analytics with enhanced (and unofficial) platform features. Digital strategy consultant Amy Webb shared her formula for 'gaming the system' of online dating (2013: 159) to create an algorithm-beating 'super-profile' in her book *Data, A Love Story*. Developer Justin Long (2016) has developed an Artificial Intelligence (AI) application to 'streamline' the process, arguing that this is a natural evolutionary step and that the data-fuelled automation of partner-seeking can actually smooth the path to intimacy.

These forms of gamification of dating apps' 'hidden logics' have also materialized in the form of plugins and ancillary apps, especially for Tinder. 'Gaming' the system in these ways in turn draws design responses (e.g. tweaks to sorting and matching algorithms or even the structure of the interface itself) and even business model changes from the app's owners. For example, partly in response to automated swiping, Tinder introduced a limit on the number of profiles users could see for free. This move also marked the shift to a 'freemium' business model (that is, basic use is free, but you can pay to see more profiles by signing up to the premium product, Tinder Plus). In turn, users learned that changing their own sexual preferences in the app's metadata would force a kind of reset, making more profiles available without paying for the upgrade (David and Cambre, 2016). In this way, user practices, business models and app functionality co-evolve to produce new data cultures.

The idea of matchmaking as a science has progressed historically alongside the evolution of information technologies, from newspaper classifieds to dating agencies' databases to contemporary algorithmic logics; in parallel, dating has been seen as a game that can be won, and has been persistently characterized by a competitive or market-based logic (Heino et al., 2010). The most notorious form of gamified dating is associated with the counter-feminist 'Pick-up Artists' (PUA) movement or seduction community, which focuses on direct behavioural manipulation and very explicit metaphors of hunting and gaming (Almog and Kaplan, 2015). These user-generated hacks, workarounds and plugins designed to tip the balance in the favour of mostly male power users can also create security and safety concerns for their targets.

## Data security, safety and ethics in cultures of use

Social anxiety and technological uncertainty around mobile dating apps inflect the public debates about their use by teenagers and young adults, provoking concerned responses from the law and youth health policy fields (Marinos, 2014). These accounts foreground user concerns regarding data security, and data management. For example, in September 2014, a North American adult user, who was charged with child sexual assault as the result of a sexual relationship with a 13-year-old, sued Grindr for failing to properly verify users' age (Duffy, 2014). Official figures from Tinder report that only 7% of all users world-wide are under 18 and that under-18s are restricted from interacting with users aged over 18 (Doutre, 2014). However, recent Australian research with same-sex attracted young people suggests that some under-18s falsify their age in order to use dating apps to interact with older peers and potential partners (Albury and Byron, 2014, 2016). Further, the generation and sharing of sexually suggestive or sexually explicit data within apps may raise legal issues – particularly in countries such as Australia, where there is a significant gap between the age of consent (16 or 17), and the age at which a young person can consent to producing or sharing sexually explicit material (18) in Australia (Albury et al., 2013).

Increasingly, there is a need to develop educational, legal and policy responses to the emerging issue of technology-facilitated sexual violence and harassment of adults and young people (Henry and Powell, 2014). In Australia, individual States have passed specific criminal legislation relating to non-consensual image sharing and associated behaviour (such as threats and extortion). There is, however, no unified legal or educational responses to this issue at a national level (Henry et al., 2017). Public commentators have also begun to question the extent to which developers and distributors of hook-ups and online dating/sex-seeker sites have a duty to safeguard their users' personal and geo-locational data. While the 2015 Ashley Madison hack (Light, 2016b) foregrounded the vulnerability of adult heterosexual men in this respect, other recent high-profile data security breaches have primarily exposed women and young people. The 2014 'Fappening' event involved a large-scale leak of 'celebrity nudes', including pictures of *Hunger Games* star Jennifer Lawrence. While there was some public commentary blaming the subjects for taking the pictures in the first place, within a few days a strong discourse of developer obligation/responsibility had emerged in publications such as *Forbes* and *The New York Times* (Hartzog and Selinger, 2014; Manjoo, 2014).

While some apps (notably Grindr) have made public moves to accept responsibility for user security (for example, by patching potential data leaks when these are brought to their attention), others have been less willing to accept a responsibility for data breaches, or abusive user behaviour. In early November 2015, Mike Ryan, a US journalist, began receiving pictures of penises via text-message. Over the course of an evening he received pictures from 19 different men, and by corresponding with them, discovered they were responding to a false Tinder profile, which claimed to be that of a young (and 'horny') woman named Carilyn (Ryan, 2015). As the evening continued, Ryan tweeted a (redacted) version of this SMS exchange with the various men. As a heterosexual man in a secure living environment, he could process the interchange as 'funny'. However, he observed:

> Strangers asking me to come over to their homes was a bit unsettling. I saw two separate pictures of men masturbating. And I was legitimately upset when someone repeatedly kept trying to FaceTime with me, and this person was very persistent. But what if I weren't an adult male? What if I were a kid? What if I were in one of many, many other situations where something like this was legitimately frightening? (Ryan, 2015)

Ryan's experience of trying to resolve the issue with Tinder led to a frustrating process of shuttling between a number of email addresses, directly tweeting the Tinder CEO, Sean Rad, making contact with Tinder's publicist, and finally corresponding with a Tinder Vice President. Ryan emphasizes that he had to draw heavily on professional contacts and social media followers, and it was still 31 hours before Tinder responded to his complaint of harassment. His detailed account of his unsatisfactory encounter with Tinder concluded as follows: 'if you find yourself in a situation where you genuinely feel like you're being harassed, good luck getting help from Tinder' (Ryan, 2015).

Given this history of developer's delayed responsiveness to user's security concerns, it is unsurprising that these have increasingly been addressed within activist and user communities, particularly those communities focusing on digital access, and the politics of sexuality and sex/gender expression. For example, the Coding Rights Network, an international collective of women 'technologists, lawyers, social scientists, hackers, artists, journalists, researchers, advocates' led by Brazilian legal researcher Joana Varon, has produced *Safer Nudes: A Sexy Guide to Digital Security* (Felizi and Varon, 2015). Presented as a' zine-style downloadable Portuguese/English pdf, the resource recommends a range of user security strategies, including encryption, VPNs, pixellating or image-scrambling apps and avoidance of public Wi-Fi. The zine lists a range of 'insecure' popular apps (including Tinder), and strongly cautions against the use of commercial apps in general for sharing nudes, gesturing to recent data leaks by SnapChat and Ashley Madison. It describes the ideal picture-sharing app as 'open-source, with end-to-end encryption', with no requirements to link to email, phone numbers or other social media accounts (Felizi and Varon, 2015).

While *Safer Nudes* represents government and/or commercial surveillance as a significant personal security risk, the' zine also addresses non-consensual image-sharing practices (sometimes termed 'revenge porn' or 'image-based abuse'), observing that its target audiences of women and sex/gender diverse people 'are more easily exposed to online harassment' (Felizi and Varon, 2015). The authors provide advice for those whose images have already been shared without their consent, including instructions on making take-down requests, and seeking legal advice (with links to relevant feminist websites, such as withoutmyconsent.org and takebackthetech.net).

App users have also responded to security threats and in-app aggression through a range of digital strategies. While the use of aggressive, threatening or belittling tactics is of course not exclusive to digitally mediated encounters, some argue that the anonymity of apps and social media platforms can encourage such behaviour due to an 'online disinhibition effect' (Suler, 2005). Whether or not such an effect exists in measurable terms, it is certainly the case that the text-based nature of in-app communication allows those who are harassed to record and share evidence of the abuse. Consequently, an array of blogs, Tumblrs and other social media sites are now dedicated to screenshot galleries of dating/hook-up profile pages, unsolicited nude pictures, and digital chat. For example, Douchebags of Grindr records incidents of sexual racism and discrimination (i.e. profiles stating 'no Asians, no fats, no fems'), and HIV stigma (see also Raj, 2011). Humanitarians of Tinder mocks white Tinder users who pose with Africans in 'humanitarian' contexts for the racism this implies, even if implicit or unconscious (Mason, 2016). Similar sites record (and call out) aggressive or offensive responses to trans and genderqueer app users, and to same-sex attracted and heterosexual women (Shaw, 2016; Vitis and Gilmour, 2016). While these cultures can be seen to represent a 'bottom-up' approach to a developing ethics of data cultures, it is important to note that screenshots themselves constitute data, and the platform logics of social media may create layers of networked publicity. Even where images or texts are de-identified, they may be discoverable through tags, cross-platform sharing facilities, and practices of algorithmic curation. While these

posters in these galleries generally de-identify those they are shaming/calling-out, this is not always the case, raising legal and ethical questions regarding the reasonable expectation of privacy and data security for even 'douche-bag' app users.

## Data cultures of health and wellbeing

The rise of dating apps generates a number of issues regarding cultures of health and wellbeing. To date, health service providers have been keen to engage in health education via apps and websites aimed at men who have sex with men. Apps have also shaped cultures of health status disclosure amongst this group (Race, 2010, 2015). The role of apps within cultures of 'mediated intimacy' is increasingly recognised within the fields of public health and health promotion.

The increasing popularity of digital devices for arranging sex has led to particular interest on the part of authorities in how to instrumentalize these technologies for the purposes of HIV prevention with the US National Institute of Health funding a two-year study of the intersection of hook-up apps usage with gay men's sexual behaviours, particularly focusing on HIV risks (National Institute of Health, 2014), and high level meetings between HIV organisations and app developers aiming to promote safer sex and reduce HIV stigma within gay men's digital cultures held in the US and by the European CDC in late 2014 and early 2015. The overwhelming focus of these initiatives has been on technological solutions to public health problems, in particular getting tech companies to deliver 'proven' HIV interventions to users through hook-up apps. However, the possibilities inherent in the use of metadata for analytic and surveillance purposes has not been lost on authorities. For example, the recent report *Adolescents Under the Radar in the Asia-Pacific* (UNICEF, 2015) states, 'intelligence is vital in order to turn the HIV epidemic around', and suggests 'technology can help to bridge data gaps in ways that were fiction not long ago'. Citing UNAIDS studies on 'the feasibility of using social networking data as a method for evaluating and detecting HIV risk behaviours and outcomes', the report lists 'everything from call detail records to blogs, texts, twitters, chats, images, video and system logs' as potential datasets. The formation of a range of public-private partnerships that draw on user data to pursue public health objectives in the field of sexual health is imminent.

For their part, digital companies are rarely willing to discuss the details of law enforcement and intelligence agencies' access to their customer databases, or the degree to which they assist or resist such access. The possibility that public health concerns will be used to instigate law enforcement and security investigations is particularly pertinent here, especially given the increasing securitization of governmental practice. Many jurisdictions around the world still criminalize the non-disclosure of HIV status on the part of HIV-infected individuals prior to sex, or the use of illicit drugs. There are numerous reports of enforcement agencies clamping down on the buying and selling of drugs on hookup sites, with drug possession and HIV non-disclosure or HIV-positive sex typically cited as a rationale for entrapping and arresting people via this medium. A pivotal question is when – and with what effects – private sexual interactions get construed as a threat to public health, law enforcement or national security. For example, in August 2015, US Federal agencies raided the offices of Rentboy.com in New York – a website that enables men to sell sex – which had operated in plain sight for nearly two decades. Owners and staff were charged with conspiring to violate the Travel Act by promoting prostitution. The raid followed investigation by the US Department of Homeland Security, whose agents were happy to share with the public prurient accounts of some of the more esoteric sexual practices they uncovered during their investigation.[1] Here we can see how the potential construction of particular sexual practices as a threat to national security has the potential to expose users of hookup sites to humiliating and recriminatory public exposure.

## The forward agenda

In this paper, we have sought to understand digital hookup and dating data cultures through a range of lenses – as cultures of production, as sites of data cultivation, as spaces where culture is 'datafied', and as everyday cultures of use. As we have noted, this preliminary foray into the field of data culture gestures at an emerging research agenda. Still more work remains to be done on the uses of data within the production cultures of mobile dating and hook-up apps, within and across platforms. For example, there is more to learn about the ways that developers draw on user-generated data to create 'premium' (subscription) services within 'free' apps. Further, a deeper understanding of the ways app developers currently deploy data analytics in dialogue with public health officials, policy makers, legislators, and other regulatory systems can lead to more nuanced, ethical responses to both individual and collective concerns regarding data security. In order to investigate these areas, empirical work within the industry and/or other forms of direct access to the companies that own, publish and/or develop these apps, will be needed.

In addition, more work is needed to explore the emergence of dating and hook-up app data cultures from the perspectives of users themselves, which, we

suggest, requires methods beyond standard qualitative interview or focus group approaches. As we have noted, the combined datafication and gamification of dating generates a particularly neat articulation between certain kinds of geek masculinity and the data cultures of mobile dating apps. Other vernacular cultures are emerging that seek to combat unwanted sexual approaches (and outright harassment) by recontextualising in-app images and text across other digital platforms. User research can lead to a better understanding of those users for whom apps offer both significant opportunities for connection and pleasure *and* increased exposure to stigma and violence.

The use of digital-qualitative methods such as the 'over the shoulder' interview or app walkthrough (Light et al., 2016) conducted in collaboration with users, as well as other creative and participatory methods that enable the exploration of user understandings and practices can be of benefit here – see for example the recent and ongoing work undertaken by Mike Michael and Deborah Lupton (2016) on new theoretical and empirical approaches to the public understanding of 'Big Data'. Such an agenda would engage with the role of users, not only in generating data, but also in cultivating, exploiting and inhabiting the data cultures of mobile dating and hook-up apps. A forward research agenda would need to consider how user experience design features and embedded 'decision support' functionality impact on user activities; how users 'game' data cultures; and, in particular, how users deploy data analytics when seeking intimate partners and the cultures of vernacular data etiquette and ethics emerging in response to app use. This agenda (and these methods) can assist policy makers, educators, legislators, and app users better in understanding the ways that intimacy, pleasure, safety, health and well-being are mediated by the data cultures of dating apps.

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## Note

1. For example, in the official criminal complaint, Homeland Security Special Agent Susan Ruiz reports that, 'based on my investigation, I have learned that . . . a rimchair is a seat resembling a raised toilet seat designed so that the anus is accessible while someone is sitting on the seat. I have also learned that ''rimming'' refers to the touching of the tongue to the anus'.

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