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**Use of 'gay dating apps' and its relationship with individual well-being and
sense of community in men who have sex with men**

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Abstract

There is growing literature and empirical work that is investigating if and how mobile phone and tablet dating apps are influencing the lives of their users. An online questionnaire-based study was developed to investigate how men who have sex with men (MSM) use 'gay dating apps' (GDAs), and how such use may relate to different aspects of their lives on an individual and on a collective level. The study included data from 191 MSM living in the UK with varying levels of GDAs use and reasons for using them. Beyond some descriptive information on use of GDAs, the findings showed that, overall, high users of GDAs report a lower sense of community, higher levels of loneliness and lower levels of satisfaction with life. Still, there is some evidence that those MSM who use GDAs mainly for sexual encounters report higher levels of self-esteem and of satisfaction with life compared to those who use GDAs mainly for other reasons. These results suggest that knowing the limits of some of the most popular existing GDAs in what they can offer to MSM and their communities may be important for these men's well-being. It appears that such GDAs cater effectively for those looking for sexual partners, but may have negative implications for those who look for other types of relationships and interactions.

Keywords: men who have sex with men, gay dating apps, community, well-being, sex

Introduction

It is difficult to exaggerate the extent to which the Internet has impacted our day to day lives. Among other examples, online technology has changed how people meet and maintain relationships with friends or romantic/sexual partners (Whitty, 2008). Through it, private liaisons or wider communities alike can be constructed outside mainstream social/geographic boundaries. For this reason, it has been argued that the Internet has been particularly useful for opening up opportunities to people belonging to hidden/stigmatized groups (Amichai-Hamburger, 2007). One such group are men who have sex with men (MSM).

LGBT communities were early adopters of the Internet, quickly using it to find sexual or romantic partners, make friends, get health information and access pornography (Gauntlett, 1999; Grov, Breslow, Newcomb, Rosenberger & Bauermeister, 2014; Shaw, 1997). MSM, in particular, have been likely to use the Internet for sexual pursuits (Parsons, Severino, Grov, Bimbi & Morgenstern, 2007). One reason they may seek partners online is due to a lack of perceived support, or opportunities offline (DeHaan, Kuper, Magee, Bigelow & Mustanski, 2013). The relatively recent creation of dedicated 'gay dating apps' (GDAs), predominantly targeted at MSM, allows MSM to present themselves in cyberspace. Doing so extends the range of partners available to them and their opportunities to engage with them. Compared to the difficulty MSM may have with developing and managing relationships in heteronormative physical environments, modern digital platforms enable individuals to meet partners easily and rapidly (Quiroz, 2013; Van De Wiele, & Tong, 2014).

GDAs can be especially useful for MSM with barriers to accessing gay offline space, like those in small cities or rural communities, who do not feel they can "just walk down the street and meet someone" (White Hughto, Pachankis, Eldahan & Keene, 2017, p.730). The anonymity means there is also less risk of users being outed online versus offline, enabling

them to pursue potential partners more securely (Coon Sells, 2013). Thus by increasing the speed, convenience and safety with which users can partners, the success of GDAs is not surprising.

In the last few years, there has been a surge in the use of GDAs by MSM such as Grindr, Scruff or Romeo. The market leader, Grindr, was founded in 2009 and has grown to have over four million users across 192 countries (Beymer, Rossi & Shu, 2016). GDAs often cater for different target audiences and come with their own social norms. For example, Grindr has a broad membership and is particularly oriented towards MSM seeking sex, whereas Scruff is aimed mainly at individuals who identify as bears (men who are relatively hairy and large in body size) or are selectively attracted to bears (Jaspal, 2017; Philips, 2015). However, they tend to work in a relatively similar way. Typically, GDAs allow users to create/ browse profiles containing photographs and some biographical/ demographic information, and to connect via proximity in real time (Blackwell, Birnholtz & Abbott, 2015).

GDAs still have a lot in common with older gay themed websites, such as chat and dating sites. Users still create profiles where they share personal information that is used to filter a range of other users with whom they can communicate with through private messages (Lemke & Weber, 2017). Moreover, some chat and dating sites now have both desktop and app versions. This means that the key distinction between them and new GDAs is mostly down to the latter's use of location to filter potential partners (Handel & Shklovski, 2012). Unlike traditional networking sites (e.g., chatrooms) modern GDAs are designed to facilitate opportune physical encounters between users based on where they are. This use of proximity in pairing algorithms makes them comparable to online gay bars (Miller, 2015).

Although MSM can use GDAs for finding friendships, dates and social networks, the most common reason is meeting people to hookup with (Holloway et al., 2014). Often these meetings later lead to romantic relationships. Between 40%-60% of same-sex couples have

met via GDAs or chat and dating sites (Liau, Millet & Mark, 2006; Rosenfeld & Thomas, 2012). This figure does not distinguish between GDAs and forums so the relative contribution of each is unclear. But the more instantaneous nature of GDAs and the current popularity of smartphone technology suggest they may account for a considerable proportion.

GDAs use and well-being in MSM

Most LGBT youths develop into healthy adults, despite experiencing significant social stresses linked to their minority status. Nonetheless, sexual minority adults and adolescents are at increased risk of negative mental health outcomes, relative to their heterosexual counterparts (Cochran & Mays, 2000; Lehavot & Simoni, 2011; Russell, Sinclair, Poteat & Koenig, 2012). They are also more likely to have suicide ideations or take their own lives (Haas et al., 2011). It is difficult to generalize these data given studies are often constrained by relatively small sample sizes. There are also significant differences depending on whether samples are selected from the general population or community-based surveys. Still, the increased lifetime prevalence of suicide attempts among sexual minority youths and adults has been a consistent finding (for a meta-analysis, see Hottes, Bogaert, Rhodes, Brennan & Gesink 2016).

People who are particularly vulnerable include individuals who have been victimized, rejected by close friends/family members or come from neighborhoods with a higher concentration of LGBT-motivated hate crimes and heterosexist social norms (Duncan & Hatzenbuehler, 2014; Hershberger & D'augelli, 1995; Ryan, Huebner, Diaz & Sanchez, 2009). Coming out is associated with positive adjustment in the long run but, in the short term, it increases the risk of a person being stigmatized (Russell & Fish, 2016). Stigma is conceptualized multifacetedly, encompassing anticipated (hypothesized), internalized (devaluations of the self), and enacted domains (Herek, Gillis & Cogan, 2009). All have been linked to increased mental health risks and dimensions of psychological well-being, including

alienation, a lack of community integration and low self-acceptance (Griffith & Hebl, 2002; Hershberger & D'augelli, 1995; Meyer, 2013; Whitehead, Shaver & Stephenson, 2016). Stigma is also a predictor of minority stress, the psychological pressure from the juxtaposition of a person's identity and the dominant values of their social context (Mayer, 1995).

Despite some liberalization of social attitudes, homonegativity is still a part of daily life for many people. This is true in high school, higher education, sporting contexts and workplaces alike (Caudwell, 2011; Einarsdóttir, Hoel & Lewis, 2015; Grimwood, 2016; Hong & Garbarino, 2012). A UK based survey, carried out by the charity Stonewall, found that one in five gay men surveyed experienced a hate incident in the last year. The most prevalent category was being insulted/pestered/intimidated or harassed because of their sexual orientation. Consequently, almost 60% of gay men did not feel comfortable holding a partner's hand in public (Bachmann & Gooch, 2017). There is ample evidence gay men and lesbian women's overall well-being can be negatively affected by homonegativity (Blais, Gervais & Hébert, 2014; Isay, 2010; Szymanski & Chung, 2001; Zervoulis, Lyons & Dinos, 2015). Links between depressive symptomatology and internalized homonegativity are also apparent (Allen & Oleson, 1999; Newcomb & Mustanski, 1998; Meyer & Dean, 1998).

Members of stigmatized or marginalized groups may find online platforms a useful outlet for countering minority stress (Caplan, 2002). GDAs potentially provide a safer space than physical LGBT spaces do. The latter are often the site of heterosexist violence due to their public nature advertising the congregation location and existence (Myslik, 1996). With GDAs, MSM can have safe and anonymous access to their community, which may be useful for closeted men fearing the stigma of being 'out' publicly (DeLonga et al., 2011; Rosser et al., 2011). However, heavy use of online communities can have negative consequences for people's well-being. For instance, use of social media sites in general has been found to correlate positively with symptoms of depression, a risk which is amplified when people report

high use (Donnelly & Kuss, 2016; Lup, Trub & Rosenthal, 2015; Tandoc Jr, Ferrucci & Duffy, 2015). Users' fears of missing out on news or opportunities in their network may push them towards spending a lot of time in online communities where they are making social comparisons (Kalpidou, Costin, & Morris, 2011; Oberst, Wegmann, Stodt, Brand & Chamarro., 2016). There are also mental health benefits associated with users limiting their access to social media, including reductions in loneliness and depression (Hunt, Marx, Lipson & Young, 2018). In this respect, although GDAs can address some of the pressures facing MSM, they potentially present some of their own.

GDAs use and sense of community in MSM

As well as being able to use online platforms to find partners more easily, another benefit that MSM may gain through GDAs is a sense of community. As per other LGBT spaces, GDAs can subvert the oppression of heterosexist norms by permitting individuals to behave genuinely (Myslik, 1996). This freedom can have psychological benefits for members of the community. For example, connecting digitally with other LGBT people can have a positive effect on people's sexual self-acceptance (Crowson & Goulding, 2013; DeHaan, Kuper, Magee, Bigelow & Mustanski, 2013). Members of online communities often feel better able to connect with others they can relate to than they do offline. Through their experiences, they can also learn "how to be gay" together (Castañeda, 2015, p 1). Hence GDAs can be socially empowering because they facilitate identity processes and interpersonal relations (Castañeda 2015; Crowson & Goulding, 2013; Dodge, 2014; Jaspal, 2017). They are an easy way for individuals to integrate themselves into insular communities and expand these communities' collective boundaries. However, GDAs are less effective towards this end for individuals in rural, or smaller urban areas with users getting frustrated at seeing "the same frickin' people"

(White Hughto et al, 2016, p.729). Still, this may be due to the relatively narrow range of prospects versus the software itself.

Sharing personal information on GDAs is negatively associated with loneliness (Taylor, Hutson & Alicea., 2017). This pattern is in line with the Internet enhanced self-disclosure hypothesis: disclosing personal information online leads to greater feelings of perceived social connectedness (Valkenburg, Sumter & Peter, 2011). GDAs offer sexual minority men a supportive platform to explore and express their sexuality. Hence, the amount of time MSM spent in such platforms may be a positive predictor of the emotional support they give and receive from others (Whitty, 2002). Although it is important to remember that GDAs software allows for many types of communication, not all will necessarily have positive effects. For instance, there is no relationship between sexting and reductions in internalized homonegativity and loneliness, or increases in well-being (Gordon-Messer, Bauermeister, Grodzinski & Zimmerman, 2013; Taylor et al., 2017). This is perhaps because sexting carries out a function that is not connected to sharing deep, personal feelings. However, as already mentioned, there are possibilities for creating all kinds of relationships, from casual to romantic.

There appears to be a trade-off between the speed versus durability of relationships people enter into via GDAs. Users pursuing long term relationships have reported dissatisfaction at the difference between how they would expect them to develop, and the emphasis they felt online communities placed on casual sex (Yeo & Fung, 2018). They said other users' communication quickly became too overtly sexual for their comfort. They also reported dissatisfaction that their relationships advanced at a far faster speed than how they would have expected them to offline. In some instances, participants unfavorably compared GDAs to online forums, since the latter still anticipated users getting to know each other gradually. According to some, the mediums represent "the difference between a hard-won

relationship and getting something too easily” (Yeo & Fung, 2018 p.9). Other samples have also said that the abundance of options on GDAs promoted ambivalence in users' attitudes towards establishing relationships (Chan, 2018).

Brubaker, Ananny and Crawford (2016) spoke to MSM who quit GDAs because they found them too time-consuming and tempting. Some passed moral judgement on them, claiming that Grindr in particular objectified men on it. The ex-users said they had difficulty finding sustainable relationships, or non-sexual ones, and felt the focus on sexual activity over meaningful connections was to the app's detriment. Nonetheless, many said that they intended to use GDAs when on vacation or visiting a new city. This implied that they still valued GDAs as a means of meeting other MSM, even if they did not facilitate the sustainable relationships they were after. Thus, users' sociosexual goals may mediate the extent that GDAs help them counter loneliness or extend their social networks.

As per other social media sites, whether or not users experience the social benefits associated with GDAs may further depend upon how intensely they use them. Heavy use has been associated with low social and psychological well-being. In an English study looking at Grindr use, participants suggested the app is best used in moderation (Jaspal, 2017). Some claimed to have undergone addictive symptoms during periods of high use. They also felt ashamed when their compulsions distracted them from other important tasks. One participant even described their Grindr use as “taking over [his] life” (Jaspal, 2017, p.198).

The same sample discussed the extent to which Grindr offered them a space for self-definition and constructing an authentic sexual identity. Whilst acknowledging the initial benefits of being able to speak freely to other MSM, they said that the sexualized virtual environment meant what they gained in agency and sexual openness was offset by a perceived pressure to conform to coercive norms. Individuals seeking non-sexual relationships felt excluded from the app and reported being judged, ignored or blocked after disclosing their

relationship goals with others. In addition, because GDAs allow users to artificially bolster their perceived self-confidence, some users felt that the option to manipulate their image online meant that, when meeting people in person, they struggled to maintain coherence between who they were on and off the app. This tension caused them distress when they were not able to measure up to their online persona in face to face interactions.

The present study

This study aims to add further evidence and clarity to the growing literature suggesting that the use of GDAs among MSM may have both beneficial and detrimental implications depending upon their reasons for using such apps and the frequency/intensity of their use. On one hand, use of GDAs may help users satisfy their emotional needs by helping MSM meet new people and increase opportunities for them to openly express themselves sexually. On the other hand, the perceived focus on superficial sexual relationships may prevent users from satisfying their emotional needs, including intimacy and meaningful connectivity with others. These latter outcomes could negatively impact users' satisfaction with life or promote feelings of alienation. Counter-intuitively, having ready access to more members of their community may make them feel lonelier.

So, this study investigates how use of GDAs amongst MSM relates not only to their well-being but also to their sense of community, a largely unexplored area at least in terms of quantitative methods. In greater detail and beyond the provision of some indications on MSM frequency of and reasons for using GDAs, this study's research questions are: i) Does frequency of logging into GDAs relate to different reasons for using GDAs? ii) Is there a relationship between intensity of GDAs use by MSM and sense of community and personal well-being measurements? iii) Is there an association between both frequency of and reasons for using GDAs and sense of community and well-being reported by MSM?

Method

Design

This is a cross-sectional, questionnaire-based study.

Participants

An online questionnaire was completed by 191 men with a mean age of 36.51 years (SD. = 10.17, range 18-72). Participants identified as 'sexually attracted to men only' (90.1%) or 'sexually attracted to both men and women' (9.9%). All were UK based, with most of them living in London (73.8%), followed by 7.9% living in 'another city in England'. The majority of participants identified as White British (n=74) and White other (n=80). The most common relationship status reported was 'single' (60.2%), with 21% 'in an open relationship' and 18.8% 'in an exclusive relationship'. Participants were recruited via opportunity sampling.

Materials

The online questionnaire started with a section on participants' demographic information (age, ethnic background, place of residence, education, relationship status and sexuality). The main questionnaire included the following six subscales, in the following order:

Sense of Community: The Psychological Sense of LGBT Community Scale (PSOC-LGBT) measures the extent to which LGBT people feel a part of the wider LGBT community (Lin & Israel, 2012). The scale consists of 22 short statements under 6 domains ('influencing others', 'influenced by others', 'shared emotional connection', 'membership', 'needs fulfilment' and 'community existence'). Each contains between 3 to 5 questions scored on a 5-point Likert scale, ranging from 1 ('none') to 5 ('a great deal'). Participants indicate the extent

to which they feel a sense of belonging (e.g., 'How much do other LGBT people influence your thoughts and actions?'). A higher mean value indicates a higher perception of community, with individuals feeling more satisfied with their interaction and support. The scale correlates significantly with other variables of community participation including satisfaction with social support and satisfaction with their nonromantic social interaction in the LGBT community. Its subscale reliabilities, as measured by Cronbach's alpha, α range from .76 for 'needs fulfilment' to .92 for 'membership' (Lin & Israel, 2012). In this study, reliability of the 6 domains in terms of Cronbach's α ranged from .73 to .92.

Self-esteem: The Global Self-Esteem Scale (RSES) is a measure of an individual's perception of their own self-worth (Rosenberg, 1965). This is a 10-item measure (e.g., 'On the whole, I am satisfied with myself', 'I feel I do not have much to be proud of'). In this study, each item was rated on a 5-point Likert scale ranging from 'strongly agree' to 'strongly disagree'. Five of the items are positively scored, and 5 negatively, and, after some reverse scoring, a higher mean score indicates higher self-esteem. The RSES has high levels of reliability ($\alpha = .88$ in this study) and correlates significantly with other measures of self-esteem, including the Coopersmith Self-Esteem Inventory (Rosenberg, 1965; Pierce, Gardner, Cummings & Dunham, 1989).

Loneliness: The UCLA Loneliness Scale (Version 3) measures participants' levels of loneliness (Russell, 1996). It consists of 20-items (e.g., 'How often do you feel that you lack companionship?', 'How often do you feel outgoing and friendly?') rated on a 4-point Likert scale from 1 ('never') to 4 ('always'). The sum score of all items is produced with higher scores indicating a higher level of loneliness. Prior research shows this scale has excellent scale score

reliability (α ranging from .89 to .94 and .93 in this study) and test-retest reliability over a 1-year period ($r = .73$).

Life Satisfaction: The Satisfaction with Life Scale (SWLS) was used to assess participants' perception of their subjective well-being (Diener, Emmons, Larsen & Griffin 1985; Pavot & Diener, 1993). It consists of 5-items ('In most ways, my life is close to my ideal', 'So far I have gotten the important things I want in life') that are rated on a 7-point Likert scale ranging from 1 ('strongly disagree') to 7 ('strongly agree'). Higher scores indicate higher satisfaction. The SWLS has good scale score reliability ($\alpha = .89$ in this study) and correlates with other measures of subjective well-being (Diener et al., 1985).

Gay dating app use: Two questions were used to assess participants' patterns of GDAs use. They were extracted from the larger 'Grindr Use Characteristics and Behavior' questionnaire that Rice et al. (2012) developed and used in their study; the word 'Grindr' was replaced by the phrase 'GDAs'. In particular, the frequency of use was assessed with the item 'How often do you log onto gay dating apps?'. Six possible responses ranged from 'about once a month or less' to 'I am almost constantly logged on to them'. The second question was 'What is your number one reason for using gay-dating apps?'. The possible responses were: 'to make new friends', 'to meet people to have sex with', 'to find someone to date', to 'kill' time', 'to connect to the gay community' or 'other' that participants were asked to define.

Intensity of GDAs use: This scale was developed on the basis of the 'Facebook Intensity Scale' (Ellison, Steinfield, Lampe, 2007) which was used to produce the 'Grindr Intensity Scale' (Taylor et al., 2017). For the 'GDAs Intensity Scale' the word 'Grindr' was replaced by the phrase 'GDAs'. It included the only 6 items that measured intensity of use on a 5-point Likert-

type scale (ranging from 1 'strongly disagree' to 5 'strongly agree'). The scale's reliability in terms of Cronbach's α was .77 in this study.

Procedure

The researchers utilized social media to share a link to the questionnaire, hosted on Google Forms, among their own contacts and various online and offline LGBTQ communities across the UK. Snowball sampling was also employed, with participants being encouraged to share the questionnaire with their own contacts. Data were collected between May 19, 2018, and June 19, 2018.

The introductory page informed participants that they were invited to take part in a study about the use of GDAs on mobile phones or tablets. They were also told about the inclusion criteria of (being 18+ years of age, MSM, and having had experience using GDAs in the past or present). Scruff, Grindr and Romeo were used as examples of GDAs, although participants were explicitly told that experience with any similar applications was acceptable. It was also explained that by clicking through to the questionnaire they were implying consent for their data to be used. Participants could also withdraw their data before the final submission page by closing the questionnaire webpage. It was stated clearly that their participation was voluntary and anonymous. Support contact telephone numbers were provided, should anyone require support because they were affected by any of the issues being dealt with in the questionnaire. Instructions were provided at the beginning of each section. The survey took approximately 15 minutes to complete.

Results

Frequency of and reasons for using GDAs

Table 1 shows a relatively even distribution of the participants of our sample in the frequency of their use of GDAs. In particular, 71.2% log onto GDAs at least once per day, the most popular option being logging on between 2 and 4 times per day. Almost half (49.2%) report that they use GDAs mainly to meet people to have sex with (see Table 2).

--- INSERT TABLE 1 HERE ---

--- INSERT TABLE 2 HERE ---

Figure 1 shows that, no matter how often they log onto GDAs, the majority of MSM in this sample use them for finding people to have sex with. Wanting to connect to the gay community is also consistently the lowest reported reason among all users. The rest vary slightly depending on the group. The figure excludes the 6 participants who gave a reason different to the 5 options provided.

In order to investigate the association between frequency of and reasons for using GDAs, a 3 (low, medium, high users) x 2 (looking for sex versus all other reasons combined) chi-square test was conducted. The original 6 groups based on the frequency of GDAs use were merged into 3 groups in order to satisfy the test's criterion of having 5 or more expected cell frequencies. Low users were those who reported logging into GDAs about once a week or less, medium users were those who logged in more than once but less than 5 times per day and high users were those who logged in 5 or more times per day. The results showed no significant association between the two variables, $\chi^2(2, 191) = 2.004, p = .367$.

--- INSERT FIGURE 1 HERE ---

Relationships between intensity of GDAs use and community and well-being measures

Table 3 presents the descriptive statistics of the Likert-type scales of this study. Table 4 is the matrix showing the bivariate correlations between all those scales plus the one referring to the frequency of GDAs use. There are statistically significant negative correlations between loneliness and sense of LGBT community ($r(191) = -.30, p < .001$), self-esteem ($r(191) = -.55, p < .001$) and satisfaction with life ($r(191) = -.54, p < .001$), and statistically significant positive correlations between satisfaction with life and self-esteem ($r(191) = .59, p < .001$), and sense of LGBT community ($r(191) = .27, p < .001$). It was found that frequency of GDAs use correlates significantly with intensity of GDAs use ($r_s(191) = .67, p < .001$).

With regard to the two variables on GDAs use, intensity correlated significantly and positively with both LGBT sense of community ($r(191) = .13, p = .040$) and loneliness ($r(191) = .12, p = .049$). On the other hand, frequency of GDAs use correlated significantly and negatively with both sense of community ($r(191) = -.16, p = .012$) and satisfaction with life ($r(191) = -.22, p < .001$), while it correlated significantly and positively with loneliness ($r(191) = .18, p < .001$).

--- INSERT TABLE 3 HERE ---

--- INSERT TABLE 4 HERE ---

Associations between frequency of and different reasons for using GDAs and the sense of community and well-being measures

A series of two-way between-groups analyses of variance were conducted to explore the interaction between frequency of and reasons for GDAs use and sense of community, loneliness, life satisfaction and self-esteem. Similarly to the chi-square analysis, participants

were divided into 3 groups according to their frequency of use of GDAs; namely low, medium and higher users. They were also divided into 2 groups according to the main reason for GDAs use, namely for sex or for any other reason.

As shown in Figure 2, no interaction between frequency and reasons and life satisfaction and sense of community were found to be statistically significant. However, there was a statistically significant main effect between the reason of use and self-esteem but with a very small effect size, $F(1, 185) = 6.41, p = .012, \eta_p^2 = .03$. A subsequent t-test with Bonferroni correction indicated that the mean self-esteem score of MSM whose main use of GDAs is sex ($M = 3.96, SD = .76$) was significantly higher than the mean score of MSM who use GDAs mainly for other reasons ($M = 3.66, SD = .83$) with an effect size $d = 0.37$. There was also a statistically significant main effect for the frequency of use and loneliness but again with a small effect size, $F(2, 185) = 3.79, p = .024, \eta_p^2 = .04$. Post-hoc comparisons using the Tukey HSD test indicated that the mean loneliness score for the low users ($M = 42.26, SD = 10.53$) was significantly lower than the mean score of high users ($M = 47.60, SD = 11.70$) with an effect size $d = 0.48$. There were no other statistically significant differences in loneliness scores. Finally, statistically significant main effects on satisfaction with life were found for both frequency ($F(2, 185) = 5.36, p = .005, \eta_p^2 = .06$) and reasons for use of GDAs ($F(1, 185) = 6.87, p = .009, \eta_p^2 = .04$). The effect sizes of both main effects were small. The Tukey HSD post-test showed that mean satisfaction with life score for low users ($M = 4.68, SD = 1.12$) was significantly higher than the mean score for high users ($M = 3.99, SD = 1.37$) with an effect size $d = 0.55$; no other groups differed significantly from each other. Also, an independent samples t-test with Bonferroni correction indicated that the mean satisfaction with life score of participants whose main use of GDAs is sex ($M = 4.61, SD = 1.39$) was significantly higher than the mean score of participants whose use of GDAs was mainly for other reasons ($M = 4.15, SD = 1.25$) with an effect size $d = 0.35$.

--- INSERT FIGURE 2 HERE ---

In order to explore the trends seen in Figure 2 further, a series of one-way between groups ANOVAs were conducted to investigate the existence of any statistically significant differences between low, medium and high users of GDAs on any of the well-being and community variables. A one-way between groups ANOVA revealed a statistically significant difference in the level of sense of LGBT community among the three user groups, $F(2, 188) = 3.22, p = .042$. Post-hoc comparisons using the Tukey HSD test indicated a significantly higher score on sense of community for low users ($M = 3.17, SD = .73$) than higher users ($M = 2.85, SD = .67$) with an effect size $d = 0.48$.

Discussion

Some research has suggested GDAs may be beneficial to users providing them with a rich community in which they could find friends or partners along with expressing or exploring their sexuality (Castañeda, 2015; Dodge, 2014; Taylor et al., 2017; White Hughto et al., 2016). Other research has suggested persistent use can predict users feeling dissatisfied, lonely and alienated from their community (Brubaker et al., 2016; Jaspal, 2017; Yeo & Fung, 2018). The current study aimed to further elucidate the relationship between GDAs use and MSM feelings of well-being and perceived sense of community.

Following this study's research questions, it seems that the level of individuals' GDAs use was significant in showing whether or not they felt that their emotional needs were being met, and the extent to which they felt part of the LGBT community. The analysis identified significant correlations between higher use and lower levels of satisfaction with life, higher

levels of loneliness and a reduced sense of community. In relation to the sense of community, an important interaction, even if not statistically significant, was identified; the less participants use GDAs, the greater their sense of community and vice versa. There was also evidence that different motivations for using GDAs can result in different outcomes. Participants who reported using GDAs mainly for finding sex partners scored higher on self-esteem and satisfaction with life than those who reported using GDAs for any other reason, including making friends, dating, killing time or connecting with the gay community.

So, if the gay scene, and particularly the online one, revolves to a great extent around sex, then GDAs seem to cater effectively to the sexual desires of MSM without necessarily having a negative impact on their lives. One can argue that MSM with consistently successful interactions/experiences from GDAs can maintain, if not increase, their positive self-esteem by having easy access to many sexual partners. On the other hand, MSM who look for a different kind of interaction may find the use of GDAs frustrating. This may not be surprising as it can be argued that relationships of any kind that require an investment of time and effort to build may be harder to achieve than quick and casual ones. The lack of any relationship between frequency of GDAs use and the participants' main motivation for using them is therefore surprising. Potentially, this is explained by the sample being relatively small. However, there are additional factors that may be playing a role.

Limitations and future directions

The majority of this study's sample live in London: a cosmopolitan city, with dedicated gay spaces, and where people are more likely to be open about their sexuality (Campkin & Marshall, 2017; Guy, 2019; Sanders-McDonagh & Peyrefitte, 2018). This means there is a wider, more visible LGBT community that MSM can integrate themselves in. MSM looking for a romantic relationship in London may be less likely to use GDAs compared to MSM living

in smaller or more conservative communities. Furthermore, unsuccessfully using GDAs to find romantic partners may become increasingly frustrating over a prolonged period, and exaggerate the addiction like symptoms reported in previous work (Jaspal, 2017). Thus, a narrower range of potential partners and a limited LGBT scene could possibly amplify the dissatisfaction MSM associate with high use. Follow-up studies should counterbalance where participants live and enquire about how long they have used GDAs for in addition to the intensity of their use.

Asking participants to reflect on how often they log onto GDAs can be complicated by the use of smartphones because users can be signed in all day without necessarily attending to them. However, by also measuring intensity of use, it is hoped that this complication is partly overcome. In the future, it may be advisable to ask participants about specific, shorter periods of time rather than asking them about their general use. It would also be beneficial to control for participants' social desirability in providing their responses. Assessing members of sexual minority groups' concerns with social approval when asking questions linked to their sexual identity can be useful (Rosario, Schrimshaw, Hunter & Gwadz, 2002).

Although the vast majority of participants reported exclusively same-sex attraction, when recruiting MSM we chose to combine data from gay and bisexual participants. This decision was made because these platforms are used by men with a range of sexual orientations. However, further studies with larger samples could explore any differences between gay and bisexual men. While there are similarities in how they adapt to stigma, compared to their lesbian/gay counterparts, bisexual men and women report lower levels of both self-disclosure and connectivity with the LGBT community (Balsam & Mohr, 2007). This may partially be because individuals who pursue different-sex relationships might face greater invisibility as sexual minorities (Ochs, 1996). In addition, negative attitudes towards bisexuality are common in gay and lesbian communities. The most prevalent of which is skepticism about the validity of bisexuality as a sexual orientation (Alarie & Gaudet, 2013). Bisexual men may therefore

feel less a part of the wider LGBT community than gay men, or be less inclined to engage with it via GDAs.

This is a correlational study and it cannot be explicitly argued that GDAs are directly responsible for these outcomes given their use could be more tempting to MSM already experiencing negative symptoms. Yet, it has been claimed that high rates of other kinds of social networking, including sites such as Facebook, can have a negative impact on people's mental health (Blease, 2015; Kross et al., 2013). The current study could therefore be less of an illustration of the negative consequences that may come from using GDAs a lot and more of an indication of the negative consequences that may come from using social networking sites more broadly. In addition, this study reported small correlation coefficients between measurements of GDAs use and MSM well-being and sense of community, even when they were statistically significant. This may be reflecting the pre-existing relatively inconclusive evidence as well as the likelihood that frequent GDAs use is one of many predictors or outcomes of poorer well-being and sense of community. Future cross-sectional studies with larger samples can reduce some of this project's limitations and provide the opportunity to unpack some of its findings.

Conclusions

The Internet provides an exciting avenue for users and researchers alike. Among the most notable changes is how online platforms, and the advent of social networking sites and GDAs, have revolutionized interpersonal communication by providing a new means of finding and developing relationships. In sum, this study provides further evidence of the double-edged nature of GDAs on the well-being and connectedness of MSM with the corresponding implication for individuals' mental health and for the collective community.

It also provides some food for thought for developers and owners of GDAs. There is certainly the business side of the offline gay bar and of the online gay app; this will, and maybe should, always exist to some extent. However, there is also the need for safe and comforting spaces for stigmatized groups such as members of the LGBT community. Some work is already being done in this area by the GDAs developers themselves who are able to use money gained by their online presence to strengthen offline communities. One example is Romeo, both a website (PlanetRomeo) and app, that funds emerging LGBT projects and initiatives around the world through a charity foundation they created. Striking a balance between profit and people's and communities' well-being is a necessity, and GDAs may have to play a greater role in not only catering for sexual desires but also in promoting and facilitating a sense of community.

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Table 1. Frequency of logging on to GDAs (N = 191)

		Frequency	Percent
How often do you log on to GDAs?	About once a month or less	38	19.9
	About once a week	19	9.9
	Once a day	24	12.6
	More than once a day but less than 5 times per day	42	22.0
	5 or more times a day	38	19.9
	I am almost constantly logged on to them	30	15.7

Table 2. Main reason for using GDAs (N = 191)

		Frequency	Percent
What is your number one reason for using GDAs?	To make new friends	23	12.4
	To meet people to have sex with	91	49.2
	To find someone to date	35	18.9
	To 'kill' time	29	15.7
	To connect to the gay community	7	3.8
	Other	6	3.1

Table 3. Descriptive statistics of study's scales

	Mean/Sum	SD	N	α	α CI	
					Lower	Upper
Intensity of GDAs Use Scale: mean score of 6 items (1-5 scale)	2.71	.95	191	.77	.71	.82
Psychological Sense of LGBT Community Scale: overall mean score of 22 items (1-5 scale)	3.01	.71	191	.93	.92	.95
Global Self Esteem Scale: mean score of 10 items (1-5 scale)	3.80	.81	191	.90	.87	.92
UCLA Loneliness Scale: sum score of 20 items (1-4 scale)	45.37	11.21	191	.93	.91	.94
Satisfaction with Life Scale: mean score of 5 items (1-7 scale)	4.37	1.33	191	.89	.86	.91

Table 4. Bivariate correlations and scale statistics for variables of interest

	GDAs Intensity	Sense of Community	Self Esteem	Loneliness	Satisfaction with Life	Frequency of GDAs use
GDAs Intensity	--					
Sense of LGBT Community	.127*	--				
Self Esteem	-.018	.054	--			
Loneliness	.120*	-.296**	-.545**	--		
Satisfaction with Life	.011	.269*	.590**	-.540**	--	
Frequency of GDAs use	.674**	-.164*	-.059	.176**	-.215**	--

One-tailed bivariate parametric zero-order correlation coefficients; non-parametric only for 'frequency of GDAs use' variable; *p<.05 and **p<.001

Use of 'gay dating apps' by men who have sex with men

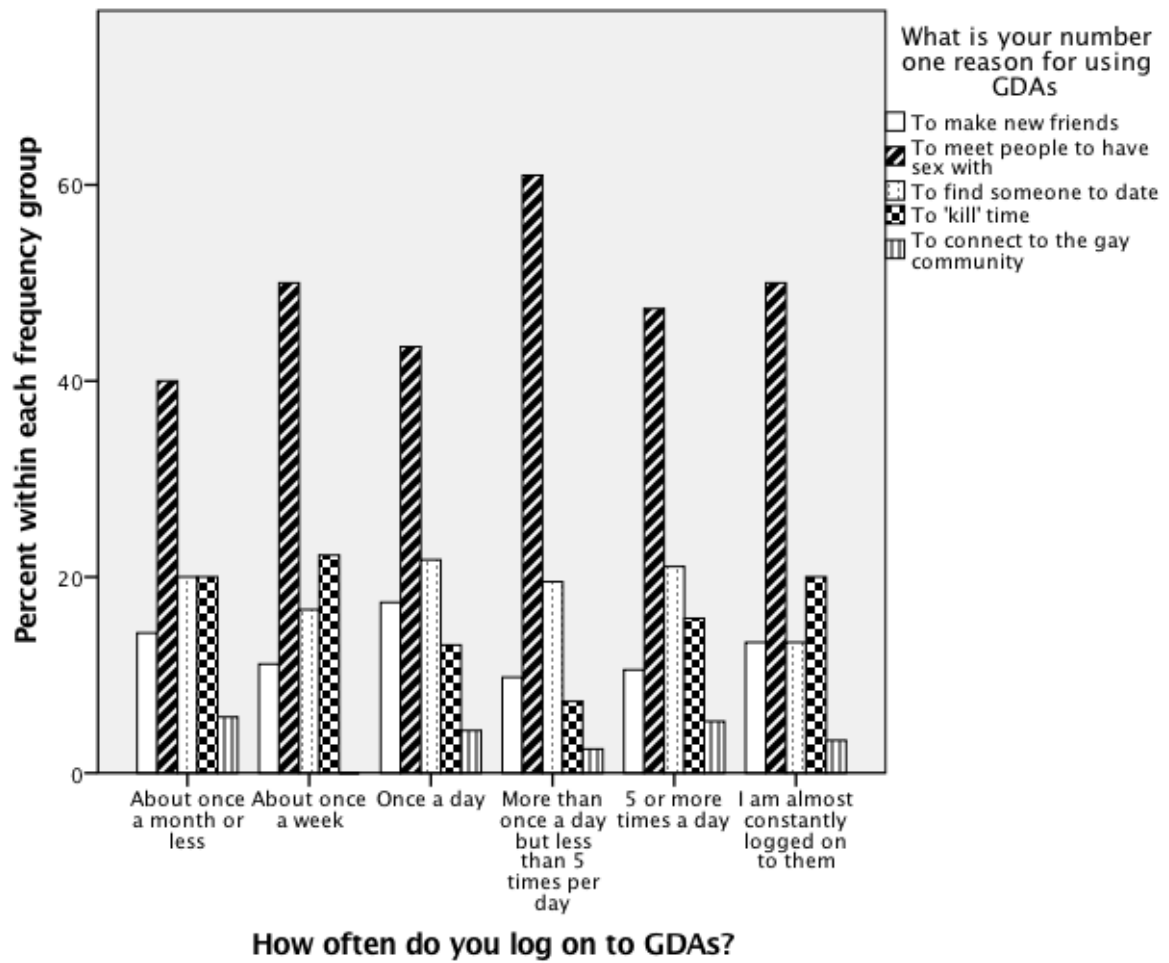


Figure 1. Frequency of GDAs use by reason of use (N = 185)

Use of 'gay dating apps' by men who have sex with men

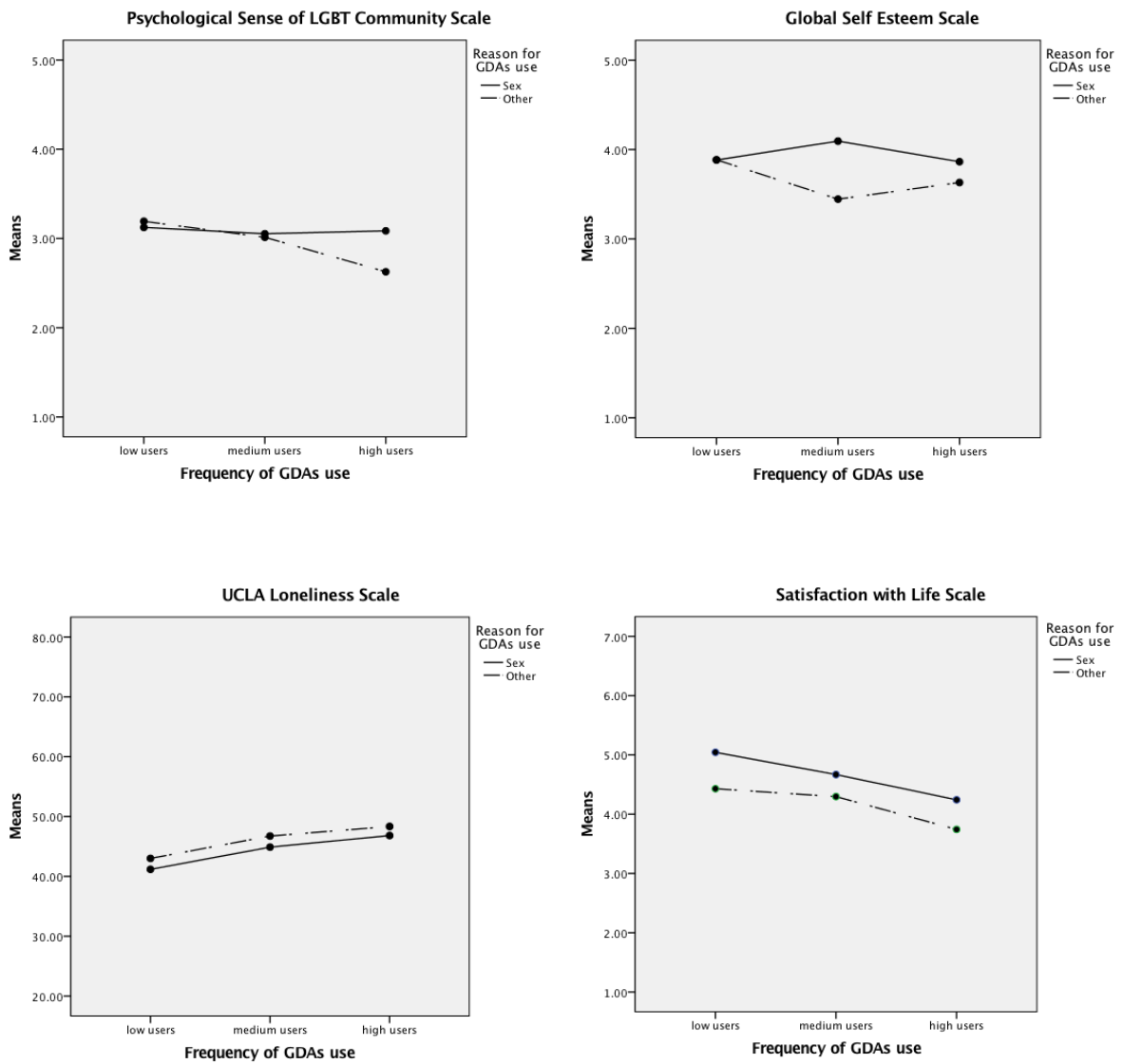


Figure 2. Associations between frequency of use of GDAs and measurements on sense of community and well-being.