

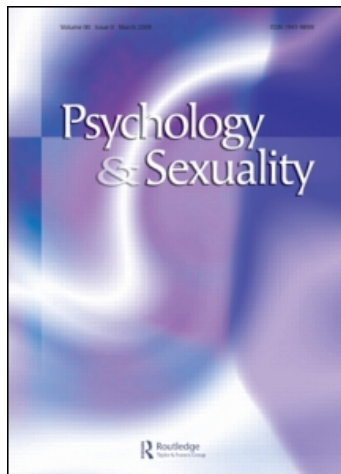
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Sexuality in the 3D Internet and its relationship to real-life sexuality

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The emerging 3D Internet provides a new medium for cyber-sexuality and a context for conducting empirical research on sexuality in digital environments. This study investigated sexual behaviour and attitudes within Second Life, the most prominent 3D virtual world, and explored the relationship between sexuality in Second Life and sexuality in real life. The results indicate a wide range of common and experimental sexual practices in Second Life, with sexual involvement occurring at faster pace and with a larger number of partners than in real life. In addition, these sexual practices occur in a range of relationship contexts, from brief casual encounters to long-term commitment and virtual marriage. Participants were evenly split on which realm was more sexually satisfying, with many participants indicating that sexuality in Second Life offers greater freedom and less inhibition than in real life. Participants also tended to view the two domains of sexual experience as largely independent, with sexuality in one realm having little effect on sexuality in the other. Overall, these data offer the first detailed description of sexuality in the emerging Immersive Internet and provide a less prurient and deviant view of sexuality in 3D virtual settings than is often depicted in popular media accounts.

Keywords: sexuality; Internet; 3-dimensional; virtual worlds; Second Life

1. Introduction

Each major phase in the development of the Internet has created new opportunities for sexual expression. In the mid-1990s, during Web 1.0 or the Informational Web, hard copies of the world's information were digitised and displayed on a vast array of websites that allowed individuals unprecedented access to viewing sexual material. After the new millennium, Web 2.0 or the Interactive Web came to prominence and generated new possibilities for cyber-sexuality through peer-to-peer applications such as chat rooms, erotic webcams and social-networking sites such as Facebook and MySpace (Subrahmanyam, Smahel, & Greenfield, 2006; Ross, 2005).

Now, the rise of Web 3.0, Web 3D or the Immersive Internet (Driver & Driver, 2008) is once again expanding the boundaries of cyber-sexuality. In this iteration of the Web,

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Portions of these data were presented at the 2009 and 2010 summits of the Immersive Education Initiative held in London, England, and Boston, Massachusetts; and the 2010 Meeting of the American Psychological Association held in San Diego, California.

the world is going through another massive process of digitisation. However, instead of digitising text and images as in Web 1.0, the entire 3D world, including the human body, is being digitally represented and placed on the Internet. In this brave new world, 3D graphical environments serve as interactive spaces where users, in the form of avatars (3D digital representations of the self), can work, learn and engage in social interaction. Although there are a number of advanced virtual environments in the new Immersive Internet, the most prominent is Second Life – a free, downloadable software program in which users can create avatars and engage in a variety of activities including socialising, shopping, building virtual objects and structures and sexual interaction (<http://secondlife.com>).

Au (2008) noted that sexuality in advanced 3D virtual environments such as Second Life involves a qualitative change from earlier forms of cyber-sexuality. In this context, users have the unprecedented ability to purchase and attach virtual genitalia that are visually realistic for avatars of both sexes and functionally realistic for males in their ability to simulate levels of erection and even depict ejaculation. In addition, avatars in 3D worlds have the ability to enact the full range of sexual behaviours through the use of sexual ‘pose balls’. As described by Peralta (2006) and Ruberg (2007), pose balls are spherical objects that contain customised avatar ‘animations’ or movement sequences written in computer code. The animation may involve non-sexual movement patterns (such as dancing) or sexual actions. In either case, when a user clicks on a pose ball, his or her avatar enacts the animation coded within it. By employing these pose balls, the entire range of heterosexual, homosexual and group sex behaviours can be enacted in 3D, from kissing to foreplay to all forms of intercourse. Accompanying this visual simulation, users can exchange sexualised text and/or voice messages to further enhance their sexual experience.

The expanded possibilities for cyber-sexuality within advanced virtual worlds have led to the consideration of its merits and drawbacks in books, press accounts and blogs. With respect to its merits, Ludlow and Wallace (2007), Lynn (2007) and Parsons (2008) have observed that settings such as Second Life offer users a safe context for sexual experimentation. Individuals have the ability to explore their sexuality without the risk of sexually transmitted disease, pregnancy, physical harm or societal judgement. For example, there are accounts of individuals who are uncertain about their sexual orientation using the virtual world as a safe context to explore their sexual identity as a possible step in a process of coming out (Cabiria, 2008).

Along with these cited benefits, concerns have been raised regarding the prevalence within Second Life and other immersive environments of virtual infidelity (Edwards, 2008; Kaining, 2007; Topsfield, 2009), sexual compulsivity (Rawstorne, 2008) and sexual practices considered illegal or transgressive [i.e. consensual activities between adults that fall outside of societal norms (see Denman, 2004)] in real-life settings. With respect to the latter concern, public outrage over the discovery of virtual paedophilia in immersive environments (i.e. simulating sex with an avatar depicted as a child even if the avatar is controlled by an adult driver) led to the practice being banned in the 3D virtual world in May 2007 and subject to criminal prosecution in some real-world jurisdictions (Au, 2008). In addition, recent efforts have been made to confine graphic sexual activities, including those that are considered illegal or transgressive in most real-life contexts, such as escort services and adult prostitution (Boyes, 2009) and BDSM (i.e. bondage, discipline and sadomasochism) practices (Ruberg, 2006; Wells, 2007), to private or segregated areas within Second Life.

Anecdotal and journalistic considerations provide a valuable window into sexuality within the 3D virtual world. In addition, Boellstorff’s (2008) ethological investigation of the culture of Second Life, including its sexual practices, added systematic qualitative data to information about Second Life sexuality. At the same time, a fuller understanding of this new context for human sexuality could benefit from augmenting this personal and

qualitative information with empirical data. This study responds to this need by acquiring detailed descriptive data on sexual practices and attitudes in Second Life (including the range of sexual practices, the number and types of sexual partners and the pace of sexual involvement) to assess whether accounts of sexuality in the Immersive Internet by active participants of 3D virtual worlds support or contradict existing depictions in the press and popular media. In addition, it investigates the levels of sexual satisfaction in the real and virtual realms and the interrelationship between sexuality in Second Life and sexuality in real life. It is important to note that although Second Life was selected as the virtual world to conduct this investigation because it is a well-known 3D platform, there are other popular immersive worlds (including Instant Messaging Virtual Universe (IMVU), Utherville, InWorldz, etc.) in which the exploration of 3D sexuality is also a significant feature.

2. Methods

2.1. Participants

Two hundred and seventeen participants, all of whom had avatars in Second Life, were recruited through posted announcements in the Second Life Events Calendar, notices sent out by heads of large groups representing major constituencies in Second Life (e.g. social, business, educational and artist networks), a CNN IReport (www.ireport.com, a website where citizen journalists can post stories) and word-of-mouth communication. Each method of recruitment offered potential participants the opportunity to come to a virtual research laboratory located within Second Life and earn 1000 Lindens (virtual currency equivalent to slightly less than US\$4) for completing approximately 30 minutes of measures on sexuality in Second Life. The recruitment notices also specified that the subject's avatar must have had at least 6 months residency in Second Life. This 'minimal residency requirement' ensured that all data were derived from at least moderately experienced users as opposed to newcomers with unstable patterns of behaviour and use of the virtual environment.

2.2. Procedures and measures

Upon arriving at the virtual laboratory, participants were screened to ensure that they (a) met the 6-month residency criterion, (b) had prior sexual experience in Second Life (defined as 'any voluntary activity that occurs with the goal of sexual excitement or arousal') and (c) had never taken the Second Life sexuality survey before. Participants who met these screening criteria and clicked their agreement to provisions of an informed consent form were then linked to the Qualtrics online survey website (<http://www.qualtrics.com>) to complete the following measures:

2.2.1. Real-life demographic data

Real-life demographic data were measured with a four-item questionnaire that assessed a participant's real-life age, sex, continent of residence and highest level of education.

2.2.2. Basic Second Life data

Basic Second Life data were measured with a four-item questionnaire that asked participants to rate the perceived importance of various Second Life activities (e.g. building/creating, shopping, sexual experience) and to indicate the sex of their primary

avatar, how long they had resided in Second Life and how often they logged on to Second Life.

2.2.3. *The Second Life sexuality survey*

The Second Life sexuality survey is a 77-item questionnaire that evaluated the extent to which participants had ever engaged in 24 sexual behaviours within Second Life (e.g. 'In Second Life, I have engaged in erotic kissing') and how frequently these sexual behaviours occurred within a particular sexual episode in Second Life (e.g. 'When you have a sexual experience in Second Life, what is the percentage of time that you perform oral sex on a partner?') as well as their total number of Second Life sexual partners and the relational contexts in which their sexual activity occurs (i.e. from one-night stands to exclusive dating or virtual marriage) (Gonzalez & Gilbert, 2009). In addition, it compared perceptions of Second Life and real-life sexuality with respect to the pace of sexual involvement (e.g. 'Do you believe that individuals in Second Life become sexually involved faster, slower or at about the same pace as in real life?'); the level of sexual satisfaction (e.g. 'Is your real-life sexuality more satisfying than your Second Life sexuality?'); the presence of sexual feelings such as confidence and assertiveness; and the impact of sexuality in one domain on sexuality in the other domain (e.g. 'When I am less sexually active in real life, I become more sexually active in Second Life.'). All questions included in the measure were derived through a set of several dozen pilot interviews conducted with active members of Second Life who indicated that they had prior sexual experience in the 3D environment.

Following completion of the measures, 1000 Lindens were transferred to the participant's Second Life account. Participants were also offered the opportunity to participate in up to three additional studies that comprised, along with the sexuality study, a broader research programme investigating the psychology of virtual worlds.

3. Results

Data were collected from 217 participants. In cases where a participant did not respond to a specific item, that participant was dropped from the relevant analysis. As a result, *n*'s and *df*'s may vary slightly among analyses.

3.1. *Real-life demographic data*

3.1.1. *Age*

There were 118 participants (54%) aged 18–29 years, 48 (22%) aged 30–39 years, 28 (13%) 40–49 years, 14 (7%) aged 50–59 years and 9 (4%) were 60 years or older.

3.1.2. *Gender*

There were 124 female participants (57%), 89 (41%) males and 4 (2%) who identified themselves as transgender.

3.1.3. *Location*

The vast majority of the sample reported living in either North America ($n = 157$, 72%) or Europe ($n = 44$, 20%). Relatively few participants resided in South America ($n = 7$, 3%), Asia ($n = 5$, 2%) and Australia ($n = 4$, 2%), and none of the participants came from Africa.

3.1.4. Education

Nineteen participants (9%) did not complete high school, 81 (37%) reported a high school diploma or GED as their highest level of education, 47 (22%) had completed a 2-year/associate's degree in college and 44 (20%) had earned a BA. Twenty participants (9%) had a master's degree and 6 (3%) had a doctorate.

3.2. Second Life basic data

3.2.1. Duration of residence in Second Life

Sixty-six participants (30%) had been in Second Life for either 6 months or 1 year, 98 (45%) were in Second Life for 1–2 years and 44 (20%) were in Second Life for 2–3 years. Only nine (4%) of the sample had been residents of Second Life for over 3 years.

3.2.2. Frequency of log-ons

Almost 90% ($n = 195$) of the sample reported logging onto Second Life on a consistent basis (i.e. daily, almost everyday or several times a week). A few participants indicated they used Second Life on an intermittent or infrequent basis, with 12 (6%) reporting that they logged onto Second Life weekly and 9 (4%) indicating that they logged on several times a month. Only one participant reported logging in less than once a month.

3.2.3. Gender of primary avatar

A total of 130 participants (60%) reported having a female avatar and 75 (35%) reported having a male avatar. These figures closely approximate the real-life gender distribution reported by participants. The remaining 12 participants (6%) characterised their avatars as 'other' (e.g. animal, mythic or non-human).

3.2.4. Second Life activities

Participants were asked to rate a series of activities based on the importance of the activity to the participant's involvement in Second Life (1 = *not important at all* to 5 = *extremely important*; n 's ranged between 211 and 217). The highest rated activity was socialising ($M = 4.39$, $SD = .77$) and the lowest rated activity was scripting (i.e. writing computer code to imbue objects with action, $M = 2.67$, $SD = 1.33$). In terms of importance ratings, sex/sexual experiences ($M = 3.21$, $SD = 1.24$) ranked eighth (out of 11 activities) for both male and female participants.

3.3. Sexual behaviour in Second Life: practices, partners and pace

In real life, the sample was almost evenly split as to being involved in a romantic relationship; 110 (51%) reported being in a relationship whereas 106 (49%) reported not being in a relationship (1 participant did not provide a response).

3.3.1. Prevalence of sexual practices

Ninety-three participants (43%) reported having a sexual experience *usually*, *frequently* or *always/almost always* while in Second Life. Fifty-eight participants (27%) reported having a sexual experience *occasionally* in Second Life, and 66 participants (30%) reported *rarely*

having a sexual experience. There was no significant difference in the percentage of times that male or female participants reported having a sexual experience in Second Life.

Table 1 lists (a) 24 sexual practices that occur in Second Life based on a series of pilot interviews and a review of the literature; (b) the percentage of participants who indicated that they had engaged in each practice *at least once* while in Second Life, arranged from the most to the least frequent practice; and (c) the percentage of participants who indicated 'Frequently' to 'Almost Always/Always' when specifying how often these 24 sexual practices *typically occur during a specific sexual encounter* in Second Life. The results indicate that the majority of participants had experienced a wide range of sexual practices at least once in Second Life, some of which would be considered common in real life (e.g. kissing, oral sex, heterosexual intercourse) and some which would be regarded as less common (homosexual sex) and/or experimental (group sex, various forms of BDSM, having sex using an avatar of a different gender, etc.) However, although many participants had tried these atypical sexual practices, very few participants viewed them as common features of sexual encounters in Second Life. In all cases, the more atypical or experimental sexual practices were rated as frequent occurrences within sexual incidents in Second Life by 20% or less of the sample and most by less than 10% of the sample. The data on sexual practices also reveal that visual enactments of sex were augmented much more frequently by text-based exchanges than voice and that less than a quarter of the sample indicated that they frequently experienced an orgasm in real life related to a sexual incident in Second Life.

Table 1. Percentages of participants reporting engaging in a Second Life sexual experience (a) at least once and (b) who indicated 'Frequently' to 'Almost Always/Always' when reporting how often each sexual practice typically occurs during a sexual encounter.

Sexual practice	Any experience	'Frequently' to 'Almost Always/Always'
Use sexual pose balls	98	60
Use sex bed	97	58
Erotic kissing	97	— ^a
Vaginal intercourse	92	54
Receive oral sex	92	52
'Talked dirty' through text	92	50
Perform oral sex	91	48
Purchase/use genitalia	87	44
Masturbation	74	34
Anal intercourse	70	24
RL orgasm while in SL	68	24
Same sex partner	56	20
Bondage	55	20
Dominance/submission in submissive role	54	18
Use other sex props	49	15
'Talked dirty' through voice	48	14
Dominance/submission in dominance role	43	12
Group sex	43	9
Masochism	32	8
Engage in sex for money	30	8
Use different gender avatar	30	8
Sadism	26	6
Paid money for sex	11	3

Notes: RL, real life; SL, Second Life. $N = 217$.

^aDue to a technical error, data for this item were not recorded.

Male participants ($n = 89$) and female participants ($n = 124$) were compared on the type of sexual practices occurring in Second Life using chi-square analyses. (Transgendered participants were not included due to the low n of 4.) (Answers were coded as '0' if a participant had never engaged in a particular sexual practice and '1' if the user had engaged in the practice, thus higher numbers reflect more engagement in that activity). Significant gender effects were found for the following activities (for all χ^2 tests, $df = 1$): females were more likely to report engaging in vaginal intercourse than males; of 124 total females, 95% ($n = 118$) reported engaging in vaginal intercourse compared with 88% ($n = 78$ of 89 total males) of males; $\chi^2 = 3.99, p < .05, \phi = .14$. Females were also more likely to report engaging in sexual activity with a same sex partner than males: 64% ($n = 79$) of females compared with 45% ($n = 40$) of males; $\chi^2 = 7.40, p < .01, \phi = .19$. Males were more likely to report purchasing or using genitalia than females, 94% ($n = 84$) of males compared with 81% ($n = 100$) of females; $\chi^2 = 8.31, p < .01, \phi = -.20$. Males were more likely to report using an avatar of a different gender than their own gender in real life compared with females; 37% ($n = 33$) of males compared with 23% ($n = 29$) of females; $\chi^2 = 4.71, p < .05, \phi = -.15$. Finally, males were more likely to report paying money in exchange for sex than females; 19% ($n = 17$) of males compared with 6% ($n = 7$) of females; $\chi^2 = 9.38, p < .01, \phi = -.21$.

3.3.2. Number and types of sexual partners

As shown in Figure 1, about half the sample ($n = 103$; 47.5%) reported having less than five sexual partners, with 47 (22%) and 24 (11%) reporting 6–10 and 11–20 partners, respectively, and 43 (20%) reporting 21 or more partners. Ten participants (5%) reported having more than 50 sexual partners. Participants indicated that these sexual encounters occurred with partners in a range of relationship contexts. Over 70% of participants ($n = 159$) reported having had sexual relations in the context of 'one-night stand', 156 participants (72%) reported having sexual relations in a casual dating relationship, and 169 (78%) reported sexual relations in an exclusive dating or long-term, committed relationship. Nearly half of the sample ($n = 104$) reported having sexual relations while engaged to be married, with over a third ($n = 83$) reporting sexual activity in the context of a virtual marriage.

3.3.3. Pace of sexual activity

A large majority of the sample ($n = 167$; 77%) perceived that the individuals in Second Life become sexually involved faster in Second Life than in real life, whereas 17% ($n = 36$) felt that there was no difference in the pace of sexual involvement across the two realms. Only 7% ($n = 14$) of participants indicated that they felt that real-life sexual involvement occurred more rapidly than in Second Life.

3.4. Sexual satisfaction and sexual feelings in Second Life and real life

3.4.1. Sexual satisfaction

Participants reported similar levels of physical and emotional sexual satisfaction in Second Life and real life. For 130 participants (60%), the physical aspects of sexuality were moderately or extremely satisfying in Second Life and a comparable percentage reported moderate to extreme sexual satisfaction in real life ($n = 140$; 65%). Similarly, participants

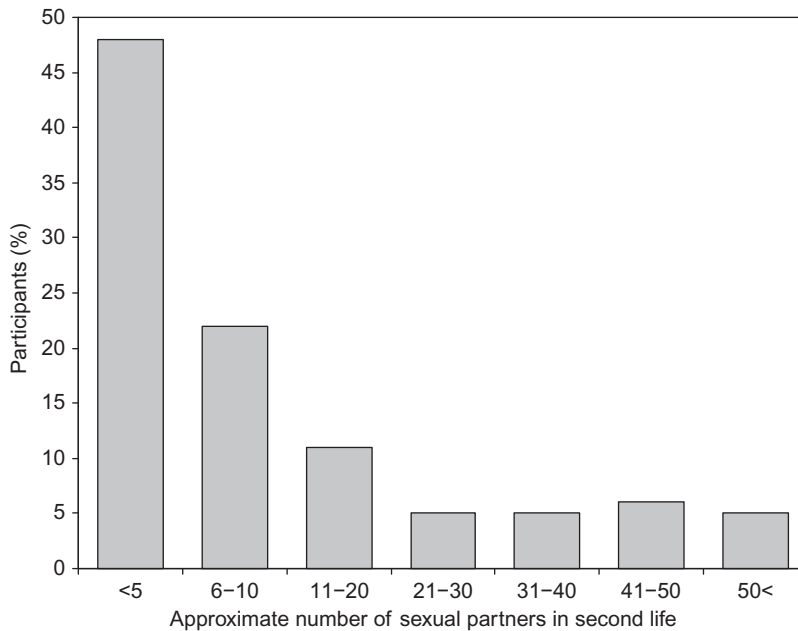


Figure 1. Total number of sexual partners in Second Life ($N = 217$).

reported their emotional satisfaction with sexuality in Second Life and real life as moderately to extremely satisfying in 66% ($n = 144$) and 58% ($n = 126$) of the cases, respectively. There were no significant gender differences in ratings of physical or emotional sexual satisfaction in either Second Life or real life. Given the equivalent levels of physical and emotional sexual satisfaction across the two realms, it is not surprising that participants were almost evenly divided when asked to indicate which context provided greater overall sexual satisfaction. Ninety-three participants (43%) perceived their Second Life sexuality as more satisfying than their real-life sexuality, whereas 91 participants (42%) perceived their real-life sexuality as more satisfying than their Second Life sexuality. Only 34 participants (16%) reported no difference in their overall sexual satisfaction between real life and Second Life.

A series of correlations investigated the relationship between physical and emotional sexuality satisfaction in real life and Second Life. Physical satisfaction of sexuality was significantly correlated with emotional satisfaction of sexuality in real life, $r(215) = .81$, $p < .01$; as well as in Second Life, $r(215) = .56$, $p < .01$. Interestingly, physical satisfaction of sexuality in real life was not related to physical satisfaction of sexuality in Second Life, $r(215) = .04$. The same pattern was found for emotional satisfaction of sexuality between real life and Second life, $r(215) = .07$.

3.4.2. Sexual feelings

Participants were given a set of eight sexual feelings (e.g. 'I feel sexually confident'; 'I feel sexually assertive'; 'I feel sexually anxious or insecure') and asked whether they experienced each feeling to the same degree in both real life and Second Life, or if they had a particular feeling 'more in Second Life' or 'more in real life'. As shown in Table 2, the majority of participants reported that their sexual feelings were the same in Second Life

Table 2. Percentages of participants ($N = 217$) reporting various sexual feelings in Second Life and real life.

Sexual feeling	More in Second Life	More in real life	Both worlds	Neither world
Confident	30	8	57	5
Motivated	17	24	53	6
Experimental	35	8	50	7
Assertive	15	4	70	11
Initiating	18	14	38	30
Aggressive	21	6	32	41
Passive	11	15	40	34
Anxious/insecure	4	26	8	61

and real life. Across the set of eight feelings, 57–80% of the sample indicated similar sexual feelings in the real and virtual realms. Those participants who indicated a difference in sexual feelings between the two domains tended to report more positive or proactive sexual feelings (i.e. confident, experimental, assertive, initiating and aggressive) in Second Life and more negative or passive feelings (i.e. passive, anxious/insecure) associated with their real-life sexuality. The one exception to this trend pertained to the proactive feeling of being ‘motivated’ to engage in sexual activity, with participants who reported different feelings across the two realms indicating a higher level of sexual motivation in real life.

3.5. The interrelationship between Second Life and real-life sexuality

3.5.1. General impact of Second Life on real-life sexuality

The majority of the sample ($n = 130$, 60%) reported that their sexual activity in Second Life has no effect on their sexual activity in real life. For these participants, an increase or decrease in sexual activity in one realm had no effect on their level of sexual activity in the other realm. Twenty-two participants (10%) indicated that more sexual activity in Second Life resulted in less sexual activity in real life whereas 64 participants (30%) reported that more sexual activity in Second Life resulted in more sexual activity in real life.

A χ^2 -test showed a significant effect of gender $\chi^2(2, n = 213) = 5.87, p = .05, \phi = .17$. Males were more likely to report no effect of Second Life on sexual activity in real life compared with females; 69% ($n = 61$) of males compared with 55% ($n = 68$) of females. On the contrary, females were more likely to report that more sexual activity in Second Life related to more sexual activity in real life compared with males; 35% ($n = 44$) of females compared with 20% ($n = 44$) of males. Results by gender are reported in Figure 2.

3.5.2. Boundaries between Second Life and real-life sexuality

Participants were asked about whether they had met with or had sexual activity with a Second Life sexual partner in real life. Over 70% of participants ($n = 159$) indicated that they had never met with a Second Life sexual partner in real life and 71% ($n = 154$) never had sexual activity with a Second Life partner in real life. There were no gender effects in meeting with a Second Life partner in real life.

4. Discussion

This study investigated a broad sample of sexually active users of Second Life to develop a more generalised view of the emerging 3D Internet as a context of human sexuality.

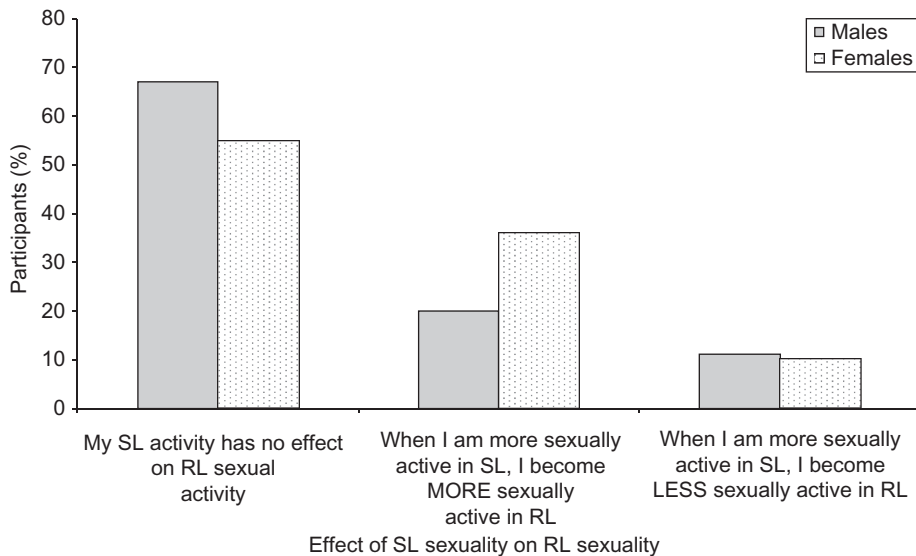


Figure 2. Gender and reports of Second Life (SL) sexual activity impact on real-life (RL) sexual activity (male $n = 89$, female $n = 124$).

Prior discussions of sexuality in advanced 3D virtual worlds such as Second Life found in blogs and popular media have tended to focus on illegal, prurient or transgressive aspects of sexuality in the Immersive Internet such as virtual prostitution, promiscuity, infidelity and BDSM practices. Given that the authors of these reports are seeking to capture the attention of an increasingly elusive and fractured audience, the selection of topics that are dramatic and titillating is understandable. However, questions remain concerning whether these anecdotal and journalistic pieces provide an accurate account of sexuality in the 3D Internet or whether a different view would result from a more objective assessment of this phenomenon. In the material to follow, major findings from this study will be discussed, followed by a consideration of methodological issues in conducting scientific research in 3D virtual settings and the future of sexuality in the Immersive Internet.

4.1. Major findings

4.1.1. Sexual behaviour in Second Life: practices, pace and partners

The data on sexual practices indicate that participants had tried a wide variety of sexual behaviours within Second Life. Behaviours considered common in real life (e.g. erotic kissing, oral sex and heterosexual intercourse) had been tried by about 70–97% of participants, whereas those regarded as less frequent (homosexual sex), experimental (group sex, using an avatar of a different gender to have sex), transgressive (BDSM) or illegal (prostitution) in most real-world contexts were generally tried by between 25% and 50% of the sample. A similar pattern was evident in the data on the reported frequency of various sexual practices within a particular sexual incident. In this case, participants tended to report that common sexual practices in real life frequently occurred in 25–55% of sexual episodes, whereas uncommon sexual practices in real life were viewed as frequent occurrences in 5–20% of Second Life sexual encounters.

The reported frequency of some uncommon sexual behaviours in Second Life can be compared to estimates of prevalence for these practices in real life. When this is done, the prevalence rates are often similar in the two realms or lower in Second Life. Specifically,

BDSM activities (i.e. bondage, discipline, dominance, submission and sadomasochism) were rated as frequent occurrences by an average of approximately 13% of the Second Life participants, a figure that is similar to a variety of real-life prevalence estimates for these practices. These include widely cited findings by Kinsey in which 5–10% of Americans occasionally engage in sexual activities related to BDSM, and 11% of men and 17% of women reported having tried bondage (The Kinsey Institute, 1990); Janus and Janus (1993) in which 14% of men and 11% of women have had some sexual experience with sadomasochism; and Masters, Johnson, and Kolodny (1995) in which BDSM is expressed in behaviour (as opposed to fantasy) in approximately 10% of the population. In addition, according to two more recent global surveys of sexuality conducted by Durex Co. in 2004 and 2005 involving over 300,000 people in 41 countries, 20% of the respondents had used masks, blindfolds or other bondage implements, and 19% admitted to spanking as part of their regular sexual practices (<http://www.durex.com/en-US/SexualWellbeingSurvey/pages/default.aspx>).

The prevalence of paying for sex was also considered a frequent occurrence by only 2.8% of Second Life participants, whereas real-life prevalence estimates suggest that approximately 10% of the population regularly pay for sex when summed across the contexts of street prostitution, escort services, massage parlours and exotic dance venues (O'Leary & Olivia, 2001). The one area of atypical sexual behaviour in which the prevalence rate was found to be higher in Second Life related to practicing prostitution. This behaviour was cited as a frequent occurrence by 8.2% of Second Life participants, whereas real-life prevalence estimates in North America and Europe (where the majority of participants physically resided) indicate that between 1% and 1.5% of the population engage in prostitution (ProCon.org, 2008; <http://prostitution.procon.org>).

Although the prevalence of atypical sexual practices in Second Life and real life is relatively consistent, differences were found regarding the number of sexual partners and the pace of sexual involvement across the two domains. Many participants reported having a high number of sexual partners in Second Life. Over half of the participants, the large majority of whom had been residing in Second Life for only *6 months to 2 years*, estimated that they had 6–10 partners (22%), 11–20 partners (11%) or more than 20 partners (20%) during their time in Second Life. Ideally, these data would be compared to the number of real-life sexual partners participants had in the same time period. However, even in the absence of this direct comparison, it is reasonable to conclude that this is a large number of sexual partners in a relatively brief period of time. The data on the pace of sexual involvement also reflected differences across two realms of sexuality, with more than three-quarters of the sample perceiving that individuals become sexually involved faster in Second Life than in real life. Thus, unlike the claims of rampant sexual deviance, assertions of widespread promiscuity and casual sex in Second Life in the popular press have some empirical basis. However, even this conclusion is modulated by the findings that (a) sexual activity in Second Life occurs with some regularity in the context of longer-term committed relationships, engagements and virtual marriages as well as in purely casual interactions and (b) both male and female participants ranked sex/sexual experiences as their eighth most important activity (out of 11) in Second Life. In addition, this study only included participants who indicated that they had prior sexual experience in Second Life. If data from the small number of individuals who were excluded from this study due to having no sexual experience in the 3D virtual world were also considered, this would modulate the findings on sexual promiscuity slightly more.

In sum, the picture of sexual behaviour that emerges from this study both contradicts and supports existing popular accounts of sexuality in Second Life. The main contradiction is that sexuality in the virtual world appears to be less filled with rampant illegal and

transgressive sexual practices than is often depicted, especially when it is viewed in relation to sexual practices in the real world. Participants in the virtual world are clearly open to trying a wide variety of sexual practices at least once. However, on an ongoing basis, their virtual sexuality is centred on practices that are more common than atypical in real life. Even with respect to the more atypical practices, most are reported to occur at a rate either similar to that in real life (e.g. BDSM) or less often than in real life (e.g. paying for sex). The only atypical sexual practice that seemed to be a more regular occurrence in Second Life than in real life was prostitution. However, although the level of transgressive sexuality may well be exaggerated in popular accounts of sexuality in the 3D Internet, the current data reinforce assertions regarding high levels of casual sex, promiscuity and rapid sexual involvement in the virtual worlds. At the same time, the sexual involvement also occurs with some regularity in the more serious contexts of longer-term relationships, engagements and virtual marriages as well as in more casual interactions, and most Second Life users do not consider sex and sexual experience to be among their primary activities in the virtual world.

4.1.2. *Sexual satisfaction and sexual feelings in Second Life and real life*

Participants were almost evenly divided in their perceptions of which realm of sexuality they felt was more satisfying and further research will be needed to understand what underlies these different preferences. However, the current data offer a number of possible contributions to these judgements. Those who found their sexuality in the virtual realm more satisfying may enjoy the more rapid pace and greater variety of partners available online. In addition, the data on sexual feelings indicated that when participants report a discrepancy in their sexual feelings across the two realms, they tend to feel more positive and proactive in the virtual world (e.g. confident, assertive) and more anxious/insecure or passive in the real world. This expanded sense of freedom or 'cyberdisinhibition' (Goleman, 2006) in the virtual context might also contribute to a preference for this realm of sexuality. Another factor that might be valuable to explore in subsequent research is whether participants prefer 3D sexuality because they consider their avatar partners in the virtual realm (who can be constructed to reflect any sexual or beauty ideal) to be more sexually attractive than their real-life sexual partners.

The data also suggest a number of reasons that might have led some participants to express a preference for their real-life sexuality. First, although the data on sexual behaviour indicated that approximately two-thirds of participants had experienced an orgasm in real life in conjunction with sexual activity in Second Life, less than a quarter were regularly orgasmic in real life in conjunction with sexual activity in Second Life. For some individuals, this diminished eroticism and sexual response may have led them to consider their sexuality in real life more satisfying. Second, in a related issue, about 70% of participants indicated that they had never had sexual relations with, or met, a Second Life sexual partner in real life. The absence of a direct physical connection, described in Boellstorff (2008, p. 160) as 'like licking honey through the glass', may also underlie a preference by some participants for their real-life sexuality.

4.1.3. *The interrelationship between Second Life and real-life sexuality*

Overall, the results indicated that participants viewed their sexuality in the two realms as largely independent. With regard to sexual satisfaction, the physical or emotional satisfaction of sexuality in real life was unrelated to the physical or emotional satisfaction of

sexuality in Second Life. Similarly, with regard to the levels of sexual activity across the two realms, 60% of participants reported that their rate of sexual activity in real life and Second Life had no impact on each other. Moreover, the majority of subjects who did report a relationship between levels of activity across the two contexts indicated that more sexual activity in Second Life resulted in *more* sexuality in real life, an effect that was primarily driven by women. Less than 10% of participants reported a relationship in which more sexual activity in Second Life led to a reduction in real-life sexual activity. Finally, as previously discussed, the large majority of participants had never crossed over from Second Life to real life with a sexual partner. Thus, a sense of both psychological and physical separations was often found between sexuality in the two realms.

4.2. Methodological considerations

In recent years there has been increased recognition of the potential value of conducting scientific research within virtual worlds (Bainbridge, 2007; Slater et al., 2006). However, because research based in the 3D Internet is relatively new, methodological standards for conducting scientifically sound studies in immersive environments are yet to be established. Of particular importance is the lack of guidelines for obtaining a broad, representative sample of participants within a virtual environment. In the absence of such standards, prior studies have tended to use informal and non-rigorous sampling methods such as directly soliciting participants in 'popular and unpopular locations in Second Life' (Nood & Attema, 2006) or setting minimal criteria for research participation such as participating in Second Life for 30 days and having payment information on file (<http://sl.markettruths.com/>).

In an effort to advance the methodology of virtual world research, this study sought to employ more rigorous sampling methods to collect a broad, representative sample of virtual world residents. This study used an efficient multi-method approach that involved posting announcements in various Second Life forums, sending out notices to a range of virtual world constituencies, networking through word-of-mouth communication and offering a moderate financial inducement for participation through each channel. This approach was successful in rapidly attracting a large number of potential participants and could serve as a prototype for subject recruitment in 3D virtual settings. However, to refine this approach, it would be valuable to ask participants which method of recruitment they responded to, a procedure that was not included in this study.

Employing this methodology generated a sample with some similarities and some differences from prior studies conducted in Second Life. The concentration of participants with real-life ages in the twenties and thirties parallels the findings of previous research, as does the broad distribution of educational levels among participants. In contrast, this sample had a somewhat higher proportion of female participants (57%) than most prior research, which has tended to find more males, or an equal distribution of males and females, in Second Life (Nood & Attema, 2006; Reuters, 2007). This difference may reflect recent changes in the overall gender distribution of Second Life residents or greater interest by females in participating in psychological research studies. Another difference is that this sample involved a heavy concentration of participants from the United States and Canada. This is likely because this study was primarily run during time slots in the mid-afternoon Pacific Standard Time. The time difference between the West Coast of the United States and other countries may have made it less convenient for some international residents to participate in this study. In addition, the recruitment announcements, note cards and survey measures were all in English. This may have served as a barrier to participation for potential participants who required translated versions of this information.

In addition to refining methods to obtain a broad sample of participants, this study extended ethical standards established in research conducted in real-world settings into the virtual world (i.e. gaining prior approval by an institutional review board, integrating a detailed informed consent form into the set of online measures). It also incorporated procedures to maximise the probability that each subject who completed a set of measures represented a unique case by (a) having participants complete a ‘statement of unique identity’ indicating that ‘neither they, nor any other avatar under their control, had previously taken the survey’ and (b) only accepting data from computers with non-redundant IP addresses. Finally, to enhance the validity of the data, surveys that were completed faster than three standard deviations from the mean completion time were manually reviewed to ensure that there was realistic variability in the responses (e.g. the first answer was not selected throughout the measure). As more research is conducted in 3D virtual settings, additional procedures will be developed to elevate the scientific quality of research within immersive environments.

Another consideration is the exploratory nature of these data and the relatively high number of significance tests. The likelihood that some significant findings are chance occurrences escalates with greater numbers of significance tests (i.e. committing a Type I error). Thus, readers are cautioned to interpret the data with some prudence; future research could establish the reliability of significant findings. Effect sizes (as reported with corresponding significance tests) can provide an alternative to relying on significance testing, as effect sizes provide estimates of the magnitude of effects, regardless of sample size (which influences significance tests).

4.3. *Sexuality in the 3D Internet: future considerations*

A variety of metrics support the view that the rise of 3D virtual platforms reflects a new phase in the history of the Internet rather than something ephemeral or faddish. In the past 2 years, the number of registered avatars in Second Life alone has increased from approximately 12–20 million, with proportionate growth in the size of the virtual world and its number of active participants. Given the proliferation of avatars and immersive environments, it is inevitable that the amount of social interaction, including sexual interaction, occurring in these 3D worlds will continue to grow.

Qualitative advances in the user’s experience of virtual worlds are also likely to fuel a rise in sexuality within 3D environments. In recent years, the development of visually realistic skin and sexual anatomy, the ability to communicate through voice as well as text and the use of sexual pose balls and switchers (i.e. scripts that enable rapid, smooth transitions in sexual positions) have enhanced the visual, auditory and kinesthetic aspects of 3D virtual sex. Going forward, next-generation avatars that are nearly photorealistic have been developed and will be employed as soon as the processing power of the servers that run the virtual worlds and the computers that participants use to run the systems catch up to the advances in computer graphics. In addition, ‘haptic interfaces’, which enable users to feel physical sensations in real life linked to their avatar’s movements and points of contact, are being refined and promise to be a more prominent feature of 3D virtual experience in the not too distant future (Rawstorne, 2008). These include ‘teledildonics’ (i.e. remote sexual interaction technology) such as the Simulator – a female vibrator that is wirelessly connected to a computer so that approved individuals can remotely control it over the Internet – and the Fleshlight – a sleeve-style vibrator for men that measures the speed and force of a pelvic movement and communicates these metrics to a software that translates them into vibrations and pulses (Lynn, 2004). The incorporation of photorealistic avatars and haptic interfaces has the potential to enhance the visual and tactile dimensions

of immersive sexuality and further narrow the distance between sexual experience in the virtual world and the visceral world. However, given the general proclivity of Second Life users towards sexual practices commonly found in real life, it remains to be seen how frequently these sexual haptic interfaces will be used.

In sum, this study provides an initial, empirical examination of sexuality in the emerging 3D Internet and compares it to sexual practices and experiences in real life. As the Immersive Internet continues to increase its user base and realism, additional attention will likely be directed towards this new context of human sexuality.

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