



Realism, idealization, and potential negative impact of 3D virtual relationships

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ABSTRACT

One hundred and ninety-nine participants, each of whom was currently involved in an intimate relationship within the 3D virtual world of Second Life, completed measures assessing whether they (1) viewed their 3D virtual relationship as an exercise in fantasy or one that had a quality of realism, and (2) perceived the personality characteristics of their 3D partner in more positive or idealized terms than a current or recent real life partner. Additionally, 71 of the 199 participants (36%) who were concurrently involved in a real life romantic relationship as well as their Second Life relationship provided data regarding the potential negative impact of Second Life relationships on co-occurring real life relationships. Results indicated that (1) the majority of participants viewed their Second Life relationships as real rather than as a form of game-playing, (2) participants generally reported more positive or idealized personality traits for their Second Life partners compared to their real life partners, and (3) a portion of participants in co-occurring Second Life and real life relationships indicated that their virtual relationship served as an emotional competitor or potential threat to their real life relationship, with the potential for detrimental effects rising as the couple progressively adds non-immersive digital and physical channels of communication to the original 3D relationship.

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1. Introduction

1.1. The rise of the Immersive Internet

In the past several years a new phase or “iteration” of the Internet and World Wide Web – the Immersive Internet (Driver & Driver, 2008) and Web 3.0/3D – has been emerging. In this latest phase of cyberspace, individuals go beyond accessing information via static web pages (The Informational Internet and Web 1.0) or interacting via chat rooms, blogs, wikis, and social networking sites (The Interactive Internet and Web 2.0) and construct avatars (i.e., 3-dimensional digital representations of the self) that operate within intricate, increasingly vivid, online environments, a number of which involve global communities or “virtual worlds” comprised of tens of millions of resident avatars. Within these graphical environments, users-as-avatars can work, shop for virtual goods, create virtual structures, socialize, and in many cases form intimate relationships with other avatars. While there are a variety of proprietary and open-source networked virtual environments that make up the new Immersive Internet, the best known is Second Life (SL), which is accessible through a free, downloadable software program (www.secondlife.com).

In the past year the number of registered avatars in Second Life alone has exceeded 20 million, which represents a dramatic increase from a user base of 1 million approximately 5 years ago (Terdiman, 2006), and the total number of worldwide avatars across all virtual platforms surpassed one billion in the last quarter of 2010 (KZero, 2010). Moreover, forecasts from major research organizations have predicted that rapid growth of 3D virtual environments will continue into the future, including the estimate that 80% of Internet users – 1.6 billion of out of 2 billion users worldwide – will have experimented with a presence in a virtual world such as Second Life (Gartner Research, 2007). If even a fraction of this predicted growth takes place, it is inevitable that the amount of social interaction and intimate relationships occurring in 3D virtual environments will significantly expand, and engaging in avatar-mediated social relationship may become as commonplace as having Facebook friends and Twitter followers and participating in other Web 2.0 modes of social interaction.

1.2. Understanding 3D virtual relationships

The expanded possibilities for intimate relationships in advanced virtual worlds have prompted a set of blog postings and on-line press reports exploring the topic of 3D digital relationships. Many of these reports involve descriptive accounts of couples who have begun romantic relationships in Second Life or other immersive environments, purchased a virtual home and cohabitated in the 3D world, or formally entered into a virtual marriage with

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another avatar (e.g., Heron, 2007; Miles, 2008). Other articles are cautionary, discussing whether SL relationships constitute cheating or infidelity and detailing several cases in which a virtual relationship or marriage has led to separation or divorce in a real life relationship (e.g., Kaining, 2007; Yamaguchi, 2008). Finally, some of these pieces have a more philosophical quality, speculating on whether 3D virtual relationships are real, whether they are analogous to a long-distance relationship in real life or a different form of relationship or intimacy altogether (Pasteur, 2007), and whether they will ultimately cause us to rethink what being “together” really means (Bennett, 2009). These personal and journalistic contributions offer valuable information and perspective regarding 3D virtual relationships. To date, however, there have been few empirical investigations into relationships in immersive virtual environments to augment these subjective accounts. In one study, sexuality in the 3D Internet was compared with real world sexuality (Gilbert, Gonzalez, & Murphy, 2011) and another study reported more positive communication patterns and higher satisfaction levels in 3D versus real world intimate relationships (Gilbert, Murphy, & Ávalos, 2011).

The general absence of empirical data on intimate relationships in the Immersive Internet is analogous to the situation that existed after the new millennium when Web 2.0 or The Interactive Web came to prominence and created new opportunities for social interaction and on-line relationships via instant messaging, video chat, and advanced social networking sites such as MySpace and Facebook. Eventually, following the recognition of Web 2.0's significance as a channel for post-millennial social relationships, empirical studies began to investigate various aspects of 2D on-line relationships including their level of commitment (Rabby, 2007), gender roles (Magnuson & Dundes, 2008), and their impact on real life social networks (Bargh & McKenna, 2004; DiMaggio, Hagittai, Neuman, & Robinson, 2001) and intimate relationships (Ilan & Amichai-Harburger, 2005; Underwood & Findlay, 2004). The growing body of studies on 2D online relationships indicate that between 10% and 20% of relationships or friendships begun online eventually become intimate or romantic (McCown, Fischer, Page, & Homant, 2001; Whitty & Gavin, 2001) and approximately two-thirds of participants in online romantic relationships gradually incorporate offline contact, including telephone and face-to-face contact, with their Internet partner (McCown et al., 2001). These online relationships often parallel face-to-face relationships in important ways, such as showing similar duration and stability patterns (McKenna, Green, & Gleason, 2002). However, some studies report lower levels of intimacy in 2D online versus face-to-face relationships (Scott, Mottarella, & Lavooy, 2006). While such findings further our understanding of online relationship patterns, all of the aforementioned research investigated 2D relationships and none addressed 3D intimate relationships in 3D virtual platforms. Additionally, none of the prior studies investigated concurrent virtual and face-to-face relationships as a way of making direct comparisons between close relationships in the physical and digital realms.

The current study sought to contribute to the nascent empirical literature on intimate relationships in 3D virtual platforms by acquiring data on a sample of participants who were involved in an intimate relationship within Second Life to investigate three major topics: First, following the issue of realism raised by Pasteur (2007), the study sought to determine whether participants in relationships within immersive digital environments viewed these relationships as real or as a form of game-playing. Second, building upon the findings of more positive communication and greater satisfaction in 3D versus real life relationships found in Gilbert, Murphy, and Ávalos (2011), the study investigated whether participants in 3D virtual relationships viewed the personality traits of their virtual partners in more positive or idealized ways than their

current or most recent partner in real life. Finally, given the concerns about the potential adverse effects of 3D relationships on real life relationships expressed by Kaining (2007) and Yamaguchi (2008), the study assessed whether individuals who are concurrently involved in an intimate relationship in both the 3D and physical realms experienced negative impacts on their real life relationship due to their 3D relationship. Empirically addressing these issues of realism, idealization, and potential real world negative impacts may expand upon the understanding of intimate relationships in the emerging 3D Internet that is currently largely restricted to anecdotal accounts in blogs and on-line press reports.

2. Method

2.1. Participants

One hundred and ninety-nine participants, all of whom had avatars who were currently involved in an intimate relationship in Second Life, were recruited via 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 Report (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 lab located within Second Life and earn 1000 Lindens (virtual currency equivalent to slightly less than four US dollars) for completing a set of measures on intimate relationships in Second Life. The recruitment notices also specified that the participant'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 behavior and use of the virtual environment. This reasoning parallels that of Young (1998) who advised that measures of Internet behavior should be used cautiously with novice users in their first 6 months of exposure to the medium. Essentially, the 6-month minimum duration requirement used in the current study extends Young's methodological guideline from Internet research conducted within Web 1.0 to the emerging 3-dimensional Internet.

The multi-method, incentivized approach to recruiting participants yielded a sample with the following real life demographic characteristics. There were somewhat more females ($n = 119$; 59%) than males ($n = 79$; 40%), with one participant self-identifying as transgendered. The vast majority of participants were between the ages of 18 and 49 ($n = 176$; 89%) and resided in either North America or Europe ($n = 183$; 92%). There were a variety of educational levels among participants: 11% ($n = 22$) had not completed high school, 34% ($n = 68$) reported a high school diploma or GED as their highest level of education, 20% ($n = 40$) had completed a 2-year/Associates degree in college, 23% ($n = 45$) had earned a B.A., and the remaining 12% ($n = 24$) held an advanced degree. Income levels also varied with 27% ($n = 54$) of participants earning less than \$10,000 (US dollars), 25% ($n = 49$) earning between \$10,000 and \$24,999, 24% ($n = 47$) earning between \$25,000 and \$49,999, and the remaining 26% ($n = 49$) earning above \$50,000.

With respect to duration of residence in Second Life, 32% participants ($n = 63$) had been in Second Life from 6 months to a year, 42% ($n = 84$) were in Second Life for 1–2 years, 20% ($n = 39$) had been in Second life from 2 to 3 years, and 5% ($n = 10$) reported residency longer than 3 years. With respect to frequency of logging onto Second Life, 90% of the sample ($n = 180$) reported logging onto Second Life on a consistent basis (i.e., daily, almost every day, or several times a week). A few participants indicated that they used

Second Life on an intermittent or infrequent basis, with 6% ($n = 12$) reporting that they logged onto Second Life weekly and 3% ($n = 6$) indicating that they logged on several times a month. One participant (1%) reported logging in less than once a month.

Seventy-one of the 199 participants (36%) were concurrently involved in a real life romantic relationship as well as their Second Life relationship. This subset of participants, subsequently referred to as the “concurrent relationship” sample or subgroup, provided comparative data regarding the potential negative impact of Second Life relationships on co-occurring real life relationships. To be included in this group, participants could not be involved in a relationship with the same person in both worlds. Thus, for example, data from a married man in real life who extends his relationship with his wife into the 3D virtual realm would not be included in analyses of cross-realm relationship influences.

The real world demographic characteristics and Second Life duration and utilization data were very similar for the overall sample and the subset of participants who were involved in concurrent relationships in the real and virtual realms. The only exception to this demographic equivalence was that there was an equal division of females and males in the concurrent relationship group versus the 59–40% gender distribution in the overall sample. Nevertheless, the gender and age characteristics of both the overall sample and the concurrent relationship subgroup were in the range found in larger demographic surveys of Second Life users (Linden, 2008; Market Truths, 2009) as well as other studies of Internet users (e.g., Gosling, Vazire, Srivastava, & John, 2004). Such findings provide some support for the representativeness of both groups with respect to the wider population of in-world residents.

2.2. Procedures and measures

Upon arriving at the virtual lab, participants were screened to ensure that they met the month residency criterion and had not participated in this study before. They were then asked if they were currently in an ongoing romantic relationship with someone in Second Life. Participants who met these screening criteria and clicked their agreement to provisions of an informed consent form were then linked to an online survey website and asked to provide real life demographic information and Second Life duration-of-residence and frequency-of-login data. Subsequently, they were asked to complete a set of measures assessing the level of realism and idealization in Second Life relationships (see descriptions below). In addition, the 71 participants who were currently involved in both a Second Life and real life relationship were asked a series of questions assessing the potential negative impact of their virtual relationship on their real life partnership.

2.2.1. Realism of Second Life relationships

2.2.1.1. Behavioral realism. In order to assess the level of behavioral realism in Second Life relationships (i.e., the degree to which the operation of the 3D relationship, including its formation, development, current activities, and future plans, were similar to analogous processes in real world relationships), participants completed 11 survey items regarding their Second Life relationship history. These items asked participants to provide information about how they met their virtual partner, the length of their courtship and relationship, the level of commitment in the relationship (from dating to marriage), and if they had any prior relationships in Second Life. Other items pertained to *current* aspects of participant's virtual relationship, such as how often they met their virtual partner in Second Life, the types of activities they engaged in while in Second Life, if and how they communicated with their partner outside of Second Life, and if they ever met, or planned to meet, their Second Life partner in real life.

2.2.1.2. Perceived realism. Participants were asked to rate their agreement, on a scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*), with eight statements pertaining to the *perceived realism* of 3D relationships. These statements assessed perceptions about whether Second Life relationships are real or have a game-like quality (e.g., “Relationships in Second Life are just as real as relationships in real life”), whether emotional experiences are similar or different between 3D virtual and real life relationships (e.g., “Falling in love in Second Life is the same as falling in love in real life”), whether the relationship to the Second Life partner would have occurred if the parties had first met in different context (“If I met my Second Life partner in real life first, we would still have formed a relationship”), and whether conceptions of cheating generally found in real world contexts are applied to the virtual realm as well (e.g., “Having more than one relationship in Second Life is cheating” or “Having a relationship in real life and Second Life is cheating”). These items are listed in Table 1.

2.2.2. Idealization in Second Life relationships

In order to investigate differences in the degree of idealization within Second Life and real life relationships, participants were asked to complete a modified version of the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). Participants were given a list of 44 statements drawn from the BFI, each of which assesses one of the five personality factors that comprise the BFI (i.e., Extroversion, Conscientiousness, Agreeableness, Neuroticism, and Openness). Participants were asked to indicate whether each statement was more like their Second Life partner, more like their current or most recent real life partner, or applied about the same to both their Second Life and real life partner to determine whether participants tended to view their Second Life partner in a more positive (idealized) or negative light than their real life partner.

2.2.3. Negative impact of Second Life relationships on real life relationships

The 71 participants who were concurrently involved in intimate relationships in both realms were asked to rate their agreement, on a scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*), with seven statements addressing possible detrimental effects of their Second Life relationship on their real life relationship including increase conflict (e.g., “I've had problems with my real life relationship due to my Second Life relationship”) or the development of competing feelings toward their virtual and real life partners (e.g., “I have a stronger connection with my Second Life partner”; “I love both of my partners equally”). These items are listed in Table 3.

After completing measures that were relevant to their circumstances (i.e., measures related to Second Life relationships only, or measures regarding both Second Life and real life intimate relationships), participants were informed that they had completed the study and 1000 Lindens were transferred to their Second Life accounts.

3. Results

3.1. Realism of Second Life relationships

3.1.1. Behavioral realism

With respect to the *formation and development* of Second Life relationships, most participants ($n = 147$; 74%) report meeting their Second Life partner through a friend or acquaintance, by chance, or at a club or party; and 75% ($n = 149$) reported their in-world romantic relationship developed within 3 months of meeting their Second Life partner. Thirty-two percent of participants ($n = 64$) reported the length of their Second Life relationship as

Table 1
Items regarding participants' perceptions of the similarities between second life and real life relationships (perceived realism items): percent of participant responses and mean ratings.

Statement	% Strongly disagree	% Disagree	% Neither agree nor disagree	% Agree	% Strongly agree	M rating
I believe that relationships in SL are only a game	37	27	20	11	6	3.77 (1.23)
Falling in love in SL is the same as falling in love in RL	6	25	18	31	21	3.37 (1.22)
If I met my SL partner in RL first, we would have still formed a relationship.	4	11	33	33	20	3.54 (1.05)
Love in SL and love in RL are two different types of love	16	24	20	29	11	3.04 (1.27)
Relationships in SL are just as real as relationships in RL	4	16	22	37	22	3.57 (1.10)
Having a romantic SL relationship is a lot like having a long-distance relationship in RL	2	13	15	49	22	3.75 (1.00)
If someone has a romantic relationship in SL and in RL at the same time, I would consider it cheating	12	25	23	30	12	3.05 (1.21)
I consider having multiple romantic relationships at the same time in SL cheating	5	40	16	41	29	3.80 (3.80)

Note. Total $N = 199$. SL = Second Life, RL = real life. Numbers in parentheses are standard deviations. Scores for the mean ratings were made on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Some percentages do not total 100% because of rounding.

Table 2
Idealization scores of the modified big five inventory.

Big five personality trait	M	SD	$t(198)$	Cohen's d
Extraversion	.15	.40	5.43**	0.38
Conscientiousness	.09	.35	3.81**	0.26
Agreeableness	.23	.42	7.56**	0.55
Neuroticism	-.14	.45	-4.26**	-0.31
Openness	.25	.39	8.95**	0.64

Note. Big Five was measured using items from the BFI (John et al., 1991). Positive means indicate that the participant rated the trait as more like the Second Life partner, and negative means indicate that the participant rated the trait as more like the real life partner. Means were tested against zero using a one-sample t -test. Cohen's d was calculated as M/SD (effect size estimate for one-sample t ; Cohen, 1988).

6 months or longer, whereas 68% ($n = 135$) reported a relationship length of less than 6 months. Almost half of the participants ($n = 98$; 49%) indicated that they had a dating relationship (either exclusive or not) with their Second Life partner, while 38% ($n = 76$) indicated that their Second Life relationship involved a long-term commitment or they were engaged to be married in the virtual world, and 14% ($n = 28$) reported that they were married in their Second Life relationship. Approximately two-thirds ($n = 133$; 67%) indicated that they had co-habitated in the virtual world with their Second Life partner. Half of participants ($n = 100$) reported between zero and one prior Second Life relationships, 19% ($n = 38$) reported two prior Second Life relationships, and 32% ($n = 64$) reported three or more prior Second Life relationships. Finally, the vast majority of participants ($n = 193$; 70%) reported no prior marriages in Second Life, whereas 27% ($n = 64$) reported one to three prior Second Life marriages, and 3% ($n = 6$) reporting more than three prior Second Life marriages.

Additional items also provided data regarding *current activities* that characterize Second Life romantic relationships. Most participants reported that they had frequent interaction with their virtual

partners in Second Life. Fifty-four participants (27%) indicated that they met their partner in Second Life several times a day; 76 (38%) said daily; 33 (17%) reported meeting in Second Life 4–6 times per week; 20 (10%) indicated 2–3 times a week; 8 (4%) said once a week, 3 (2%) reported 2–3 times a month and 5 (3%) indicated once a month or less. Participants also indicated the kinds of in-world activities they engaged in with their virtual partner from a standardized list of typical Second Life activities. (Participants were able to select more than one activity.) Ninety-nine percent of participants ($n = 197$) indicated that they talked and spent time with their partner; 191 (96%) socialized with others; 182 (91%) shopped together; 178 (89%) spent time together in a virtual home; 169 (86%) went dancing and to clubs; 164 (82%) had sex with each other; 155 (78%) attended concerts and listened to music; 97 (49%) built virtual objects and structures together; 88 (44%) worked together; and 42 (21%) engaged in sexual activities together with others.

Finally, participants indicated whether they ever communicated with their 3D partner outside of Second Life and, if so, what non-immersive mediums of communication they used. Seventy-two percent of participants ($n = 144$) said they communicated with their partner outside of Second Life. Of those, 125 (87%) used instant messaging or outside chat; 114 (79%) used email; 79 (55%) used the telephone; 69 (48%) used text messages via cell phone; 63 (44%) used video chat, and 37 (26%; or 19% of the total sample) had physically met in real life.

3.1.2. Perceived realism

Table 1 lists the percentage of participants in the entire sample ($N = 199$) who agreed with eight statements pertaining to the perceived realism of Second Life relationships in comparison to real life relationships. The results indicate that the majority of participants believed that intimate relationships in Second Life were just as real as those in the physical world as opposed to being a game. Consistent with the view that Second Life relationships are real, far

Table 3
Items regarding negative impact of second life relationships on real life relationships (negative impact items): percent of participant responses and mean ratings.

Statement	% Strongly disagree	% Disagree	% Neither agree nor disagree	% Agree	% Strongly agree	M rating
I have ended a RL romantic relationship due to an SL romantic relationship	61	18	16	4	2	1.68 (0.98)
I have a stronger connection with my SL partner	11	23	28	20	18	3.11 (1.27)
I can be more open about my feelings with my SL partner.	9	16	30	28	18	3.32 (1.19)
I love both of my partners equally	10	39	27	17	7	2.72 (1.09)
I have had problems with my RL partner because of my SL relationship	24	25	28	14	9	2.58 (1.24)
I have thought about leaving my RL partner as a result of my SL relationship	41	16	21	11	11	2.37 (1.41)
My RL partner is comfortable with my SL relationship	25	9	39	20	7	3.25 (1.24)

Note. Total $n = 71$ participants concurrently involved in Second Life and real life romantic relationships. SL = Second Life, RL = real life. Numbers in parentheses are standard deviations. Scores for the mean ratings were made on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Some percentages do not total 100% because of rounding.

more participants conceptualized their Second Life relationship as analogous to a long-distance relationship in real life ($n = 141$; 71%) as opposed to a relationship in an on-line chat room ($n = 78$; 39%), and a majority felt that if they had met their Second Life partner in real life they would still have formed a relationship ($n = 105$; 53%). However, their opinions were far more divided regarding whether falling and being in love is similar across the two realms. Over half of the sample ($n = 103$) agreed that falling in love is the same in real life and Second Life while approximately a third disagreed ($n = 60$). In addition, an equal percentage of participants ($n = 80$; 40%) agreed and disagreed with the statement that love in Second Life and real life are different forms of love. With respect to conceptions of what constitutes cheating, the majority of participants considered having more than one romantic relationship within real life or Second Life to be cheating, with only 15% of participants ($n = 30$) indicating that they have multiple, concurrent relationships in Second Life. However, there was a lack of consensus regarding whether concurrent relationships across the two realms was cheating, with 42% ($n = 84$) agreeing that it was and 37% ($n = 74$) disagreeing with this position.

3.2. Idealization in Second Life relationships

3.2.1. Partner personality characteristics (modified Big Five Inventory)

For each of the 44 personality characteristics drawn from the BFI, participants were asked to indicate whether each characteristic applied more to their current Second Life partner (scored as 1), more to their current or most recent real life partner (scored as -1), or whether it applied equally to these partners (scored as zero). The 44 characteristics were then grouped according to which BFI personality trait they assessed (i.e., Extroversion, Conscientiousness, Agreeableness, Neuroticism, or Openness.) For example, scores for the individual personality characteristics of “talkative,” “full of energy,” “enthusiastic,” “outgoing, sociable,” and “assertive” were averaged to obtain summary scores for the personality factor of Extraversion. The resulting score indicated whether the trait applied more to the Second Life or real life partner, or if the partners were about the same on the trait. (A positive average indicated the trait applies more towards the Second Life partner, a negative average indicated the trait applied more towards the real life partner. The closer the average was to zero, the more perceived similarity between the Second Life and real life partners.)

Table 2 summarizes the BFI results. Means for BFI subscale scores were tested against zero using a one-sample t -test. The results indicate that participants were significantly more likely to report their virtual partners to be more extraverted, agreeable, conscientious, and open, than their real life partners. Participants were also significantly more likely to rate neuroticism items as more descriptive of their real life partners compared to their Second Life partners.

3.3. Negative impact of Second Life relationships on real life relationships

For those participants in concurrent Second Life and real life relationships ($n = 71$), Table 3 indicates the percentage of participants who agreed with seven statements pertaining to potential negative effects of Second Life relationships on real life relationships. The data indicate that over one-third ($n = 24$) of the concurrent-partner participants whose real life partners were aware of their Second Life relationship were uncomfortable with the existence of this relationship. About a quarter of participants ($n = 16$) indicated that they had problems or thought of leaving their real life relationship due to their Second Life relationship ($n = 16$) but less than 10% ($n = 6$) had actually ended a real life relationship due to their Second Life relationship. Nevertheless, while the Sec-

ond Life relationship rarely ended a real life relationship, many participants indicated that the virtual relationship was an emotional competitor to their real life relationship. About a quarter of participants ($n = 17$) indicated that they loved their Second Life partners as much as their real life partners, more than a third ($n = 27$) felt they had a stronger connection with their virtual partner, and nearly half ($n = 33$) felt they could be more open with their Second Life partner than their real life partner.

3.4. The relationship between perceived realism, idealization, and negative impact

In order to assess the relationship between the perceived realism, level of idealization, and negative impact of 3D virtual relationships, composite scores were computed for each of these major variables and the relationship between these scores were statistically evaluated.

To obtain a summary score representing the overall perceived realism of Second Life relationships, the mean participant ratings for the eight Likert-scale items noted in Table 1 were summed and averaged. In calculating this average, the items “I believe that relationships in SL are only a game,” and “Love in SL and love in RL are two different types of love” were reverse coded because they reflect the view that Second Life relationships are not realistic compared to physical world relationships. The alpha of the seven items was $\alpha = .80$, indicating adequate internal consistency. The average perceptual realism score was 3.49 ($SD = 0.74$).

An overall partner idealization score was also calculated for each participant. Conceptually, because each of the Big Five traits could be considered positive social characteristic, positive scores for the ratings comparing Second Life partners to real life partners were viewed as an indication of greater idealization of the Second Life partner while negative scores were seen as reflecting more idealization of a real life partner. Statistically, the partner idealization score was the average of all five modified BFI subscale scores, such that partner idealization scores ranged from -1 to 1. (Neuroticism was reverse-coded such that higher scores indicated less neuroticism.) Within this range, positive scores indicated more idealization of the Second Life partner than the real life partner and negative scores indicated more idealization of the real life partner. The average idealization score was .17 ($SD = .28$). This average was significantly different from zero, as measured with a one-sample t -test, $t(198) = 8.75$, $p < .01$, $d = 1.24$, suggesting that Second Life partners were more idealized than real life partners.

Finally in order to obtain a composite score reflecting participant's overall perception of the negative impact of their 3D relationship on their real life relationship, the ratings of the 71 concurrent-partner participants on the seven negative impact items noted in Table 3 were summed and averaged. (The item “My RL partner is comfortable with my SL relationship” was reverse-coded.) The alpha of the seven items was $\alpha = .71$, indicating adequate internal consistency. The average negative impact score was 2.72 ($SD = 0.72$).

After deriving the composite scores for the major variables of perceived realism, idealization, and negative impact, the summary scores for the perceived realism and idealization of Second Life relationships were correlated with the summary negative impact scores for the 71 concurrent-partner participants to determine if the level of perceived realism or idealization in a 3D virtual relationship was associated with perceptions of its negative impact on the participant's real life relationship. With respect to perceptual realism and negative impact, a large, significant correlation was found, such that greater levels of perceived similarity between Second Life and real life relationships were associated higher negative impact scores, $r(69) = .52$, $p < .01$. The results also showed a significant correlation between idealization and negative impact,

$r(69) = .40, p < .01$, suggesting that the more a participant idealizes his or her Second Life partner the greater the negative impact on his or her real life relationship.

3.5. The impact of communication outside of Second Life

On the items assessing Second Life relationship history, participants were asked a series of questions regarding whether or not they communicated with their 3D partner outside of Second Life. As previously noted in the subsection of the results pertaining to behavioral realism, 72% of participants ($n = 144$) said they communicated with their avatar partner outside of Second Life via some combination of instant messaging or outside text, email, text messages via cell phone, telephone, or video chat, and about 20% ($n = 37$) of the total sample had physically met at least once in real life. Thus, because many of the relationships were not completely confined to the 3D realm, it was deemed important to investigate whether the degree of non-immersive interaction significantly influenced perceptions regarding the realism, idealization, and negative impact of relationships that originated, and primarily operated, in the 3D world.

In order to assess this potential influence, a 4-point index entitled the "Multiple Modality Relationship Index" (MMRI) was developed. Scores on the index, which ranged from 0 to 3, reflected the degree to which communication in a relationship begun in Second Life was confined to the 3D realm or whether it was extended incrementally into 2D digital platforms and possibly the physical domain. Within the index, a score of zero indicated that interaction between the members of the couple only occurred in Second Life (i.e., the relationship had an absence of multiple modalities of interaction; $n = 55$; 28%). A score of 1 indicated that interaction occurred via text and audio in both Second Life and 2D channels such as email, computer-mediated chat, texting, telephone, or VOIP ($n = 72$; 36%). In this case, the same sensory modalities of communication present in Second Life were used (i.e. text and audio) but they occurred in both 3D and 2D digital platforms. In contrast, a score of 3 indicated that the couple had added video chat (i.e., realistic, visual information mediated by a 2D digital channel) to 3D and 2D text and voice ($n = 35$; 88%). Finally, a score of 3 indicated that the couple had met in real life at least once, thus adding a direct, visceral element to the 3D relationship ($n = 37$; 19%).

A series of one-way ANOVAs tested the effect of relationship contact (i.e., MMRI level) in relation to perceptual realism, idealization, and negative impact scores. Means and SDs for each modality according to scale score are presented in Table 4. For perceptual realism scores, there was a significant effect between groups, $F(3, 198) = 12.78, p < .01, \eta^2 = .16$. A linear contrast testing the linear trend of more modalities being associated with greater perceptual realism revealed a highly significant effect, $t(195) = 5.85, p < .01, d = 0.84$. These results suggest that as a participant adds more modalities of interaction to the Second Life relationship, perceptual realism scores increase.

For negative impact scores, there was also a significant effect between modality groups, $F(3, 70) = 4.04, p = .01, \eta^2 = .15$. A linear contrast testing the linear trend of more modalities being associated with greater negative impact revealed a highly significant effect, $t(67) = 3.22, p < .01, d = 0.79$. These results suggest that as a participant adds modalities of interaction to the 3D virtual relationship, the level of negative impact on their real life relationship increases.

There was no significant effect for modality and idealization scores, $F(3, 198) = 1.10, p = .35, \eta^2 = .02$.

In sum, the data on communication outside of Second Life indicate that while participants perceive a quality of realism, idealization, and negative impact associated with virtual relationships that are exclusively confined to the 3D realm (i.e., MMRI scores of 0),

Table 4

Means and SDs of perceptual realism, idealization, and negative impact scores by modality.

Scores by modality	M	SD
<i>Perceptual Realism (N = 199)</i>		
Only SL	3.05	0.75
2D text + audio	3.57	0.70
Video	3.91	0.63
Met in RL	3.58	0.65
<i>Idealization (N = 199)</i>		
Only SL	0.18	0.27
2D text + audio	0.20	0.30
Video	0.17	0.27
Met in RL	0.25	0.04
<i>Negative impact (N = 71)</i>		
Only SL	2.33	0.64
2D text + audio	2.75	0.76
Video	3.02	0.67
Met in RL	3.09	0.55

Note. SL = Second Life, RL = real life. Perceptual realism and negative impact scores range from 1 to 5; idealization scores range from -1 to 1, with positive scores indicating more idealizing of the Second Life partner than the real life partner.

perceptions of realism and negative impact, but not idealization, tend to increase as the relationship extends into 2D text and visual platforms and the physical domain (i.e., MMRI scores of 1, 2, or 3).

4. Discussion and conclusion

4.1. Major findings

4.1.1. Realism

The data on behavioral and perceptual realism indicate that intimate relationships in Second Life have many similarities with those in real life and are viewed by a majority of participants as having a quality of realism and seriousness that goes beyond a game or idle fantasy. As in real life, the typical behavioral profile of an intimate relationship in Second Life is one in which the members of the couple meet (via their avatars) daily or multiple times a week, participate in a variety of social, commercial and entertainment-oriented activities that take place in one of the partner's virtual homes or in the wider 3D world, and communicate regularly, often using both in-world and non-immersive channels (i.e., instant messaging, email, telephone and telephonic text messages, and video chat.) In addition, with respect to attitudes regarding 3D virtual relationships, a majority of participants supported the view initially expressed by Pasteur (2007) that intimate relationships in Second Life are just as real as those in the physical world and conceptualized their Second Life relationship in real life terms – as analogous to a long-distance relationship in real life – rather than as a heightened version of a relationship that might take place in a chat room or other on-line venue. Consistent with the view that relationships in Second Life are real, a substantial portion of participants expressed the position that having more than one romantic relationship in Second Life at a time was cheating, just as it was in real life.

While participants had an overall sense that 3D relationships are real, they expressed uncertainty about whether there is an exact correspondence between intimate relationships in the two realms. Specifically, opinions were divided regarding whether falling in love is the same in real life and Second life and whether love in the two realms are different forms of love. In addition, there was a lack of consensus regarding whether having concurrent romantic relationships in Second Life and real life constituted cheating, indicating uncertainty about whether Second Life relationships should be given equal weight to those occurring in real

life. It is possible, however, that this position may have been influenced by the fact that approximately one-third of the sample was currently involved in romantic relationships in both realms. In sum, the data indicate that the majority of participants view Second Life relationships as real relationships rather than as a form of game playing. However, opinions were more divided regarding whether there is an exact correspondence between emotions and expectations across the two types of relationships.

4.1.2. Idealization

The comparative data on partner personality traits present a more idealized view of Second Life relationships than those occurring in real life. Participants formed intimate relationships with virtual world partners who they perceived to have higher levels of extraversion, conscientiousness, agreeableness, and openness, and less neuroticism than their real life partners. These results are consistent with previous research by Gilbert et al. (2011) who found higher ratings of positive communication and relationship satisfaction in virtual world versus physical relationships. Thus, 3D virtual relationships appear to involve personal and interpersonal qualities that are perceived more positively than those found in participants' real life relationships.

4.1.3. Negative impact

Due to the sense of realism and positive qualities participants ascribed to their virtual relationships, it is not surprising that the feelings in these relationships sometimes rivaled those present in their real life relationships. About a quarter of participants indicated that they loved their virtual partners as much as their real life partner, about a third reported they had a stronger connection with their virtual partner, and about half noted that they could be more open with their virtual partner and that it was easier to have a romantic relationship in Second Life than in real life. In approximately 25% of the cases participants indicated that they experienced problems or considered leaving a real life partner due to competing feelings toward their virtual relationships, although only 10% had actually ended a real life relationship due to their Second Life relationship.

The data also revealed significant associations between perceived negative effects of 3D virtual relationships on a co-occurring physical relationship and the other major variables in the study. Analyses conducted on the composite scores revealed strong correlations between perceived realism and negative impact and between idealization and negative impact. These findings suggest that the more a participant attributes a quality of realism to his or her Second Life relationship and/or views his Second Life partner in relatively idealistic terms, the greater the potential negative impact on a co-occurring real life relationship. In addition, the data pertaining to the Multi-Modality Relationship Index (MMRI) revealed that while negative impacts on a physical relationship can occur even when the virtual relationship is completely confined to the 3D realm, the potential for detrimental effects rises as the couple progressively adds non-immersive digital and physical channels of communication to the relationship that originated in the 3D world. This may be due, in part, to the fact that the perceived realism of the virtual relationship, which is associated with greater negative impact, rises as the MMRI score increases.

4.2. Implications

Taken as a whole, the data on the perceived realism, idealization, and negative impact of 3D virtual relationships indicate that intimate relationships occurring in immersive digital settings are often experienced by the virtual partners as far more than a game. Even with the rudimentary, almost cartoonish, graphical quality that are characteristic of present-day avatars, the virtual relation-

ships operate and are experienced in realistic, even idealized, terms and can sometimes serve as emotional competitors to co-occurring intimate relationships in the physical world.

On the level of basic research, the current findings contribute to our understanding of next generation, computer-mediated, intimate relationships and their relationship to intimate attachments in the physical world. As the number of avatars continues to proliferate worldwide, and their graphical quality moves toward photo-realism, behavioral scientists will increasingly be called upon to make sense of this new form and context for human intimacy through research and theorizing (much as they have been with the rise of relationships mediated via Facebook and other 2D social networking sites) and the current work advances this objective.

On an applied level, the present study provides empirical support for cautionary reports in the popular media that have highlighted instances where an intimate virtual relationship has led to a separation or divorce in a real life relationship (Kaining, 2007; Yamaguchi, 2008). As with compulsive surfing of web sites with sexual content or emotional and/or sexualized interaction in 2D chat rooms or social networking sites, the current data suggests that involvement in an intimate relationship within a 3D virtual platform could reasonably become an area of contention in a marriage or committed real world relationship and perhaps be a topic that is considered in the context of marital or couples therapy. Moreover, it identifies a number of specific variables – the level of perceived realism and idealization associated with the virtual relationship, along with the number and kinds of non-immersive channels of communication incorporated by the virtual couple – that can be examined to assess the degree of seriousness of a 3D virtual relationship and the likelihood that it could have detrimental impacts on a simultaneous relationship in the physical world.

4.3. Limitations and conclusion

In the interest of simplicity, the current study on intimate relationships in 3D virtual worlds confined itself to investigating heterosexual relationships and no data was obtained on the number of participants who were excluded because their Second Life relationship was homosexual. However, the anecdotal impression of several research assistants who screened potential participants was that it was not an inconsequential amount. In the future it would be important to extend the current study to include same-sex couples in 3D virtual settings as well.

The study was also entirely focused on virtual relationships that took place in Second Life and did not investigate intimate relationships occurring in other 3D platforms that support open-ended socialization such as Instant Messaging Virtual Universe (IMVU), Uthervers, InWorldz, etc. This was done because Second Life is currently the dominant propriety virtual world with over 20 million registered accounts and the in-world research laboratory where this research was conducted is housed within Second Life. In the future it could be valuable to investigate intimate relationships occurring within other immersive platforms to assess the generality of the current findings across virtual worlds.

In conclusion, the current study provides one of the first empirical examinations of how participants in intimate relationships in the 3-dimensional Internet view their virtual relationships and whether these computer-mediated unions have the potential to adversely impact co-occurring romantic relationships in the physical world. Given that a variety of metrics point toward continued expansion of the user base, graphical realism, and accessibility of immersive digital worlds, it is likely that intimate relationships within virtual worlds will be the subject of growing attention by those interested in the impact of computers on central areas of human behavior.

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