EFFECTS OF VOLUNTEERING BEHAVIOR IN MASSIVELY MULTIPLAYER ONLINE ROLE-PLAYING GAMES

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Nathan Joseph Wilts

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Abstract

of

EFFECTS OF VOLUNTEERING BEHAVIOR IN MASSIVELY MULTIPLAYER ONLINE ROLE-PLAYING GAMES

by

Nathan Joseph Wilts

Research was conducted to determine if certain effects upon volunteers found in other studies of volunteering in real-life environments could also be found in the virtual environments of massively multiplayer online role-playing games. Participants were 59 male and 17 female players of a popular MMORPG between the ages of 13 to 65 gathered via advertisements in online forums for the game. Participants completed an online survey consisting of demographics and play-time questions, the International Positive and Negative Affect Schedule Short Form, the Center for Epidemiologic Studies Depression Scale, the UCLA Loneliness scale, and the Miller Competitiveness scale. No statistically significant correlations were found between hours spent in volunteering activities in the game and any of the four scales. Since results would have been significant only at extremely large sample sizes, it was concluded that if there is an actual effect of volunteering behaviors in MMORPGs it is likely very small.

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I would also like to thank Nicholas Arroyo for keeping me sane over the last few years, and for his understanding, love, and support.
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Chapter 1

INTRODUCTION

Video games have become the subject of research as psychologists seek to investigate how people interact with this relatively new, increasingly popular, and quickly changing form of entertainment. Video games let players engage in a wide variety of fantastic and realistic activities within computer generated game environments. Previous research would seem to indicate that video games can and do influence people in many ways, both physically and psychologically (Baldaro, Tuozzi, & Codispoti 2004; Wang, Hummer, Kronenberger, Mosier, & Mathews 2010; Bartholow, Sestir, & Davis 2005; Williams & Skoric 2005; Williams 2006; Goldstein, Cajko, & Oosterbroek 1997).

Baldaro et al. (2004) found short term increases in blood pressure and anxiety levels after playing violent video games compared to those who played a non-violent video game. A very recent study by Wang et al. (2010) using fMRI scanning found that after two weeks of playing violent video games players had less prefrontal cortex activation than those who did not play, with effects diminishing after play was discontinued. Bartholow et al. (2005) found that violent video game exposure positively correlated with increased scores on the Buss-Perry Aggression Questionnaire and a modified version of the Capara Irritability Scale, indicating higher levels of hostility and aggression for those players, as well as with dimensions of basic personality associated with impulsivity and antisociality on the Eysenck Personality Questionnaire and Tridimensional Personality Questionnaire.
On the other side of the coin, some research finds less harmful effects of game play. Williams and Skoric (2005) attempted to use the General Aggression Model to test the hypothesis that playing a massively multiplayer online role-playing game (MMORPG) would lead to short term increases in aggressive social interactions. The GAM proposes that learning and rehearsal of aggression related cognitive structures causes changes in personality that leads to aggressive behavior, but their results did not support that hypothesis. Adachi and Willoughby (2011) found that after playing a competitive video game, participants were willing to put more hot sauce in the food of a confederate than those who played a non-competitive video game, regardless of the violence level of the game. Another study by Dimitri Williams (2006) on social effects of online game play also found no negative effects from playing an MMORPG for one month. Research by Goldstein et al. (1997) found that elderly adults who played the classic action puzzle game *Tetris* for a five week period had better reaction times and reported feeling more positive than those who did not play.

Video games can influence people in many different ways, but they are not a stale and unchanging influence. In the early history of video games, players shot down endless monochromatic alien spaceships in early classics such as *Space Invaders*, released as an arcade game by Taito in 1979, whilst using only a joystick and a single button. Today, we have incredibly realistic and detailed graphics, complex programming to give our modern day alien foes a sense of realistic behavior, and even new ways of interacting with our games with new technological innovations such as with motion controls and touch screen
technology. It is also possible to play video games with vast numbers of other people from across the globe via the Internet.

The genre of MMORPGs is one such internet connected video game genre which is fairly unique in the domain of human interaction and video games. MMORPGs are a genre of role-playing computer games where the player connects to a computer generated game world that is shared in real time with a large number of other players via the internet. In these games, participants are able to create a virtual avatar which represents them while they play and customize them to create an individual look, name, and identity which they use to interact with the online game world and with the avatars of other players. Depending on the game, users may engage in all manner of game activities with many different goals and themes, ranging from defeating evil superheroes or fighting in fantasy wars to throwing a festive virtual party. These activities can be offered by the game itself or organized by the players themselves, and can vary greatly depending on the game’s content. The environment and experience presented by MMORPGs is uniquely different from other methods of interaction. In traditional video games you cannot have a social multiplayer experience without another person physically present with you. For other forms of digital communication such as instant messaging or chatrooms, you do not have a personalized representation of oneself with which others interact with and a world to interact in. In face to face communication you cannot generate many such avatars and identities without others knowing the real person behind the avatar. MMORPGs are able to do all of these.
As these virtual worlds both mimic real life interactions and differ from it, it would be a valid line of research to investigate what sorts of phenomena that result from real world or other digital methods of interaction also might occur or have different results in the virtual world of MMORPGs. Much previous research in video games has focused on the effects of violence in video games or other negative impacts of playing (Adachi 2011; Arriaga 2006; Baldaro 2004; Bartholow 2005; Durkin 2002; Wang 2011). However there are many more possible subjects that could be explored in the research of video games than the effects of violent content.

Volunteering

One such subject that could be examined is that of the effects of volunteering in these online games. Greenfield and Marks (2004) found volunteering among older adults correlated with higher scores on a measure of positive affect. Another study found volunteering in older adults to correspond with better self ratings of health and depressive symptomology (Morrow-Howell, Hinterlong, Rozario 2003). Borgonovi (2008) also found similar results with higher self ratings of health and happiness for volunteers. One study found that extended volunteering reduced depression measures amongst younger age groups (Musick, Wilson, & Bynum 2000). While one might infer that the effects of volunteering would be similar in real life as it would in an online computer generated world such as those in MMORPGs, these games present a way of human interaction that is quite different from every day human interaction. There are a great number of factors which might change the way volunteering to help impacts those who volunteer. These factors could include the nature of the volunteering activity, how well the person helped
is known, how much sacrifice the volunteer is required to make, how anonymous the volunteer feels to his beneficiary when he volunteers, and so forth. When you consider the virtual environment of MMORPGs, other possible considerations arise. Is community volunteering in the game similar or equivalent to real world volunteering? Would the amount of hours spent volunteering in a real world environment equate to an equal number spent in a real world volunteering task? Might there not be an equivalent effect of volunteering at all, and if so what is the difference between the two activities that causes this? There are numerous possible studies that could be done within this topic.

**Social Effects**

The second subject of interest is the effect gaming has on players socially. A study of computer use in Hong Kong found that males who spent more time using their computers to play video games had less perceived social support and engaged in less exercise activities than others who used them for communication and homework (Ho, Lee 2001). Although somewhat dated given the advance of technology since the date of the study, one study from the late 90’s found that internet use was related to negative impacts on participants social lives over the course of a longitudinal study, such as the shrinking of social circles and increased loneliness and depression and proposed that the cause for this effect is because time spent using the internet replaces time spent in social interaction (Kraut, et al. 1998). However, a revisiting of that study found somewhat contradictory findings with the negative effects disappearing after an additional three years and another group similar study finding opposite results specifically for people who were more extroverted (Kraut, et al. 2002). A study by Duchenaut, Yee, Nickell, and
Moore (2006) examined social interaction in *World of Warcraft* in great detail. They examined the relationship between increasing size of in game guilds or groups and the reduction of time spent playing together, how choices in game character development can make the game more or less social by facilitating solo play, and how being surrounded by other players leads to a feeling of social presence without having direct company.

As with the previous topic, there are many possible hypotheses for the social impact of volunteering. Excessive online game play in an MMORPG would take the place of time spent for other social behaviors, or that players who spend such a great deal of time on such games care less about social interaction and competition. Conversely, MMORPGs create more social environments than games which cannot be played with others.

**The Present Study**

As there has not been much if any previous research into the impact of volunteering within virtual environments such as MMORPGs, the purpose of this study was to determine if those effects found in the aforementioned research on volunteering (namely the changes in loneliness, depression, and affect) could be found for volunteering behaviors within MMORPGs. By comparing data collected via a survey on volunteering behavior and score on measures shown in previous research to be affected by real life volunteering it would be possible to see if there was a similar effect for virtual volunteering for players of these games. In an attempt to examine a possible social impact of MMORPGs, a measure of competitiveness was included in the previously mentioned survey. In summary, it was hypothesized that participants who reported more
volunteering would have decreased scores on measures of depression and loneliness, and higher scores on a measure of positive affect compared to participants who volunteered less. Social competition was predicted to be affected by volunteering and overall play time as well, although with a lack of previous research on the subject it could only be tentatively hypothesized that scores on a measure of social competition would decrease from increased play time. Although there are many possible explanations why this research might find one outcome or another and given the limitations and difficulties of attempting to perform experimental research on internet communities, the aim of this study was only exploratory in nature and to determine if an effect could be found at all. Other possible effects from gender and overall video game playtime were also considered for analysis as well.

In sum, the hypotheses are as follows:

H1 - Players who engage in more volunteering hours will have higher positive affect.

H2 - Players who engage in more volunteering hours will be less depressed.

H3 - Players who engage in more volunteering hours will be less lonely.

H4 - Players who engage in more volunteering hours will be less socially competitive.
Participants

Participants were 59 males and 17 females players of the popular MMORPG *World of Warcraft*, developed and sold by Blizzard Entertainment. Respondents responded via email through online advertisement of the study on posts made to *World of Warcraft* related internet forum boards. These boards ranged from smaller *World of Warcraft* community sites to larger general gaming websites with *World of Warcraft* specific forums. All participants were self reported active players of *World of Warcraft* with ages ranging from 13 to 65 for females, and 14 to 57 for males. Mean age of all participants was approximately 25.

Materials

To assess the impact of volunteering and game play upon the participants, two measures of mental health and two social measures were used for a total of four scales. These scales were selected based on assessment of research on volunteering and video game play.

The first mental health measure is the Positive and Negative Affect Schedule International Short form or I-PANAS-SF, developed by Thompson (2007). The I-PANAS-SF is a revision of the original PANAS, a scale developed by Watson et al. (1988) with the intent of making a measure which overcame several shortcomings of the original study, namely the removal of items which showed redundancy or whose meaning
was misinterpreted or confusing to non-native English speakers while retaining strong psychometric properties. Using principal component analysis, Thompson identified items to be removed based on their loadings into their intended scales. The resulting Cronbach’s alphas for the negative and positive affect subscales after removing items were .74 and .80 respectively, down only slightly from their original values of .82 and .85. Correlations between the short form and original scales were $r = .95$ for negative and .92 for positive affect ($p < .01$). Same sample retests showed similar retest reliabilities as Watson’s original research, and cross sample validation showed that the scale performed well outside of the initial validation. Thompson also compared native and non-native English speakers to establish the I-PANAS SF cross culture validity, and his results seemed to support a lack of difference in scores between native and non-native speakers.

The final scale consists of 10 single word items which the respondent rates on a 1-to-5 scale, with 1 representing never and 5 representing always, and are asked “Thinking about yourself and how you normally feel, to what extent do you generally feel…” for each item. Items consist of words such as ‘upset’ or ‘inspired.’ Half the items tally to form the score for positive affect and the other five for negative.

The other mental health measure used in this survey is the Center for Epidemiologic Studies Depression Scale, or CES-D. The CES-D is a scale designed with the intent to measure depressive symptomology of members of the general population. It is not intended to diagnose depression. Radloff (1977) created the scale by drawing questions from a number of previously validated depression scales and choosing a number of questions which represented major components of depression. To determine
reliability of the scale, he took data from two data gathering campaigns where the CES-D was included as part of a multi-survey interview. Participants from the second campaign were asked to mail back a retest of the CES-D a number of weeks later, and a sample of participants from both were also asked to be re-interviewed approximately one year later. Radloff also took data from clinical samples of psychiatric depression patients.

Internal consistency of the items of the scale was supported by higher inter item correlations and coefficient alpha in the clinical samples than the general population samples. Radloff admits that test-retest reliability is not strong for this scale as its questions aim at measuring current symptomology, and that variation in an individual’s symptomology and the incidence or lack of depressive events would cause fluctuations. Test-retest correlations were not excellent, but for this study on MMORPGs no retests were performed. In terms of establishing validity, the psychiatric patient sample’s scores correlated moderately with nurse clinician’s ratings of depression severity and moderately well with other measures of depressive symptomology and general psychopathology. In one of the clinical samples, data were also gathered after several weeks of treatment, and patients who had reduced scores on other measures of depression also had reduced scores on the CES-D.

The scale itself consists of 20 items which the respondent indicates how often in the past week he/she has felt the way the item describes. The items are made up of statements such as “I felt hopeless about the future,” or “I felt that everything I did was an effort.” Respondents indicate if they had felt this way in range of less than 1, 1-2, 3-4, or 5-7 days for the past week. To score the answers, one assigns a score from 0 to 3
increasing with the indicated number of days, meaning a response of ‘less than 1 day’
adds zero points and ‘5-7 days’ adds three. Items with positive messages such as ‘I felt
happy’ are reverse scored. Scores range from zero to sixty, with higher scores indicating
more symptomology. There are no clearly defined or tested cutoff scores.

The first of the social scales used in this study will be the UCLA Loneliness scale
version 3 developed by Russell (1996). The scale was used and validated in a wide
variety of populations and in a variety of administration methods. This most recent
revision addresses items that some respondents indicated confusion in interpreting the
meaning of several items as well as questions with excess negations that proved difficult
to respond to accurately. In his preparation of this revision, Russell analyzed student,
teacher, nurse, and elderly samples in several previous studies. In terms of reliability the
UCLA Loneliness Scale had a coefficient alpha ranging from .89 to .94 across each
sample, and a 12-month retest in the elderly sample returned a test-retest correlation of
.73. The scale had convergent validity in correlations with other measures of loneliness
administered to the college student sample, and discriminant validity when compared to
measures of self esteem and depression due to its higher correlation with other measures
of loneliness than either of the other two factors. The scale is composed of 20 questions
in the format of “How often do you feel…?”, some examples include “How often do you
feel left out?” and “How often do you feel that you can find companionship when you
really want it?” The respondent then assigns each question an answer between 1 and 4,
with 1 meaning ‘never’, 2 as ‘rarely’, 3 as ‘sometimes’, and 4 as ‘always.’ After reverse
scoring proper items the total scores are tallied with higher scores indicating more loneliness.

The last scale is the Miller Competitiveness scale (Miller, 1998). The scale was originally developed by Miller with the intent of studying gender differences in sport competition and making distinctions between social appearance competition and event based competition. After developing the measure with a principal components and factor analysis of his initial scale, he collected data from a sample of participants to several regional running events. The results of his analysis supported the hypothesis that males would score higher on the measure of event competition and females on social competition. The social competition scale contains questions such as ‘At parties, I get anxious for fear of being ridiculed’ and ‘I try to impress others with my appearance,’ whereas the event competition subscale contains questions such as ‘The level of my competition often dictates the level of my performance’ and ‘I am at my best when I am “in competition.”’ and ask the participant to rate how much they agree with the questions on a five point Likert type scale, with 5 meaning ‘strongly agree’ and 1 meaning ‘strongly disagree.’ The complete score for a subscale is determined by taking the sum of numerical responses to the questions. Although this study is primarily concerned with the social competitiveness subscale, the complete measure will be used to maintain the validity of the measure.

Lastly, participants were asked to respond to demographic questions and also detail their play time per week on *World of Warcraft*. For participants, a volunteer
activity was defined as one in which you engage in primarily for the benefit of another
player or group of players. The questions asked were:

- Age
- Gender (Male / Female)
- On average, how many hours per week do you spend playing *World of Warcraft*?
- On average, how many hours per week spend playing *World of Warcraft* are spent
  engaging in helping or volunteer activities within the game
- In general, how well do you feel you know the people you volunteer to help? (5
  point Likert type response scale, with 1 meaning not at all known and 5 meaning
  very well known.)

For the two demographics questions asking for hours per week responses, the survey site
used to collect the data did not allow for numerical only responses or sufficiently long
drop down menus to include each whole age. An open response text box was used
instead. If participants responded with a range the mean of that range was used (e.g. a
response of '9-12 hours' would be recorded as 10.5 hours), and when responses were not
able to be interpreted they were flagged and excluded from analysis.

**Procedure**

During summer of 2011, posts were made to various internet forum boards
relating to *World of Warcraft* advertising for participants in an academic study on the
effects of playing MMORPGs. This posting also contained an informed consent
document that was repeated at the beginning of the actual survey. Respondents were
asked to send an email to the researcher’s school email asking to participate, and were
sent a personalized link to the online survey and ID number they would be asked to provide as a means of discouraging repeat or fallacious participation. Respondents were asked to complete the demographics questionnaire, the I-PANAS SF, the UCLA Loneliness Scale, the CES-D Depression scale, and the Miller competitiveness scale. After completing these questionnaires participants were shown a page with information on the nature of the study, debriefed, and thanked for their participation. Total completion time for the study was estimated to have taken no more than 10 to 30 minutes. No personally identifiable information was requested from any participant, and participants were informed that they could withdraw at any time. As an incentive to participate, respondents were included in an equal opportunity drawing for paid subscription time cards to *World of Warcraft*. This incentive was chosen on the reasoning that this reward would be generally desirable by any continuing *World of Warcraft* player and not useful to anyone else.

Simple linear regression analysis was performed on volunteering hours spent per week against each of the four measures of negative affect, loneliness, depression, and social competitiveness to test each hypothesis. Two-tailed bivariate correlation analysis was performed on the demographic variables of age, play time per week, volunteering time per week, the proportion of play time spent volunteering, and how well the helper knew those he helped against the measures from each of the scales. Student's *t*-tests were performed to determine if any variables differed for males versus females. For any test in which participants had missing data, those cases were excluded from that analysis.
Chapter 3

RESULTS

The first regression analysis of volunteering hours on positive affect had an \( N \) of 70 after cases with missing data were excluded. The mean on the I-PANAS SF was 10.20 with a standard deviation of 3.28. Volunteering hours per week averaged at 6.21 hours with a standard deviation of 5.44. The correlation of volunteering on the positive affect subscale of the I-PANAS SF was not statistically significant at \( r = .08 \) (one-tailed), \( p = .26 \). Hypothesis H1, that players who engage in more volunteering hours will have higher positive affect, was not supported.

The second regression analysis of volunteering hours on depression had an \( N \) of 68 after removing cases with missing data. The mean on the CES-D Depression scale was 12.96 with a standard deviation of 9.91. Volunteering hours per week averaged at 6.33 hours with a standard deviation of 5.61. The correlation of volunteering on the CES-D depression scale was not statistically significant at \( r = -0.02 \) (one-tailed), \( p = .44 \). Hypothesis H2, that players who engage in more volunteering hours will be less depressed, was also not supported.

The third regression analysis of volunteering hours on loneliness had an \( N \) of 69 once cases with missing data were excluded. The mean on the UCLA Loneliness scale was 41.71 with a standard deviation of 11.20. Volunteering hours per week averaged at 6.39 hours with a standard deviation of 5.58. The correlation of volunteering hours on the UCLA Loneliness scores was also not statistically significant at \( r = -0.08 \) (one-tailed), \( p \)
Hypothesis H3, that players who engage in more volunteering hours will be less lonely, was not supported.

The fourth and last regression analysis of volunteering hours on social competitiveness had an $N$ of 67 when cases with missing data were excluded. The mean for the social competitiveness subscale of the Miller competitiveness scale was 82.93 with a standard deviation of 23.72. Volunteering hours per week averaged at 6.33 hours with a standard deviation of 5.59. The correlation of volunteering hours on the social competitiveness subscale scores was not statistically significant at $r = 0.07$ (one-tailed), $p = .29$. Hypothesis H4, that players who engage in more volunteering hours will be less socially competitive, was also not supported. For a summary of each of the analysis, please look for table 1.

Table 1

Results of analysis for main hypotheses

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>St. dev</th>
<th>N</th>
<th>Pearson's $r$</th>
<th>Sig. (one-tailed)</th>
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<tr>
<td>I-PANAS SF</td>
<td>10.20</td>
<td>3.28</td>
<td>70</td>
<td>.08</td>
<td>.26</td>
</tr>
<tr>
<td>CES-D</td>
<td>12.96</td>
<td>9.91</td>
<td>68</td>
<td>-.02</td>
<td>.44</td>
</tr>
<tr>
<td>UCLA Loneliness</td>
<td>41.71</td>
<td>11.20</td>
<td>69</td>
<td>-.08</td>
<td>.25</td>
</tr>
<tr>
<td>Miller Competitiveness</td>
<td>82.93</td>
<td>23.72</td>
<td>67</td>
<td>.07</td>
<td>.29</td>
</tr>
</tbody>
</table>

Note, mean and standard deviation are for the measures and not for volunteering hours.

In comparing the demographic variables against our four scales, a small number of two-tailed correlations that approached a $p < .05$ level of significance were found. Age
trended negatively with scores from the UCLA loneliness scale ($N = 73, r = -0.20, p = 0.09$) and had a statistically significant negative correlation with CES-D scores ($N = 71, r = -0.24, p = 0.04$). Age also trended negatively with social competitiveness ($N = 69, r = -0.17, p = 0.16$). A participant's rating of how well they knew the persons they helped trended negatively with loneliness scores ($N = 73, r = -0.19, p = 0.12$). Lastly, social competitiveness trended positively with the proportion of playtime spent helping per week ($N = 65, r = 0.22, p = 0.074$).

The $t$-tests comparing differences in scores between genders found that male participants were younger than female participants. Of the 59 male and 17 female participants, males had a mean age of 23.61 years with a standard deviation of 7.83 and females had a mean age of 31.35 years with a standard deviation of 12.37. with a 95% confidence interval of males being between 1.13 and 14.36 years younger and a mean difference of 7.74 years ($t = -2.44$ and $p = 0.024$, equal variances not assumed, due to Levene’s Test resulting in $F = 5.29, p = 0.02$). Ages ranged from 13 to 65 for females and 14 to 57 for males. Males also had higher loneliness scores than females, with a 95% confidence interval of the difference lying between 0.449 and 12.667, mean difference 6.558. ($t = 2.141, p = 0.036$).
Chapter 4

DISCUSSION

As indicated by the analyses, the hypotheses that volunteering has an impact upon players of MMORPGs was not supported. This was estimated to be due to several factors such as the effect being too small to find significant at the present sample size, or the differences between the traditional volunteering and virtual volunteering behaviors.

The impact of being unable to advertise on larger World of Warcraft related sites may have had a strongly detrimental impact in failing to find significant results on each hypothesis if the effects were actually present. The originally desired sample size for this project was between 125 to 250 or more, but many sites including the World of Warcraft official forums construed the posts seeking participants as spam and deleted them despite an explanation of the academic nature of the research. Posting on smaller sites proved to have diminishing returns, likely due to a lower number of active users. Even after over a month of time spent locating and advertising on many smaller sites there was only a very small return in participants or in a response of any kind to the advertisement posts. Even at a desired 200 participants, an $r$ of 0.117 would have been required for statistical significance of a one-tailed test at the $p < .05$ level. The correlation between volunteering hours and positive affect was the strongest at $r = .079$, with the others being much weaker. Even had the exact same results been found with a larger sample, we still would not have had significant results unless we approached an $n \geq 1000$. 
Another possible explanation is that the nature of volunteer behaviors in these online virtual environments differs too greatly from that in traditional real world volunteer activities. A player assisting his or her friend, guildmates, or strangers in *World of Warcraft* is different than assisting a person in real life. Donating virtual game currency carries different weight than donating to charity, and helping other players in the guild acquire new items to aid in their progress through the game is different than volunteering at your local food bank or library. To some extent, this helping behavior may be less of an act of charity to the player and more an extension of the player’s own continued play experience. This is especially true if we consider that players might be more likely to help friends or acquaintances than strangers. In this study the mean score of how well the participant knew the person he helped was 3.22, which would seem to indicate that players helped people they had at least some familiarity with. Many real world volunteer activities are done for the benefit of strangers or with no immediately associated beneficiary. For instance, people who volunteer at local libraries to organize bookshelves are not directly assisting any specific patron, and neither does donating money to charities that seek to find cures for breast cancer. Games such as *World of Warcraft* are designed with the intent that players do not play the game strictly by themselves. Forming temporary or lasting groups carries significant benefit in success and progression of game activities. It would be intuitive that players would be more likely to assist those who will value or return their good will, or in conditions where it improves social standing within their game group. Given that people likely play *World of*
In order to entertain themselves it also makes sense that ingame activities will be taken to further that purpose.

Given the above statements, this still does not exclude the possibility that these effects of volunteering do exist even if they were not found in the present study. Limitations on the study of online gaming make it extremely difficult to test in a manner that might more accurately reveal these sorts of effects. This researcher could not provide a large number of gaming ready computers for participants to play on *World of Warcraft* in a monitored lab, with half asked to play normally and the other half asked to only engage in certain volunteer activities in order to create more experimental conditions. On the other hand, a study of that nature might not provide us with results that accurately reflect the environment we would claim to be measuring. The finding that certain specific kinds of volunteering behavior in a virtual environment has the same results as it does in real life is less valuable if the people who occupy and use that environment rarely behave in that manner.

Each trending bivariate correlation between the demographic variables and each of the four measures would have been found statistically significant with an $N$ of 200, although as they were not the primary focus of the research we do not have much interesting to say or infer from those results. Without an experimental condition we can make no strong causal inferences, and there is also little information from this study to guide these side analyses beyond their role as interesting tidbits of information. For instance, older participants had lower scores on depression. This result and the trend of older participants to have lower scores on loneliness also could be the result of
covariates. For example, younger players under the age of 18 are also far less likely to be married than those near the age of 35. If marriage has any significant impact on a measure of loneliness, than we cannot explicitly list age as the reason for this effect. Alternatively, the older participants who play video games may be less lonely because of the social connections they formed within the game that they otherwise might be lacking. Without further information gathering to perform additional analyses, there is not much that can be said on this topic.

One caveat that should be noted for any future research related to this topic is that we cannot explicitly say that video games have any specific cause in these effects, merely that the virtual environment provided by World of Warcraft was the stage on which these effects were tested. World of Warcraft is iconic in the MMORPG genre, but it is not representative of all MMORPGs on the market. Disney's Toontown Online is an MMORPG aimed at a much younger audience and carries with it a much different thematic than the war torn fantasy setting of World of Warcraft. An MMORPG designed to appeal at young girls might similarly provide a different setting that might focus more on social interactions and cooperative activities even more than other games within the genre that are marketed toward young adult males. Even outside the subject of video games, we are likely to find ourselves interacting digitally more and more as a normal form of communication as technology progresses. If the current popularization of 3D television and motion and touch controls in our electronic devices is any indication, we soon might find ourselves able to engage in virtual representations of real environments and other persons in those environments very similar to how players in World of Warcraft
interact today. Maybe we will be making 3D video phone calls while able to see some representation of ourselves interacting with the person we are talking to. How will a meeting with our boss at work be different if we only do it by 3D video call instead of in person, and how is it different from the ways we use our technology today? The advance of technology will require us to constantly reexamine our old theories and findings.
REFERENCES


