Publications

1-15-2021

Friendships in Gamers and Non-Gamers

Christina M. Frederick
Embry-Riddle Aeronautical University, frederic@erau.edu

Tianxin Zhang
Embry-Riddle Aeronautical University, zhangt2@my.erau.edu

Scholarly Commons Citation

Friendships in Gamers and Non-Gamers

Abstract

Online social technologies, such as email, social networking applications, texting and others, are now used by a majority of individuals in the U.S. (Pew, 2018a). As a result, it is not uncommon to develop friendships with others that are conducted primarily in an online environment. However, we know little about the qualities of online friendships and how they may, or may not, differ from traditional face to face friendships. The present study focused on exploring friendship quality in online and offline domains using two groups: a gamer group and a non-gamer group that used non-gaming applications to connect with others online. Participants completed a demographic questionnaire to gather information about their online and face to face friendships, the McGill Friendship Questionnaire (Mendelsohn & Aboud, 2014) for their closest online and offline friends and measures of happiness, anxiety, and depression. In Study 1, within group comparison found that gamers' online friendships were of significantly higher quality than their offline friendships. For non-gamers, the opposite results were found. A second study was done using a larger, non-college-based sample. Results of Study 2 found that for gamers and non-gamers offline friendships were of higher quality than online friendships, although both types of friendships existed in both groups. There were no differences between groups in general life happiness, anxiety or depression. Suggestions for follow-up research are presented.

Keywords: gaming, friendship, social networks, happiness

Friendships in Gamers and Non-gamers

Across the world, it is now the norm to use social media platforms like Facebook, Instagram, and Snapchat to connect with friends and family. In the U.S., nearly 75% of adults report using Facebook to connect with others (Pew, 2018a). Although individuals generally have positive feelings and attitudes about our immersion in the digital world, awareness is growing of the risks of such immersion (Pew Research Center, 2018b). A potential risk of social media use is that meaningful connections between individuals will be changed or negatively impacted. (Bradshaw & Saha, 2010)

Another way people are interacting virtually with each other is by immersion into online communities, such as those offered by online games. There are more than one billion people worldwide who play online games, and almost one-half of the population in the U.S are video gamers (Liu, Li, & Santhanam. 2013). Similarly, when the public is asked how they perceive online gamers, people with no understanding of gaming often picture those gamers as isolated at home, hiding away from social activities, and not building real friendships in the virtual world (Kowert, Domahidi, Festl, & Quandt, 2014; PaaBen, Morgenroth, & Stratemeyer, 2017).

To gain a better understanding of social interactions and close relationships in both online and face to face (offline) environments, the present study examined online and offline friendships in both gamers and individuals who connected with others online, but were not gamers, and then compared the quality of online and offline friendships within and between groups. For simplicity and clarity, the group comprised of individuals who connected with others online, but not through games is referred to in this study as the non-gamer group. The purpose of the study was to empirically study how friendships may differ depending on the environment in which

they are conducted and to provide accurate information about the quality of online and offline friendships in gamers and non-gamers.

Friendship Qualities

Based on conceptualizations by researchers such as Buhrmester (1990), Buhrmester & Furman, (1987), Bukowski, Hoza & Boivin (1994) and Aboud & Mendelson (1996), a friendship is an interpersonal relationship between individuals with mutual affection and attachment. It serves several functions, conceptualized by Asher & Parker (1989), Parker & Asher (1989), and Aboud & Mendelson (1996; 1992). The functions served by friendships refer to those qualities or resources that individuals in friendships seek to have provided to them by their friends, and which they may reciprocate in providing.

Aboud & Mendelson (1992) and Mendelson & Aboud (2014) studied friendship functions and concluded that there were six distinct functions that friendships provide. These are:

1. Stimulating Companionship: sharing activities that arouse or stimulate

2. Help: Providing assistance or aid to meet goals

3. Intimacy: Sharing and disclosing personal thoughts and aspects of self

4. Reliable Alliance: Availability and loyalty

5. Self-Validation: Positive self-image maintenance through a friend's reassurance

6. Emotional Security: emotional support provided when needed

It is interesting to note that much of the theoretical and foundational work defining friendships occurred prior to the creation of virtual environments. When formulated, friendships were primarily conducted face to face. Even Mendelson & Aboud's (2014) scale, although developed fairly recently, still reflects work based on a norm of face to face social interaction.

Social Interaction and Friendship in Online Communities

What does social interaction and friendship look like in virtual communities? The answer to this question may be as complex and diverse as virtual environments themselves. Early work examined email and chat room 'netiquette' and found that behaviors online reflected an awareness of the audience, adhered to norms of politeness and privacy, and had well-articulated rules of conduct for misbehavior that were reinforced by a designated online authority (e.g. a system administrator (Pankoke-Babatz & Jeffrey, 2002). Later studies also found online norms were reflective of those in real life (Sivunen & Hakonen, 2011; Yee, Barlenson, Urbanek, Chang & Merget, 2007).

While the studies discussed above allude to similarities between virtual and real-life social interactions, other studies have uncovered differences. Moncur, Orzeck & Neville (2016) studied 'fraping', a behavior unique to online environments. Fraping occurs when someone other than the owner/user of an online account modifies the user's personal information. When fraping occurs it is typically viewed as mischievous, subversive and unacceptable when done by strangers, but can be humorous if done by friends. Hu, Kumar, Huang & Ratnavelu (2017) also examined self-presentation, which manifests differently online and offline. While individuals typically try to hide negative aspects of self in face to face interactions in order to avoid disapproval or rejection, in online environments people often express themselves more freely with negative components, while also taking less responsibility for the potentially negative results of the interaction.

Friendships have been studied in non-gaming online environments. Levine & Stekel (2016) studied adolescent girls who used technology to communicate with others and found that friendships existed for participants both online and offline with great similarity across settings.

In contrast, Pierce (2009) found that female high school students were more comfortable communicating online with friends and experienced higher social anxiety in face to face conversations. However, a more recent empirical study of Dutch teenagers found that social media use and empathy were positively linked and social media use led to greater cognitive and emotional empathy in teens across a one year time period (Vossen & Valkenburg, 2016).

In a study of Facebook use, Marino, Vieno, Pastore, Albery, Frings & Spada (2016) found that introverts had a greater tendency than extroverts to initiate and nurture friends through Facebook, thus making up for a lack of friendships in real life. Finally, Sherblom, Withers, Leonard & Smith (2018) studied teams in Second Life, finding that better communication among team members and team satisfaction was paired with behaviors such as trust, and being present.

In general, it seems that social interaction norms do exist in online environments and, at times, reflect the same norms and behaviors that are present in real life. Even so, new behaviors have arisen in online environments (e.g. fraping) that also infuse social interactions and friendships with different dimensions.

Online Gaming, Social Interaction and Friendship

A virtual community of interest in the present study is the online gaming community. For a number of years, social interaction occurring as a result of online gaming has been examined, although controversy exists about the effects gaming has on participants. In 2001, Nie expressed concern that online activity, including gaming, may impede face to face social interaction between individuals. Since Nie's work, there has been a fear perpetuated in society that focused on gamers as solitary individuals whose online activities reflect a dysfunctional lack of meaningful, positive social interaction (Shen & Williams, 2010; Williams, 2006). In a statement on the impact of violent video games, an APA resolution found support for research linking

aggressive behavior, affect and cognition in older children and adults to violent video game use (American Psychological Association, 2020; 2005; 2015a; 2015b). At the same time, the APA acknowledged more research was needed to fully understand this relationship. In response to these reports, critics argued the APA work was methodologically flawed and the recommendations presented were not only not justified, they were not replicated in empirical studies (Copenhaver & Ferguson, 2018; Elson et al., 2019; Ferguson & Wang, 2019). Most recently, Ferguson, Copenhaver & Markey (2020) re-evaluated the APA's 2015 meta-analysis and found that the relationships the APA meta-analysis found between violent video game use and various forms of aggression were much weaker than previously reported and the associated effect sizes were smaller.

Research with MMORPG (massive, multiplayer, online, role playing game) players found that gameplay helped create strong online friendships, that social motives were key for player participation, and that male players felt more comfortable conversing online than offline (Griffiths et al., 2011). A large study of gamers and non-gamers in Germany showed that gamers use online gaming to interact with friends as well as create new friendships through game playing, and there were no significant online socialization differences between the groups. (Domahidi, Festl & Quandt, 2014). However, Hussain and Griffiths (2014) also reported that some MMORPG gamers reported experiencing social conflict related to their online behavior, using gaming to escape from real life. In this set of studies, both positive and negative effects on friendship through engagement in MMORPG activity were reported.

In a study of players of the online space-focused game, EVE, Ramirez (2018) found that friendships between players evolved over time. Players used communication during and outside of gameplay to facilitate and negotiate friendships developed through EVE. In a similar study,

Bonenfant, LaFrance-Martin, Pregent & Cremier (2018) compared friendships in League of Legends players versus Guild War Players. In this comparison, the dynamics of the game tended to create different types of friendships. League of Legends is a very individualistic game where personal skill and knowledge of the game are key to player status and acceptance. Thus, friendships are based more on superficial alliances and not on characteristics of warmth or caring. Bonenfant et al. referred to these friendships as having 'toxic allies'. On the other hand, Guild Wars is an environment that provides assistance for new users and shares resources across players, leading to friendships characterized by kindness and caring.

Other research compared friendships and social competencies in more general groups of gamers and found that online gaming impacts social interactions in both positive and negative ways. In a study of college-age, male and female gamers, Kowert & Oldmeadow (2013) found that more involved video gamers were able to positively express themselves and regulate emotion, but might be less able to initiate social interaction offline. In 2014, Life Course Associates surveyed over 1,000 adults in the U.S ranging in age from 13-64 years old, and reported that gamers (defined as anyone who played an online game in the past 60 days) reported having strong friendships that were important to them and that they were close to family members. Kowert & Oldmeadow (2015) found that for individuals experiencing an avoidant form of attachment, games provided players an opportunity for connection and closeness they were not able to establish in offline interactions. Domahidi, Breuer, Kowert, Festl, & Quandt (2016) in a longitudinal study of online and offline gaming friendships found no negative effects of gaming on players' offline friendships or social support. Likewise, in e-sport gamers, Trepte, Reinecke & Juechems (2012) found that online gaming led to positive social networks across

players. However, this was only so if the players extended their social interactions beyond the boundaries of the online game and brought other players into their offline world.

While some studies have found little negative social impact of online gaming, there is also newer evidence that social interaction within the online gaming environment frequently includes behaviors that are unfriendly, hostile and undermine positive social connection (Ditchthelabel.org, 2017). In this survey of over 2,000 online teenage and adult gamers using Habbo, over half reported that they were bullied, trolled, and experienced unwanted hate speech while gaming. Forty-seven percent said they were threatened during play and nearly a third of players had their personal information shared without their consent. Results of a negative gaming experience included participants having to leave a game or experiencing negative psychological states, such as depression, after they were bullied.

The Personal Effects of Friendship

Having healthy friendships has been positively associated with psychological variables such as happiness (Demir & Weitekamp, 2005). Likewise, lack of friendships and negative social connections have been associated with higher levels of anxiety and depression (LaGreca & Harrison, 2005). These findings are not new, however, examining how online friendship qualities relate to psychological health or ill-health is a question that needs to be examined. The present study focused on three psychological variables (happiness, anxiety, depression) in order to examine how online versus face to face friendship qualities correlated with each variable, as well as whether gamers vs. non-gamers had any differences in these personality variables.

Happiness. Happiness is the cognitive and affective evaluation of an individual's life; it consists of the presence of positive affect, the absence of negative affect, and global life satisfaction (Diener et al., 2009; Diener et al., 2002). Demir & Weitekamp (2005) investigated

the relationship between personality, number of friends, best friendship quality and happiness. The study found that friendship quality (FQ) predicted happiness and had more significant influence on level of happiness than personality and number of friends. Lyubomirsky, Tkach, & DeMatteo (2006) also reported when individuals reported greater satisfaction with their friendships they were also happier.

The relationship between friendship quality and happiness may not be culturally unique. Demir, Ozen, & Dogan (2012) conducted a cross-cultural study to investigate the association between same-sex best friendship quality with happiness among college students in Turkey and the United States. In both the Turkish and American sample, friendship quality was positively and significantly correlated with happiness.

Anxiety and Depression. Researchers have also examined how friendship relates to anxiety and depression. LaGreca & Harrison (2005) studied adolescents and concluded that when teens had positive friendships, were in dating relationships, and affiliated with high status peers this buffered them from experiencing anxiety and depression. Rodebaugh, Lim, Shumaker, Levinson & Thompson (2015) found that quality friendships lowered social anxiety. Conversely, however, social anxiety did not predict friendship quality. Likewise, Page-Gould, Mendoza-Denton & Tropp's (2008) reinforced the idea that it is the friendship experience that determines anxiety, rather than friendship being used as a way to lessen anxiety. In the Page-Gould et al. study, those who had experienced friendships with others who had diverse backgrounds experienced lower levels of anxiety in new environments.

Research has also explored how Internet and social media use might impact anxiety and depression. Selfout, Branje, Delsing, ter Bogt & Meeus (2009) studied depression and anxiety in adolescents who used the Internet and social media, concluding that social media use is tied to

depression and anxiety only when the use is not related to communication with peers. Using the Internet to connect with peers using communication technologies, such as instant messaging, seemed to lower levels of depression. Vannuci, Flannery & McCauley-Ohannessian (2017) examined length of time spent using social media and found that greater usage time correlated positively with trait-based anxiety. Rather than examining time spent online or using social media, Primack, Shensa, Escobar-Viera, Barrett, Sidani, Colditz & James (2017) focused their work on the number of social media platforms participants used and found that depression and anxiety were positively correlated with the number of platforms used, even when controlling for time online.

Several takeaways can be gleaned from these studies. First, it seems that the experience of friendship and the quality of friendship may play a role in alleviating anxiety and depression. Second, research has also shown a relationship between Internet and social media use and the experience of anxiety and depression.

The Present Study

The current research builds on earlier work and extends knowledge about friendship in several ways. A preliminary study (Study 1) examined and compared qualities of online and offline friendships within a general, non-gamer group of individuals and self-identified online gamers. Specifically, we wished to know if online gamers perceived functions of their close friendships differently based on whether that friendship is online or offline. Second, we compared the quality of online and offline friendships, across gamer versus non-gamer groups. Two within subjects and one between subjects hypotheses were tested in Study 1: H_1: there is no difference between online friendship scores and offline friendship scores within the gamer group. H_2: Offline friendship scores in the non-gamer group will be higher than online friendship scores

in the non-gamer group. H_3: there will be differences in online friendship scores and offline friendship scores between the gamer group and the non-gamer group. It is predicted that online friendship qualities will be higher in the gamer than non-gamer group. Furthermore, offline friendship qualities will be higher in the non-gamer than gamer group. H_4: there is no difference in happiness scores between the gamer group and the non-gamer group.

STUDY 1

Method

Participants

Participants were undergraduate students at a small private university in the southern United States. They were recruited through the University's Sona System and received class credit or extra credit for participation. Gamer and non-gamer determination was made on a self-report basis. Before completing the study, participants were asked if they currently played games online with others. If they responded affirmatively, they were placed in the gamer group. In the present study, gamers were thus self-identified. This self-labeling as a means of identifying gamers is consistent with past research comparing gamers and non-gamers (King, Delfabbro, & Griffiths, 2013; Carras et al., 2017). Conversely, non-gamers were those who reported that they did not play games online with other people. There were 92 participants (73 males and 19 females) in the gamer group with a mean age of 21.43 years, and there were 59 participants (23 males and 36 females) in the non-gamer group with a mean age of 21.25 years.

Measures

Demographic Survey. Participants completed a demographic survey developed for the present study. Demographic items included: age, gender, length of friendship with closest online and offline friend, amount of time spent interacting with closest online and offline friend in online mode, amount of time spent interacting with closest online and offline friend in person, age of closest online and offline friend, and gender of closest online and offline friend.

McGill Friendship Questionnaire (Mendelson & Aboud, 2014). The McGill Friendship Questionnaire was used to assess the qualities of friendship for this study. The questionnaire contains 30 items measuring perceptions about a friend or friendship in late adolescence and adulthood (Mendelson & Aboud, 2014). It includes 6 subscales based on functions of friendship: stimulating companionship, help, intimacy, reliable alliance, self-validation and emotional security. Each item is a statement of a specific friendship function, and items are responded to on a 9-point Likert scale from 0 (never) to 8 (always). The Cronbach alphas of all subscales range from .84 to .90.

The Oxford Happiness Questionnaire (Hills & Argyle, 2002). This questionnaire is comprised of 29 items. Each item is a statement about happiness, and items are responded to on a 6- point Likert scale from 1 (strongly disagree) to 6 (strongly agree). The Cronbach alpha reported for this questionnaire was .91.

Procedure

After completing the demographic survey and the Oxford Happiness Questionnaire, participants in both gamer and non-gamer groups were asked to complete the McGill Friendship Questionnaire twice; once for their closest online friend and one for their closest offline friend. For gamers, the closest online friend was defined as the person they felt closest to through online gaming and interacted with most often using online games. For the non-gamer group, the closest

online friend was defined as the person with whom they interacted most often online using social media or other online applications and whom they felt closest to in the online domain. For both groups, the closest offline friend was the person they felt closest to and interacted with primarily in a face to face manner.

Results

Demographics responses for both gamer and non-gamer groups are presented in Table 1. Participant mean scores on the McGill Friendship Questionnaire subscales are shown in Table 2.

Table 1

Demographic Information for Gamer and Non-Gamer Groups

	Gamer Group	Non-Gamer Group
Demographic Items	Mean (SD)	Mean (SD)
Participant Age	21.43 (4.11)	21.25 (5.86)
Participant Gender	19 Female 73 Male	36 Female 23 Male
For Gamers only, mean number so hours spent playing against the computer per week	4.22 (4.72)	n/a
For Gamers only, mean number so hours spent online gaming with other people per week	7.53 (7.83)	n/a
Demographic Information about Online Friend		

Length of Friendship in Years	5.46 (4.52)	5.17 (5.28)
Age of Online Friend	20.43 (6.37)	22.63 (7.35)
Gender of Online Friend	7 Females 83 Males	29 Females 30 Males
Frequency of Interaction with Online Friend in Online Mode	3.26% Never 19.57% 3 to 4 times per year 34.78% 1 to 2 times per month 19.57% 0 to 1 hour per day 17.39% 2 to 4 hours per day 3.26% 4 to 6 hours per day 2.17% 6+ hours per day	10.17% Never 16.95% 3 to 4 times per year 33.90% 1-2times/month 28.81% 0 to 1 hour per day 6.78% 2 to 4 hours per day 3.39% 4 to 6 hours per day 0% 6+ hours per day
Frequency of Interaction with Online Friend in Offline Mode	32.61% Never 25.00% 3 to 4 times per year 22.83% 1 to 2 times per month 11.96% 0 to 1 hour per day 1.09% 2 to 4 hours per day 1.09% 4 to 6 hours per day 5.43%	44.07% Never 22.03% 3 to 4 times per year 18.64% 1 to 2 times per month 8.47% 0 to 1 hour per day 3.39% 2 to 4 hours per day 0% 4 to 6 hours per day 1.96% 6+ hours per day
Demographic Information about Offline Friend		
Length of Friendship in Years	8.51 (5.65)	6.78 (5.03)
Age of Offline Friend	21.39 (3.67)	21.29 (5.69)
Gender of Offline Friend	21 Females	34 Females

	70 Males	24 Males
Frequency of Interaction with Offline Friend in Offline Mode	1.09% Never 32.61% 3 to 4 times per year 31.52% 1 to 2 times per month 6.52% 0 to 1 hour per day 10.87% 2 to 4 hours per day 8.70% 4 to 6 hours per day 8.70% 6+ hours per day	5.08% Never 1.69% 3 to 4 times per year 23.73% 1 to 2 times per month 40.68% 0 to 1 hour per day 15.25% 2 to 4 hours per day 5.08% 4 to 6 hours per day 8.47% 6+ hours per day
Frequency of Interaction with Offline Friend in Online Mode	2.17% Never 6.52% 3 to 4 times per year 22.83% 1 to 2 times per month 35.86% 0 to 1 hour per day 11.96% 2 to 4 hours per day 7.61% 4 to 6 hours per day 13.04% 6+ hours per day	1.96% Never 32.20% 3 to 4 times per year 25.42% 1 to 2 times per month 10.17% 0 to 1 hour per day 10.17% 2 to 4 hours per day 10.17% 4 to 6 hours per day 10.17% 6+ hours per day

Comparing Friendships

A fully factorial MANCOVA was conducted to examine overall between group and within group differences on the 6 friendship subscales for both online and offline friendships using gender as the control variable. Box's test for homogeneity of variance was significant ($p < 0.05$). Due to inequality of variances, the alpha level was set at p<.01. Results of the MANCOVA found significant differences in friendship scale scores between gamers and non-gamers, $F (6,295) = 8.191$, $p<.001$, Wilk's $\Lambda = .627$, partial eta-squared = .144, observed power = .99. Within groups differences were also found to be significant when considering gender as a

control variable , F (6,295) = 3.744, p<.001, Wilk's Λ = .928 partial eta-squared = .072 observed power = .961.

Post-hoc tests were then conducted to examine specific between and within group differences on each of the 6 friendship subscales for both online and offline friendships. For the between group comparisons, Levene's Tests of Equality of Error Variances was conducted. Levene's test indicated that for all variables with the exception of Self-Validation for the offline friend, variances across groups were unequal. As a result, the alpha value for significance was set at p<.01. Univariate tests with Bonferroni correction showed significant within and between group differences on all six friendship variables. Results of this analysis are presented in Table 2.

Table 2

Post Hoc Comparisons for Gamer (N=92) and Non-Gamer (N=59) Online and Off-Line Friendship Qualities

	Group			
	Gamer Online	Gamer Offline	Non-Gamer Online	Non-Gamer Offline
Friendship Qualities	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Help	6.75 (1.37) a	5.72 (1.57) a	4.16 (2.12) a b	6.33 (1.25) b
Intimacy	6.85 (1.28) a	5.40 (1.87) a b	4.57 (2.44) a b	6.85 (1.17) b
Reliable Alliance	7.30 (1.09) a	6.51 (1.53) a b	5.64 (2.19) a b	7.34 (.85) b
Emotional Security	6.69 (1.41) a	5.53 (1.73) a b	4.87 (2.14) a b	6.79 (1.12) b
Companionship	7.02 (1.13) a	6.23 (1.37) a b	5.42 (2.08) a b	7.06 (1.01) b

Self-Validation	6.57 (1.40) a	5.60 (1.49) a	5.00 (2.14) a b	6.47 (1.40) b

Note. Those means sharing subscripts are significantly different from each other at p<.05, with the exception of self-validation for which p<.01.

Results for the within group analysis showed that the means of each friendship subscale score for gamer online friendships were significantly higher than the means for gamer offline friendships. The means of each friendship subscale score for non-gamer online friendships were significantly lower than the means for non-gamer offline friendships.

Examination of the between group post hoc comparisons, showed that the gamer group's mean scores on each friendship subscale for their online friendships were significantly higher than the non-gamer group's online friendship scores, and the gamer group's means on 4 of 6 friendship subscales for their offline friendship qualities were significantly lower than the non-gamer group's mean offline friendship scores. An interesting finding, however, is that gamers' online friendship scores were not significantly different from the non-gamers' offline friendship scores. This pattern of results does not support Hypothesis 1, however it is supportive of Hypotheses 2 and 3.

Differences in Happiness

The mean happiness score in gamers ($M = 4.31$, $SD = .69$) was not significantly different than the mean happiness score in non-gamers. ($M = 4.42$, $SD = .71$). An independent samples t-test was not significant at the alpha level of .05, $t(120.586) = -.869$, $p = .386$. Therefore, the analysis supports Hypothesis 4.

Study 1: Discussion

Study 1 provided further insight into the nature of gamer and non-gamer friendships. The results of the analyses conducted found that self-reported gamers perceived the quality of their closest online friendship as higher than their closest offline friendship. In the non-gamer group, the opposite pattern held true; the quality of the closest offline friendship was higher than the online friendship. Analysis further showed that between group differences were present and that non-gamer's offline friendship scores were higher than the same scores for gamers. Likewise, gamer's online friendship scores were higher than online friendship scores for the non-gamers.

Perhaps the most interesting finding, however, was that gamer online friendship scores were the same as non-gamer offline friendship scores. In essence, the closest, face to face friendship non-gamers have looks the same as the closest online friendship reported by gamers. High mean scores for the friendship variables for each of these types of friendships support the conclusion that gamers do have close and important friendships with other people, and that these occur online rather than face to face. For gamers, their comfort in the online environment allows them to meet and grow close to others within this milieu, even though they may never meet their closest friend face to face.

Study 1 also found that general life happiness levels did not vary between gamers and non-gamers. One contributing factor could be that gamers were able to establish and value close friendships (albeit in the online environment). The domain in which social connection occurs may be different, but the quality and function of the connections appear the same.

Although the results of Study 1 are interesting, the sample size for the study was small and the sample consisted only of college students. In addition, participants were allowed to self-select as a gamer or non-gamer, which could have blurred the distinction between the groups. Last, Study 1 only examined the relationship between gamer/non-gamer status and happiness

score, neglecting to include other important personality variables that have been linked to friendship qualities, such as anxiety and depression. In order to address these concerns, a second sample was collected, which is presented as Study 2.

STUDY 2

Based on the results of Study 1, a second study was conducted. The purpose of the second study was to increase the sample size and collect data from a general young adult population, rather than a specific college sample. Study 2 also addressed some of the weaknesses of the first study, including a refinement of how the gamer versus non-gamer groups were categorized and the addition of several measures of personality that have been used in studying the psychological correlates of friendship. The following hypotheses were tested in Study 2:

H$_1$: There will be no difference between online friendship scores and offline friendship scores within the gamer group.

H$_2$: Offline friendship scores in the non-gamer group will be higher than online friendship scores in the non-gamer group.

H$_3$: There will be differences in online friendship scores and offline friendship scores between the gamer group and the non-gamer group. It is predicted that online friendship qualities will be higher in the gamer than non-gamer group. Furthermore, offline friendship qualities will be higher in the non-gamer than gamer group.

H$_4$: Higher overall friendship scores for both offline and online friendships will be positively correlated with individual happiness and negatively correlated with anxiety and depression.

$\underline{H_5}$: There will be no difference in happiness, depression, or anxiety levels between the gamer group and the non-gamer group.

Method

Participants

Participants were recruited using mTurk and were paid for their participation. The final sample for study 2 included 521 individuals. The total response set was comprised of 600 individuals, however 79 surveys (13%) were eliminated due to incomplete responses, response patterns showing no variability (e.g. participants responded '1' to all items), or because non-binary gender was chosen. The number of participants who selected non-binary for gender was too small for accurate analysis and so those cases were removed from analysis. Table 3 below provides complete demographic information about participants. For study 2, individuals were placed in gamer/non-gamer groups using modified criteria. Study 1 allowed self-selection into categories. For study 2, in order to be placed in the gamer group, one had to self-identify as a gamer <u>and</u> play online games 5 hours a week or more.

Table 3

Demographic Information for Gamer and Non-Gamer Groups

	Gamer Group	Non-Gamer Group
Demographic Items	Mean (SD)	Mean (SD)
Participant Age	25.17 (6.48)	27.27 (6.15)
Participant Gender	113 Female 280 Male	72 Female 56 Male

Hours Spent Gaming Online per Week	14.96 (13.20)	6.89 (9.54)
Demographic Information About Online Friend		
Length of Friendship in Years	6.28 (6.03)	5.67 (5.43)
Age of Online Friend	25.74 (5.52)	27.67 (8.15)
Gender of Online Friend	109 Females 276 Males	51 Females 77 Males
Frequency of Interaction with Online Friend in Online Mode	3.54% 0 to 1 time per year 10.35% 2 to 5 times per year 9.09% 1 to 2 times per month 17.42% 3 to 5 times per month 37.38% 2 to 5 times per week 22.22% More than once a day	4.58% 0 to 1 time per year 9.92% 2 to 5 times per year 15.27% 1 to 2 times per month 20.61% 3 to 5 times per month 31.30% 2 to 5 times per week 22.22% More than once a day
Frequency of Interaction with Online Friend in Offline Mode	29.04% 0 to 1 time per year 17.42% 2 to 5 times per year 12.63% 1 to 2 times per month 14.65% 3 to 5 times per month 17.17% 2 to 5 times per week 9.09% More than once a day	35.88% 0 to 1 time per year 16.79% 2 to 5 times per year 10.69% 1 to 2 times per month 13.74% 3 to 5 times per month 10.69% 2 to 5 times per week 11.45% More than once a day
Mode of Online Interaction with Online Friend (participants were allowed to choose more than one mode)	73.99% Online Games 61.87% Texting 42.93% Social Media 40.40% Voice Chat	84.73% Texting Online 64.12% Social Media 42.93% Online Games 27.48% Voice Chat

	17.68% Video Chat	20.61% Video Chat
	3.78% Email	17.34% Email
Demographic Information about Offline Friend		
Length of Friendship in Years	9.13 (7.09)	9.63 (6.38)
Age of Offline Friend	24.31 (7.59)	26.37 (7.57)
Gender of Offline Friend	160 Females 226 Males	62 Females 63 Males
Frequency of Interaction with Offline Friend in Online Mode	4.29% 0 to 1 time per year 13.13% 2 to 5 times per year 13.89% 1 to 2 times per month 17.93% 3 to 5 times per month 28.79% 2 to 5 times per week 21.97% More than once a day	7.63% 0 to 1 time per year 12.98% 2 to 5 times per year 14.50% 1 to 2 times per month 18.32% 3 to 5 times per month 21.37% 2 to 5 times per week 25.19% More than once a day
Frequency of Interaction with Offline Friend in Offline Mode	4.80% 0 to 1 time per year 15.91% 2 to 5 times per year 18.94% 1 to 2 times per month 21.21% 3 to 5 times a month 22.73% 2 to 5 times per week 16.41% More than once a day	12.21% 0 to 1 time per year 14.50% 2 to 5 times per year 15.27% 1 to 2 times per month 19.08% 3 to 5 times a month 15.27% 2 to 5 times per week 22.14% More than once a day

Measures

Participants completed the McGill Friendship Questionnaire (Mendelson & Aboud, 2014) and the Oxford Happiness Questionnaires (Hills & Argyle, 2002). The information about these scales was reported in Study 1 above. Additionally, participants completed a measure of anxiety and depression.

DASS-21 (Lovibond & Lovibond, 1995): The DASS-21 is a 21 item measure of depression, anxiety and stress, although the present study only used the depression and anxiety scores from this scale in Study 2. The anxiety and depression subscales of the DASS-21 are 7 items each and participants respond to statements based on a 4 point Likert scale ranging from 0 - did not apply to me at all to 3 – applied to me very much for most of the time. Responses to the items on each subscale are summed and then multiplied by 2, with possible scores ranging from 0-42. A normal depression score on the DASS-21 is 0 to 9, indicating little or no depression, with a score of 28 or higher indicating severe depression. A normal anxiety score is 0 to 7, with a score of 20 or above an indicator of extreme anxiety. The mean depression score for the present sample was 9.265 with scores ranging from 0 to 21. The mean anxiety score for the present sample was 8.800 with scores ranging from 0 to 21. Reliability and validity information for the DASS-21 when used with young adults can be found at Osman, Wong, Bagge, Freedenthal, Gutierrez & Lozano (2012).

For this sample, the DASS-21 Depression subscale had a Cronbach alpha score of .89, and the Anxiety subscale had a Cronbach alpha of .87. The happiness measure had a Cronbach alpha score of .78. The Cronbach alphas for the McGill Friendship Questionnaire subscales were .88 for Companionship, .88 for Help, .91 for Intimacy, .91 for Reliable Alliance, .89 for Emotional Security, and .89 for Self-Validation. Thus, all measures used in the present study showed adequate internal reliability.

Procedure

The survey for the present study was posted on mTurk in spring 2019 for a total of 35 days. Recruitment described the study as a survey focused on friendship in online environments, specifying that respondents be between 18 to 30 years of age. After reading and completing the consent form, participants responded to the demographic survey, followed by the McGill Friendship Questionnaire (Mendelsohn & Aboud, 2014), the Oxford Happiness Questionnaire (Hills & Argyle, 2002) and the DASS-21 (Lovibond & Lovibond, 1995). All participants were asked to complete the McGill Friendship Questionnaire twice; once for their closest online friend and one for their closest offline friend. Definitions provided for the closest online and offline friends were the same as used in Study 1.

<div align="center">**Results**</div>

Hypotheses 1-3 in Study 2 examined within and between group differences on all friendship subscales for the gamer and non-gamer groups. A fully factorial MANCOVA was conducted to examine overall between group and within group differences on the 6 friendship subscales for both online and offline friendships using gender as the control variable. Box's test for homogeneity of variance was significant ($p < 0.05$). Due to inequality of variances, the alpha level was set at p<.01. Results of the MANCOVA found significant differences in friendship scale scores between gamers and non-gamers, F (6, 1036) = 4.148, p<.001, Wilk's Λ = .931, partial eta-squared = .024, observed power = .99. Within groups differences were also found to be significant when considering gender as a control variable , F (6, 1036) = 3.672, p=.001, Wilk's Λ = .979, partial eta-squared = .021, and observed power = .960.

Post-hoc tests were then conducted to examine specific between and within group differences on each of the 6 friendship subscales for both online and offline friendships using Bonferroni Correction. Results of this analysis are presented in Table 4.

Table 4

Post Hoc Comparisons for Gamer and Non-Gamer Online and Off-Line Friendship Qualities

	Group			
	Gamer Online	Gamer Offline	Non-Gamer Online	Non-Gamer Offline
Friendship Qualities	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Help	5.43 (1.63) a	5.99 (1.54) a	5.45 (1.72) b	6.42 (1.54) a b
Intimacy	5.41 (1.83) a	5.93 (1.71) a b	5.44 (1.92) b	6.46 (1.61) a
Reliable Alliance	5.93 (1.67) a	6.23 (1.64) a b	5.91 (1.65) b	6.66 (1.60) a b
Emotional Security	5.55 (1.63) a	5.93 (1.64) a	5.52 (1.72)	6.41 (1.53) a
Companionship	6.00 (1.47) a	6.15 (1.51) b	6.01 (1.57) c	6.53 (1.40) a b c
Self-Validation	5.60 (1.58) a	5.89 (1.58)	5.69 (1.61) b	6.29 (1.47) a b

Note. Those means sharing subscripts are significantly different from each other at $p<.05$

Hypothesis 1 predicted that gamer offline friendship quality scores would not different from their online friendship scores. Results indicated that gamers' offline friendships scored

significantly higher on the qualities of help, intimacy, reliable alliance and emotional security, than their online friendships. No differences were found for the qualities of companionship or self-validation. Hypothesis 1 was partially supported.

Hypothesis 2 predicted that offline friendship scores in the non-gamer group would be higher than online friendship scores in the non-gamer group. Results showed that non-gamers rated their offline friendships significantly higher than their online friendships for the qualities of help, reliable alliance, companionship and self-validation only. Hypothesis 2 was partially supported.

A review of these results also found few significant differences between gamer offline and non-gamer offline friendships qualities. Likewise no significant differences were found between gamer online friendship qualities and non-gamer online friendship qualities. These two sets of findings are contrary to what was predicted by Hypothesis 3.

Relationships among Friendship Qualities and Personality Variables

It was hypothesized (Hypothesis 4) that higher overall friendship scores for both offline and online friendships would be positively correlated with individual happiness and negatively correlated with anxiety and depression. Partial correlations controlling for gender with Bonferroni correction were used to examine this hypothesis. Results found that happiness was positively and significantly correlated with all six offline friendship variables, while anxiety and depression were negatively and significantly correlated with all six offline friendship variables. For online friendships, happiness was positive and significantly correlated with companionship, help, reliable alliance, and self-validation, but was uncorrelated with intimacy and emotional security. The online friendship qualities of companionship, reliable alliance, and self-validation

were significantly and negatively correlated with depression and anxiety. All correlations are

presented in Table 5.

Table 5

Correlations among Friendship Qualities and Personality Variables

	Happiness	Depression	Anxiety
Offline Friendships			
Companionship	.17**	-.24**	-.27**
Help	.17**	-.19**	-.20**
Intimacy	.14**	-.22**	-.26**
Reliable Alliance	.13**	-.22**	-.31**
Emotional Security	.18**	-.22**	-.25**
Self-Validation	.17**	-.22**	-.22**
Online Friendships			
Companionship	.11**	-.14**	-.17**
Help	.09*	-.09*	-.03
Intimacy	-.01	-.05	-.03
Reliable Alliance	.08*	-.16**	-.20**
Emotional Security	.04	-.07	-.05
Self-Validation	.07*	-.09*	-.11**

N=520, * P<.05, ** P<.01

Group differences in personality variables. Hypothesis 5 stated that there would be no difference in happiness, depression or anxiety levels between the gamer group and the non-gamer group. Between group *t*-tests were used to examine this hypothesis, and the results showed no significant group differences on any of the three personality variables.

Discussion

The present study provided a comprehensive examination of the characteristics and correlates of online and offline friendships in two groups: a group of gamers and a group who used online resources to interact with others, but who were not identified as gamers. The results of the study provide a greater understanding of what online and offline friendships look like for both groups. Demographic information showed great similarity in the characteristics of online and offline friendships. Online and offline friendships tended to be long term (> 5 years) in duration, with individuals of the same age and gender as the participants. Online friendships had frequent online contacts, typically 3-5 times a month or more with the majority of participants connecting with their friend 2-5 times a week or more. Offline friendships had similar norms for connecting with the closest friend in both gamer and non-gamer groups, although the length of acquaintance with the closest offline friend was longer in duration than the online friend for both gamers and non-gamers. It can be concluded from this information that online and offline friendships are present in both gamers and non-gamers and that they are robust in terms of their duration and the amount of contact the participants had with their friends.

The study also examined if there were differences in the qualities of online and offline friendships within and between gamer and non-gamer groups. Study 1 explored this question for a group of college students. In study 1, it appeared that online friendships in gamers were strong

and positive in quality and corresponded most closely with offline friendships in non-gamers. However, the sample for study 1 was small and reflected only a college-age group. In study 2, a larger and broader sample of young adults was collected, and the friendship qualities compared again. In the second study, results were somewhat different. We found no significant differences between gamer and non-gamer offline friendships qualities or between gamer and non-gamer online friendship qualities. Within both groups, offline friendships were rated higher than online friendships on only a subset of friendship qualities, although it should be noted that the means of all friendship qualities for both types of friendship were quite high, showing mean scores greater than 5.0 with the highest possible mean rating being a 7.0.

The results of study 2 point to the important place both offline and online friendships now hold in the lives of young adults. Although the results attest to the presence and positive quality of online friendships, offline friendships still tend to be of somewhat higher quality, as well as longer duration. It does not appear that gamers or non-gamers are abandoning face to face interactions with those closest to them. Instead, they have kept their offline friendships and added online friendships. In both types of friendships, online and face to face contacts are used to maintain the connection between parties.

The current study also examined how online and offline friendships related to personality variables, as well as if gamers and non-gamer differed in happiness, anxiety, and depression. The strongest correlations between personality and friendship qualities were found for offline friendships, and it appears that higher positive friendship qualities are related positively to happiness, but negatively to depression and anxiety. This finding speaks to the strength of positive friendships in the life of young adults, as one possible buffer against the common but negative conditions of anxiety and depression. Online friendship qualities were, in general,

positively related to happiness and negatively to anxiety and depression, but the correlations were weaker and for some important qualities, like intimacy and emotional security were not present at all. It may be that online friendships provide some personality benefits, but not in as comprehensive a manner as offline friendships. We also do not know how these results may apply to individuals for whom social interactions present challenges, such as those with communication disorders or on the autism spectrum. Durkin (2010) makes the case for more research about social interactions and videogaming in people struggling with developmental disorders, so this may be a fruitful line of inquiry.

Results also showed that general life happiness did not vary between gamers and non-gamers. In addition, Study 2 found depression or anxiety levels were not significantly different between gamers and non-gamers. It would seem, when coupled with the finding that both groups could establish and value close friendships online and offline, that worry over gamers being socially isolated, unable to form social connections, and suffering psychologically is not supported.

There is no doubt that online environments are popular and include opportunities for social interaction that can be both positive and negative. It is also clear that more research needs to be done to understand the qualities of social relationships that develop in online environments and how those compare to traditional face to face relationships.

Follow-up research related to gamer and non-gamer friendships and social connections could take many forms to enhance our understanding of this phenomenon. A recently published article by Nowland, Necka & Cacioppo (2018) focused on loneliness in the online world. The present study only examined perceived happiness, anxiety, and depression in gamer and non-gamer groups, however, exploring how loneliness relates to online and offline friendships in

gamers and non-gamers would be a valuable avenue to pursue. Additionally, it would also be valuable to see how this finding varies by personal qualities of gamers and non-gamers, such as gender, age, or the amount of time spent immersed in online environments. A final avenue of research that could be explored is examining how online friendships function in virtual reality vs. non-VR online environments. vs. face to face environments. We know very little about social functioning in virtual reality, even though this form of online entertainment is quickly growing in popularity (Lessick & Kraft, 2017; Loureiro, Guerreiro, Eloy, Langaro, & Panchapakesan, 2018). While the present study provides some intriguing information about friendship quality in young adults, and the results are optimistic about online social interactions, follow-up research will be important to fully understand both online and offline friendship dynamics.

Conflict of interest statement

On behalf of all authors, the corresponding author states that there is no conflict of interest. No funding was provided by any agency, government or private, to conduct this study.

Ethical Approval Statement

The current study was approved by Embry-Riddle Aeronautical University's Institutional Review Board. Approval number was 19-110.

Informed Consent

Informed consent was obtained from all individual participants included in the study. At the beginning of the online survey, the Consent Form was given. The consent form was prepared by specified IRB guidelines and approved as part of the overall IRB review. Each participant was asked if they understood the Consent Form and provided agreement with the terms.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

Aboud, F. E., & Mendelson, M. J. (1996). Determinants of friendship selection and quality: Developmental perspectives .In A.F. Newcomb, W. M. Bukowski, & W. W. Hartup (Eds.), *Friendship in children and adolescents.* Cambridge: Cambridge University Press.

Aboud, F. E., & Mendelson, M. J. (November, 1992). *Measurement and determinants of friendship quality.* Invited address to Conference on Friendship in Childhood and Adolescence, Montreal, Quebec.

American Psychological Association (2020). Resolution on violent video games. February 2020 revision to the 2015 resolution. Retrieved from: https://www.apa.org/news/press/releases/2020/03/violent-video-games-behavior

American Psychological Association (2015a). Resolution on violent video games. Retrieved from: http://www.apa.org/about/policy/violent-video-games.aspx.

American Psychological Association (2015b). APA review confirms link between playing violent video games and aggression. Retrieved from: http://www.apa.org/news/press/releases/2015/08/violent-video-games.aspx.

American Psychological Association (2005). APA Council deliberations from the 2005 Video Game Resolution. Retrieved FROM: https://www.scribd.com/document/325420128/APA-Council-Deliberations-from-the-2005-Video-Game-Resolution.

Asher S.R., Parker J.G. (1989). Significance of peer relationship problems in childhood. In: Schneider B.H., Attili G., Nadel J., Weissberg R.P. (eds) *Social Competence in Developmental Perspective. NATO ASI Series (Series D: Behavioural and Social Sciences), vol 51.* Springer, Dordrecht.

Bonenfant, M., Lafrance St-Martin, L. I., Prégent, F., & Crémier, L. (2018). Social systems and behavioral norms: The comparative case study of Guild Wars II and League of Legends. *Social Interaction in Virtual Worlds*, 130-161.

Bradshaw, K. M. & Saha, S. (2010). Academic administrators and the challenge of social networking sites. In Levmore, S., & Nussbaum, M. (Eds.), *The offensive Internet: Speech, privacy, and reputation*. Cambridge, MA, US: Harvard University Press.

Buhrmester, D. (1990). Intimacy of friendship, interpersonal competence, and adjustment during preadolescence and adolescence. *Child Development, 61*,1101-1111.

Buhrmester, D., & Furman, W. (1987). The development of companionship and intimacy. *Child Development, 58*,1101-1113.

Bukowski, W. M., Hoza, B., & Boivin, M. (1994). Measuring friendship quality during pre- and early adolescence: The development and psychometric properties of the Friendship Qualities Scale. *Journal of Social and Personal Relationships,11*,471-484.

Carras, M. C., Porter, A. M., Van Rooij, A.J., King, D., Lange, A., Carras, M., & Labrique, A. (2017). Gamers' insights into the phenomenology of normal gaming and game "addiction": A mixed methods study. *Computers in Human Behavior, 79,* 238 – 246.

Copenhaver A. & Ferguson, C. J. (2018). Selling violent video game solutions: A look inside the APA's internal notes leading to the creation of the APA's 2005 resolution on violence invideo games and interactive media. *International Journal of Law and Psychiatry 57*, 77–84. Https://doi.org/10.1016/j.ijlp.2018.01.004

Demir, M., & Weitekamp, L. A. (2007). "I am so happy cause today I found my friend: Friendship and personality as predictors of happiness": Erratum. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being, 8*(2), 213. https://doi.org/10.1007/s10902-006-9034-1

Demir, M., Özen, A., & Doğan, A. (2012). Friendship, perceived mattering and happiness: A study of American and Turkish college students. *The Journal of Social Psychology*, *152*(5), 659-664.

Diener, E., Kesebir, P., & Tov, W. (2009). *Happiness.* In M. R. Leary & R. H. Hoyle (Eds.), *Handbook of individual differences in social behavior* (p. 147–160). The Guilford Press.

Diener, E., Lucas, R. E., & Oishi, S. (2002). Subjective well-being: The science of happiness and life satisfaction. *Handbook of Positive Psychology*, *2*, 63-73.

Ditchthelabel.org (2017). In:Game abuse: The extent and nature of online bullying within digital gaming environments. Retrieved from https://us.ditchthelabel.org/wp-content/uploads/sites/2/2017/05/InGameAbuse.pdf May 22, 2018.

Domahidi, E., Festl, R., & Quandt, T. (2014). To dwell among gamers: Investigating the relationship between social online game use and gaming-related friendships. *Computers in Human Behavior, 35*, 107-115.

Domahidi, E. Breuer, J., Kowert, R., Festl, R., & Quandt, T. (2016). A longitudinal analysis of gaming - and non-gaming- related friendships and social support among social online game players. *Media Psychology*, DOI: 10.1080/15213269.2016.1257393

Durkin, k. (2010). Videogames and young people with developmental disorders. *Review of General Psychology, 14* (2), 122-140.

Ferguson, C. J., & Wang, J. C. (2019). Aggressive video games are not a risk factor for future aggression in youth: A longitudinal study. *Journal of Youth and Adolescence*, *48*(8), 1439-1451.

Ferguson, C.J. & Coperhaver, A. & Markey, P. (2020). Reexamining the findings of the American Psychological Association's 2015 Task Force on Violent Media: A Meta-Analysis. *Perspectives in Psychological Science, 15* (4), 1-21.

Elson, M., Ferguson, C. J., Gregerson, M., Hogg, J. L., Ivory, J., Klisanin, D., ... & Wilson, J. (2019). Do policy statements on media effects faithfully represent the science?. *Advances in Methods and Practices in Psychological Science*, *2*(1), 12-25.

Griffiths, D. M., Hussain, Z., Grusser, M. S., Thalemann, R., Cole H., Davies, N.O. M., & Chappell, D. (2011). Social interactions in online gaming. *International Journal Of Game-Based Learning, 1*(4), 20-36.

Hills, P., & Argyle, M. (2002). The Oxford Happiness Questionnaire: a compact scale for the measurement of psychological well-being. *Personality and Individual Differences, 33*, 1073-1082.

Hu, C., Kumar, S., Huang, J., & Ratnavelu, K. (2017). Disinhibition of negative true self for identity reconstructions in cyberspace: Advancing self-discrepancy theory for virtual setting. *PLoS ONE, 12*(4), Article e0175623. https://doi.org/10.1371/journal.pone.0175623

Hussain, Z., & Griffiths, M. D. (2014). A qualitative analysis of online gaming: social interaction, community, and game design. *International Journal of Cyber Behavior, Psychology, and Learning, 4*(2), 41-57.

King, D. L., Delfabbro, P. H., & Griffiths. M. D. (2013). Trajectories of problem video gaming among adult regular gamers: an 18-month longitudinal study. *Cyberpsychology, Behavior & Social Networking, 16* (1).

Kowert, R., Domahidi, E., Festl, R., & Quandt, T. (2014). Social gaming, lonely life? The impact of digital game play on adolescents' social circles. *Computers in Human Behavior, 36*, 385-390.

Kowert, R., Domahidi, E., & Quandt, T. (2014). The Relationship between online video game involvement and gaming-related friendships among emotionally sensitive individuals. *Cyberpsychology, Behavior, and Social Networking, 17*(7), 447-453.

Kowert, R., & Oldmeadow, J. A. (2013). A social reputation: Exploring the relationship between online video game involvement and social competence. *Computers in Human Behavior, 29*, 1872-1878.

Kowert, R., & Oldmeadow, J. A. (2015). Playing for social comfort: online video game play as a social accommodator for the insecurely attached. *Computers in Human Behavior, 53*, 556-566.

La Greca, A. M., & Harrison, H. M. (2005). Adolescent peer relations, friendships, and romantic relationships: Do they predict social anxiety and depression?. *Journal of Clinical Child and Adolescent Psychology*, *34*(1), 49-61.

Lessick, S., & Kraft, M. (2017). Facing reality: the growth of virtual reality and health sciences libraries. *Journal of the Medical Library Association. 105* (4), 407-417. doi:http://dx.doi.org.ezproxy.libproxy.db.erau.edu/10.5195/jmla.2017.329

Levine, D. T., & Stekel, D. J. (2016). So why have you added me? Adolescent girls' technology-mediated attachments and relationships. *Computers in Human Behavior, 63,* 25–34. https://doi.org/10.1016/j.chb.2016.05.011

Life Course Associates (2014). The new face of gamers. Retrieved from http://www.lifecourse.com/assets/files/The%20New%20Face%20of%20Gamers_June_2014.pdf, May 22, 2018.

Liu, D., Li, X., & Santhanam, R. (2013). Digital games and beyond: what happens when players compete? *MISQ, 37*(1), 111-124.

Loureiro, S.M.C., Guerreiro, J., Eloy, S., Langaro, D., & Panchapakesan, P. (2018). Understanding the use of Virtual Reality in Marketing: A text mining-based review. *Journal of Business Research*, *100*, 514-530. Doi : https://doi.org/10.1016/j.jbusres.2018.10.055

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour research and therapy*, *33*(3), 335-343.

Lyubomirsky, S., Tkach, C., & DiMatteo, M. R. (2006). What are the differences between happiness and self-esteem. *Social indicators research*, *78*(3), 363-404.

Marino, C., Vieno, A., Pastore, M., Albery, I. P., Frings, D., & Spada, M. M. (2016). Modeling the contribution of personality, social identity and social norms to problematic Facebook use in adolescents. *Addictive behaviors, 63*, 51–56. https://doi.org/10.1016/j.addbeh.2016.07.001

Mendelson, M. J. & Aboud, F. (2014). McGill Friendship Questionnaire- Friendship Functions. Available from Measurement Instrument Database for the Social Science. Retrieved from http://www.midss.org/mcgill-friendship-questionnaire-friendship-functions

Moncur, W., Orzech, K. M., & Neville, F. G. (2016). Fraping, social norms and online representations of self. *Computers in Human Behavior, 63*, 125-131. DOI: 10.1016/j.chb.2016.05.042

Nie, N. H. (2001). Sociability, interpersonal relations, and the Internet: Reconciling conflicting findings. *The American Behavioral Scientist, 45*(3). 420-435.

Nowland, R., Necka, E. A., & Cacioppo, J. T. (2018). Loneliness and social internet use: pathways to reconnection in a digital world. *Perspectives on Psychological Science, 13*(1), 70-87.

Osman, A., Wong, J. L., Bagge, C. L., Freedenthal, S., Gutierrez, P. M., & Lozano, G. (2012). The depression anxiety stress Scales—21 (DASS-21): further examination of dimensions, scale reliability, and correlates. *Journal of Clinical Psychology*, *68*(12), 1322-1338.

PaaBen, B., Morgenroth, T., & Stratemeyer, M. (2017). What is a true gamer? The male Gamer stereotype and the marginalization of women in video game culture. *Sex Roles, 76*, 421-435.

Page-Gould, E., Mendoza-Denton, R., & Tropp, L. R. (2008). With a little help from my cross-group friend: Reducing anxiety in intergroup contexts through cross-group friendship. *Journal of Personality and Social Psychology, 95*(5), 1080–1094. https://doi.org/10.1037/0022-3514.95.5.1080

Pankoke-Babatz, U., & Jeffrey, P. (2002). Documented Norms and Conventions on the Internet, *International Journal of Human-Computer Interaction, 14*:2, 219-235.

Parker, J. G., & Asher, S. R. (1989). Friendship Quality Questionnaire-Revised: instrument and administration manual. University of Michigan.

Pew Research Center (2018a). Social media fact sheet. Retrieved from http://www.pewinternet.org/fact-sheet/social-media/ on May 22, 2018.

Pew Research Center (2018b). The future of well-being in a tech-saturated world. Retrieved from http://www.pewinternet.org/2018/04/17/the-future-of-well-being-in-a-tech-saturated-world/ on May 22, 2018.

Pierce, T. (2009). Social anxiety and technology: Face-to-face communication versus technological communication among teens. *Computers in Human Behavior, 25*, 1367-1372.

Primack, B. A., Shensa, A., Escobar-Viera, C. G., Barrett, E. L., Sidani, J. E., Colditz, J. B., & James, A. E. (2017). Use of multiple social media platforms and symptoms of depression and anxiety: A nationally-representative study among US young adults. *Computers in human behavior*, *69*, 1-9.

Ramirez, F. A. (2018). From Good Associates to True Friends: An Exploration of Friendship Practices in Massively Multiplayer Online Games. *Social Interactions in Virtual Worlds*, 62–79. https://doi.org/10.1017/9781316422823.004multiplayer online games.

Rodebaugh, T. L., Lim, M. H., Shumaker, E. A., Levinson, C. A., & Thompson, T. (2015). Social Anxiety and Friendship Quality over Time. *Cognitive Behaviour Therapy, 44*(6), 502–511. https://doi.org/10.1080/16506073.2015.1062043

Sivunen, A., & Hakonen, M. (2011). Review of virtual environment studies on social and group phenomena. Los Angeles, CA: SAGE Publications. doi:10.1177/1046496410388946

Sherblom, J. C., Withers, L. A., Leonard, L. G., & Smith, J. S. (2018). Virtual Team Communication Norms: Modeling the Mediating Effects of Relational Trust, Presence, and Identity on Conversational Interactivity, Openness, and Satisfaction. *Social Interactions in Virtual Worlds*, 103–129. https://doi.org/10.1017/9781316422823.006

Shen, C., & Williams, D. (2010). Unpacking Time Online: Connecting Internet and MMO use with Psycho-social Well-being. *Communication Research, 38*(1), 123-149.

Selfhout, M. H., Branje, S. J., Delsing, M., ter Bogt, T. F., & Meeus, W. H. (2009). Different types of Internet use, depression, and social anxiety: the role of perceived friendship quality. *Journal of adolescence, 32*(4), 819–833. https://doi.org/10.1016/j.adolescence.2008.10.011

Trepte, S., Reinecke, L. and Juechems, K. (2012). The social side of gaming: How playing online computer games creates online and offline social support. *Computers in Human Behavior, 28*(3), 832-839.

Vannucci, A., Flannery, K. M., & Ohannessian, C. M. C. (2017). Social media use and anxiety in emerging adults. *Journal of Affective Disorders, 207*, 163–166. https://doi.org/10.1016/j.jad.2016.08.040

Vossen, H.G., & Valkenburg, P.M. (2016). Do social media foster or curtail adolescents' empathy? A longitudinal study. *Computers in Human Behavior, 63*, 118-124.

Williams, D. (2006). Groups and goblins: the social and civic impact of an online game. *Journal of Broadcasting & Electronic Media, 50* (4), 651-670.

Yee, N., Bailenson, J. N., Urbanek, M., Chang, F. and Merget, D. 2007. The unbearable likeness of being digital: The persistence of nonverbal social norms in online virtual environments. T*he Journal of Cyberpsychology and Behavior, 10*: 115–121.