



Social network use and personality

Yair Amichai-Hamburger^{a,*}, Gideon Vinitzky^b

^aThe Research Center for Internet Psychology (CIP), Sammy Ofer School of Communication, Interdisciplinary Center (IDC), Herzliya, Israel

^bDepartment of Economics and Business Management, Ariel University Center of Samaria, Israel

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ABSTRACT

Studies have shown a connection between the individual personality of the user and the way he or she behaves on line. Today many millions of people around the world are connected by being members of various Internet social networks. Ross et al. (2009) studied the connection between the personality of the individual users and their behavior on a social network. They based their study on the self-reports of users of Facebook, one of the most popular social networks, and measured five personality factors using the NEO-PI-R (Costa & McCrae, 1992) questionnaire. They found that while there was a connection between the personalities of surfers and their behavior on Facebook, it was not strong. This study is based on that of Ross et al. (2009), but in our study the self-reports of subjects, were replaced by more objective criteria, measurements of the user-information upload on Facebook. A strong connection was found between personality and Facebook behavior. Implications of the results are discussed.

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1. Introduction

The Internet is a worldwide decentralized network of computers that today has a far-reaching influence and may affect almost all aspects of our existence. In fact, the Internet has integrated so well into people's lives that, for many, it is very difficult to imagine how they lived without it. One aspect of our daily existence where the Internet has introduced major changes is our social lives (Amichai-Hamburger, Wainapel, & Fox, 2002; Hamburger & Ben-Artzi, 2000). The Internet is a leading social arena where people can meet others and interact. Social life on the Internet initially comprised social tools, such as chat forums and newsgroups. Today it has developed many additional components, such as blogs, fantasy environments, and social networks (Amichai-Hamburger, 2005; Amichai-Hamburger & Barak, 2009).

One of the fastest growing and most popular of such sites is the social network. It is defined as a web-based service that allows individuals to: (1) construct a profile within an organized framework; (2) generate a list of other users with whom they share a connection; and (3) navigate their own list of connections and view those made by others within the system (Boyd & Ellison, 2007). Typically, the social network is utilized to sustain existing offline relationships or support offline connections, as opposed to meeting new people. These relationships may be based on frail ties, but typically there is some common offline connection among individuals (Ellison, Steinfield, & Lampe, 2007).

1.1. Impression management in social networks

Impression management (IM) refers to the attempt to control information in order to affect others' opinions of us (Goffman, 1959). As Shakespeare eloquently explained: "All the world is a stage, and all the men and women merely players" (1564–1616 reprinted 1978, p. 287). Erving Goffman (1959), it seems, would agree. He writes that the actor, shaped by the environment and target audience, sees the interaction as a performance. The objective of the performance is to provide the audience with an impression consistent with the desired goals of the actor. Boyd (2007) suggested that in the social network arena it seems that the individual "profile can be seen as a form of *digital body* where individuals must write themselves into being" (p. 131). Sundén (2003) suggested that people frequently reproduce themselves on the Internet so that others may see them and communicate with them.

While social networks request that users construct truthful representations of themselves, they actually do so with varying degrees of accuracy. In fact, Marwick (2005) who studied such users, basing his findings on three different social networking sites, reported that participants had developed complex strategies for negotiating the rigidity of the prescribed "authentic" profile. In other words, people on Facebook and other social networks do not so much as lie, but rather stretch the truth (sometimes to its outer limits).

One of the IM tools available on social networks is the acceptance, or otherwise, by users of other users wishing to be their "friends". Their choice of whom to accept (or reject) reflects a significant part of their ongoing effort to project the "right" image to the world (Donath & Boyd, 2004). As befits the slogan "tell me who

* Corresponding author. Tel.: +972 9 9527649; fax: +972 9 9527650.
E-mail address: yairah@idc.ac.il (Y. Amichai-Hamburger).

your friends are and I will tell you who you are,” people try to have the right list of friends in order to create the desired image of themselves. Zinman and Donath (2007) pointed out that this tendency sometimes causes people to loosen their criteria as to whom to accept as their “friend”.

On social networks, as part of their profiles, users frequently present varying numbers of photographs. This display is in addition to their cover picture. Zhao, Grasmuck, and Martin (2008) examined this phenomenon on Facebook, one of the most popular social networking sites, and found that, on average, Facebook sites display around 88 photos per user. The number of users who displayed their profile photos and wall posts was above 90%. While some created walls of privacy for themselves and their friends, most users were happy to put on public exhibition a broad range of photos, including those sent to them by others, mostly of themselves in the context of their friends and mostly showing happiness and enjoyment. It seems clear that the photos displayed on the individual profiles constitute an important way to project the image we wish to present to others.

1.2. Personality and social networks

Hamburger and Ben-Artzi (2000) suggested that Internet use is related to personality. They demonstrated that on the Internet “the poor can get richer,” namely, that introverts can compensate themselves for the difficulties they experience in offline social interactions (see also Amichai-Hamburger et al., 2002). According to Amichai-Hamburger (2002), personality is a leading factor in understanding why people behave the way they do on the Internet. Since the net, by its very nature, is powered by human interaction, it follows that we cannot understand the workings of the Internet without understanding the personalities of those who surf it (see also Amichai-Hamburger, 2005). This link between personality and Internet use has been demonstrated using a number of different personality theories, among them those of extroversion and neuroticism (Hamburger & Ben-Artzi, 2000); need for cognition (Amichai-Hamburger, Kinar, & Fine, 2007; Kinar & Amichai-Hamburger, 2008); need for closure (Amichai-Hamburger, Fine, & Goldstein, 2004) and sensation seeking (Lin & Tsai, 2002).

The relationship between personality and social networking was previously noted in a study of nostalgic websites carried out by Amichai-Hamburger, Kaplan, and Dorpatcheon (2008). They found that extroverted participants who frequently surfed nostalgic websites, made greater use of the social services found on the net, as compared with introverted subjects who used a lot nostalgic websites. However, introverts who did not use nostalgic websites were found to use the social services on the net more than those extroverts who did not use the nostalgic websites. Amichai-Hamburger and his colleagues suggested that when surfers’ foremost behavior on the net is surfing nostalgic websites where they interact with former offline friends, their pattern of social interaction offline is transferred to their behavior online. In this way, extroverts retain their offline social dominance when they are online. This is consistent with the rich-get-richer theory (Kraut et al., 1998). Conversely, among people who do not surf nostalgic websites and whose Internet behavior is more explorative, introverts are more likely to use the Internet as a compensative environment and this, in turn, may lead them to become more socially dominant on the net as compared with extroverts. This is consistent with the poor-get-richer theory (Hamburger & Ben-Artzi, 2000). It seems logical to assume that the behavior observed among users of Facebook, i.e., the transference of old friends from their offline world to online, demonstrates the dominance of extroverts.

The Five-Factor Model (FFM) is a broad classification of personality traits. The model separates the human personality into a ser-

ies of five dimensional traits (Costa & McCrae, 1992). The first trait, neuroticism, reflects a person’s tendency to experience psychological distress and high levels of this trait are associated with a sensitivity to danger. Extraversion, the second trait, reflects a tendency to be sociable and able to experience positive emotions. The third factor, openness to experience, represents an individual’s willingness to consider alternative approaches, be intellectually curious, and enjoy artistic pursuits. Agreeableness, the fourth factor, is another aspect of interpersonal behavior, reflecting a tendency to be trusting, sympathetic, and cooperative. The fifth dimension, conscientiousness, reflects the degree to which an individual is organized, diligent, and scrupulous.

The FFM has been applied in a number of recent studies assessing the Internet environment. For example, Guadagno, Okdie, and Eno (2008) employed it in their study of blogs. They found that people who are high in openness and high in neuroticism are likely to be bloggers. Additionally, the neuroticism relationship was moderated by gender indicating that women who are high in neuroticism are more likely to be bloggers as compared with those low in neuroticism, whereas no differences were found for men. These results indicate that personality factors impact on the likelihood of being a blogger and have implications for understanding who blogs. Amichai-Hamburger et al. (2008) also employed the Five-Factor Model when they assessed the personality profile of Wikipedia contributors. Their results revealed significant differences between Wikipedia members and non-Wikipedia members with regard to the factors of agreeableness, openness, and conscientiousness. These were found to be lower for the Wikipedia members as compared with non-Wikipedia members. Ross et al. (2009) suggested that Facebook use is related to personality. Using a Five-Factor Model personality questionnaire, they examined behavior on Facebook as reported by users. Their first five predictions pertained to the relationship between behavior and the user’s personality. They predicted that:

1. Due to their greater tendency to be sociable, individuals who scored higher on the trait of Extraversion would (a) demonstrate more frequent use of Facebook; (b) make greater use of Facebook components for communication; (c) have more “Facebook friends”; and (d) belong to more Facebook groups.
2. It was predicted that individuals who scored higher on the trait of Neuroticism would be more willing to share personally-identifying information on Facebook, spend more time on Facebook, and be less likely to use private messages, since they would be seeking to receive social support through Facebook.
3. People with an ability to engage in caring and meaningful interpersonal offline relationships and who scored higher on the trait of agreeableness were expected to have greater numbers of “Facebook friends” on their profile.
4. Those with a tendency to be curious and desirous of exploring new activities, who scored higher on the trait of openness to experience, were expected to be more willing to use Facebook as a communication tool and to use a greater number of components, resulting in greater knowledge of Facebook features.
5. Individuals who scored higher on the trait of Conscientiousness and who placed great importance on fulfilling their obligations and meeting deadlines were expected to demonstrate a more limited use of Facebook activities.

The results reported by Ross et al. (2009) gave partial support to the link between individual personality and Facebook behavior. The researchers did not find any significant connection between Facebook behavior and the personality factors of agreeableness and openness (Hypotheses 3 and 4). However, they did find a partial link between behavior on Facebook and the traits of extroversion, neuroticism, and conscientiousness.

It is important to point out that, although there was a strong basis for Ross et al.'s (2009) predictions, we suggest that a more effective research method would be to examine the way people build their profile on Facebook instead of relying on self-report questionnaires. This would have provided a more objective criterion than asking users about their individual behavior on Facebook, since these self-reports are likely to be influenced by social desirability. We would, therefore, suggest replicating Ross et al.'s assessments using the Facebook profiles which are less prone to bias.

We concurred with all of Ross et al.'s (2009) predictions, except their final one. In the case of prediction number 5, in contrast to Ross et al.'s prediction, we suggest that, in fact, individuals who scored higher on the trait of conscientiousness will reveal a larger number of friends. This is because conscientiousness involves high-target orientation which, in the context of the Facebook environment, involves striving for a greater number of friends.

2. Method

2.1. Participants

Data was collected from 237 students at an Israeli university. All were undergraduate students enrolled in the Department of Economics and Business Management. All participants received credit in their introductory courses for participating in the study. Participants comprised 101 males and 136 females with an average age of 22. Research suggests that university students form suitable samples for studies involving the Internet because they tend to be frequent users, including regular use of a variety of CMC functions (Pornsakulvanich, Haridakis, & Rubin, 2008). In Israel about two million people use Facebook which is about third of the population. The assessments typically lasted 30–45 min.

2.2. Procedure and measurements

The study consisted of two sequential phases held over a two month period. All participants were requested to complete the NEO-PI-R, a self-report measure, in order to assess personality along the domains of the Five-Factor Model. The NEO-PI-R (Costa & McCrae, 1992) is a widely used self-report measure of the Five-Factor Model of personality. It is broken down into five domains, or factors, each of which has six facet scores (each facet comprising eight items). The NEO-PI-R contains 240 items which are scored on a five-point Likert scale from “strongly agree” 1 to “strongly disagree” 5. Reliability for the five factors is acceptable (from $\alpha = .78$ to $\alpha = .91$).

In the next phases, user-information upload on Facebook was measured and encoded. Based on the Facebook profile setup, four dimensions of Facebook users were created, namely: *Basic information*, *personal information*, *contact information* and *education*, and *work information*. *Basic information* included information which users upload to Facebook concerning gender, birth dates, hometown, home neighborhood, family members, family status (single, engaged, married, etc.), the type of relationship the user is seeking (friendship, dating, random play, etc.), political views, and religious views. *Personal information* included activities, interests, favorite music, favorite TV shows, favorite movies, favorite books, favorite quotations, and about me. *Contact information* included email, IM (Immediate message) screen name, mobile phone, land phone, address, city/town, neighborhood, zip code, and website. *Education and work information* included information about university, focus, degree, high school, employer, position description, city/town, and time period.

The encoding of information upload on Facebook was based on the method devised by Zhao et al. (2008). The coding scheme cov-

ered virtually all major items that can be found in a Facebook account (see Appendix 1). Using this coding scheme the contents of the resulting Facebook accounts were numerically recorded by a specially trained graduate research assistant. In addition, the sum of all information uploads regarding each dimension of the Facebook profile (i.e., basic information, personal information, contact information, education and work) was calculated. However, since only four participants provided information regarding contact information, this dimension was removed from the analysis.

3. Results

In order to investigate personality features, groups were created by dividing each personality domain into equal thirds. The NEO-PI-R domain scores cutoffs for each personality domain are listed in Table 1. Only the upper and lower thirds were analyzed and all scores were within three standard deviations from the mean. Such a test allows for greater statistical sensitivity in searching for group differences, especially given our sample size (see Ross et al., 2009).

Hypothesis 1 suggests that individuals in the highly extroverted group will demonstrate a higher number of friends and would belong to more Facebook groups than individuals in the least extroverted group. In order to examine the effect of extroverted personality on Facebook use, two analysis of covariance (ANCOVA) were conducted. For both analyses the independent variables were extroverted personality while for the first analysis the number of friends was entered as a dependent variable and for the second analysis the extent of participation in Facebook groups was entered as a dependent variable.

In both tests gender was entered as a covariant. The data indicated that individuals in the highly extroverted group have a significantly higher number of friends (Mean = 150.96, $SD = 116.39$) than individuals in the least extroverted group (Mean = 103.18, $SD = 85.71$), $F(1,134) = 6.23$, $p < 0.001$. However no significant difference was found with regard to participation in Facebook groups.

Contrary to the intuitive assumption, individuals in the highly extroverted group demonstrated a lower use of personal information (Mean = 0.14, $SD = 0.38$) than individuals in the least extroverted group (Mean = 0.47, $SD = 1.39$), $F(2,150) = 2.72$, $p = 0.1$. This finding partially supported hypothesis 1.

Hypothesis 2 suggests that those with a higher level of neuroticism would be more willing to share personally-identifying information on Facebook, and be less likely to use private messages. Information upload regarding to personally-identifying information and its relevant fields, such as mailing address or phone number, was found to be very rare. We therefore examined this Hypothesis by observing the use of self-pictures as an indicator of personally-identifying information sharing and the feature of posting other pictures as an indicator of willingness to upload private information. Specifically, two chi square tests were conducted. In the first a correlation between neurotic personalities and posting the picture of the person holding the account was analyzed and in the second the correlation between neurotic personalities and use of the feature of posting other pictures was analyzed. The results supported the hypothesis. Individuals in the highly

Table 1
Cutoff for NEO-PI-R domain scores measure.

	Low cutoff	High cutoff
NEO-PI-R		
Neuroticism	88	104
Extroversion	108	126
Openness	108	123
Agreeableness	98	116
Conscientiousness	106	129

neurotic group were found to prefer posting their photos on their Facebook profile more than individuals in the least neurotic group $\chi^2(1) = 4.30, p < 0.05$. Individuals in the highly neurotic group were less inclined to use the feature of upload other pictures than individuals in the least neurotic group $\chi^2(1) = 2.42, p < 0.1$.

In addition an approximate regression analysis revealed a U shape correlation between Neurotic personality and the amount of basic information reported on Facebook ($F(2,234) = 2.33, p < 0.1$, Exponential term: $t = 1.96, p < 0.05$). This result indicates that people with a low or high level of neuroticism prefer to share more basic information than people with a moderate level of neuroticism. This may suggest the conflict encountered by people with neurotic personalities with regard to the amount of the information sharing needed.

Hypothesis 3 suggests that individuals who scored higher on the trait of agreeableness would have more “Facebook friends” added to their profile. In order to examine the effect of agreeableness on Facebook use, an analysis of covariance (ANCOVA) was conducted. The independent variable was agreeableness and number of friends was the dependent variable. Gender was entered as a covariant. The data did not support hypothesis 3. Interestingly, an interaction effect on uploading pictures was found between agreeable personality and gender. Specifically, to examine the effects of agreeableness and gender on the number of pictures uploaded to Facebook, a 2 (high agreeableness vs. low agreeableness) \times 2 (male vs. female) two-way ANOVA was conducted. Means and SDs for the feature of picture use, according to agreeableness and gender in Facebook, are presented in Table 2. A significant interaction was found between agreeableness and gender, $F(1,147) = 4.04, p < 0.05$; (see Fig. 1). A *t*-test for simple effects revealed that, among females, individuals belonging to the low agreeableness group have fewer pictures compared with individuals belonging to the high agreeableness group, $t(86) = -2.63, p < 0.01$. However among males no effect was found. The analysis revealed no main effect in terms of agreeableness. No differences in the number of pictures uploaded was found between participants with lower and higher agreeableness, and no main effect was found in terms of gender. No difference was found between males and females in the number of pictures uploaded.

However, interestingly, individuals who scored higher on the trait of agreeableness were found to have used less page features (Mean = 2.15, $SD = 7.50$) than individuals who scored lower on the trait of agreeableness (Mean = 0.52, $SD = 1.39$) $F(2,111) = 3.95, p < 0.05$.

In addition, an approximate regression analysis revealed a U shape correlation between agreeable-type personality and the number of pictures uploaded to Facebook ($F(2,234) = 4.65, p < 0.01$, Exponential term: $t = 1.97, p < 0.05$). This result indicates that people with low and high levels of agreeableness are inclined to upload more pictures than people with a moderate level of agreeableness.

Hypothesis 4 suggests that individuals who scored higher on the trait of openness to experience were expected to be more willing to use Facebook as a communication tool and to use a greater number of features, resulting in greater knowledge of Facebook

features. In order to examine the effect of openness to experience on Facebook use, an analysis of covariance (ANCOVA) was conducted. The independent variable was personality characterized by openness to experience, and the dependent variable was the number of features used from the personal information section of Facebook. Gender was entered as a covariant. The hypothesis was found to be supported by the data. Specifically, individuals who scored higher on the trait of openness to experience used more features from the personal information section (Mean = 0.48, $SD = 1.51$) than individuals who scored lower on the trait of openness to experience (Mean = 0.22, $SD = 1.01$) $F(2,148) = 2.85, p < 0.05$.

Hypothesis 5 suggests that individuals who scored higher on the trait of conscientiousness would demonstrate a higher number of friends. In order to examine the effect of conscientiousness on Facebook use, an analysis of covariance (ANCOVA) was conducted. The independent variable was conscientious-type personality and the dependent variable was the number of friends. Gender was entered as a covariant. The hypothesis was supported by the results. Individuals who scored higher on the trait of conscientiousness were found to have a higher number of friends (Mean = 147.8 $SD = 112.6$) than individuals who scored lower on the trait of conscientiousness (Mean = 112.72 $SD = 82.49$) $F(2,136) = 5.04, p < 0.05$. In addition, individuals who scored higher on the trait of conscientiousness were found to demonstrate less use of the picture upload feature than individuals who scored lower on the trait of conscientiousness $\chi^2(1) = 2.75, p < 0.09$.

To increase the degree of freedom in our analysis and to better understand how personality influences on Facebook use, a multi-variable regression were performed with the five personality domains as predictors of Facebook use. Specifically, two hierarchical multiple regressions were used to test the extent to which personality factors moderate the motivations associated with Facebook use. The following predictors were entered in the two given steps: (1) covariant (gender); (2) personality factors. The entry order of the variables permits an examination as to whether the variables of interest account for any additional variance in the criterion variable that is not explained by previously entered predictors. The results of the hierarchical regression analyses are shown in Table 3. Hierarchical multiple regression results indicated that the number of friends on Facebook may only be predicted by extroverted-type personality $\beta = .24, t(201) = 2.27, p < .01$. Extroverted personality explained a significant proportion of variance in depression scores as well, $R^2 = .07, F(6,201) = 2.64, p < .01$. In addition the amount of personal information reported by individuals on Facebook was found to be predicted by gender, $\beta = .18, t(225) = 2.74, p < .01$, openness $\beta = .18, t(225) = 2.45, p < .01$, and negatively by extroversion $\beta = -.21, t(225) = -2.48, p < .01$. These personality factors were found to explain a significant proportion of variance in depression scores, $R^2 = .04, F(6,225) = 2.64, p < .01$.

4. Discussion

Following the study by Ross et al. (2009), the present study sought to analyze personality and motivations associated with

Table 2
Means and SDs for use of the picture upload feature, according to agreeableness and gender.

Low/high agreeableness – personality trait	Facebook					
	Male		Female		Total	
	SD	M	SD	M	SD	M
Low agreeableness	55.9	26.13	4.02	1.17	42.33	14.32
High agreeableness	31.3	19.83	54.33	25.4	48.17	23.66
Total	47.8	23.73	43.74	15.76	45.49	19.09

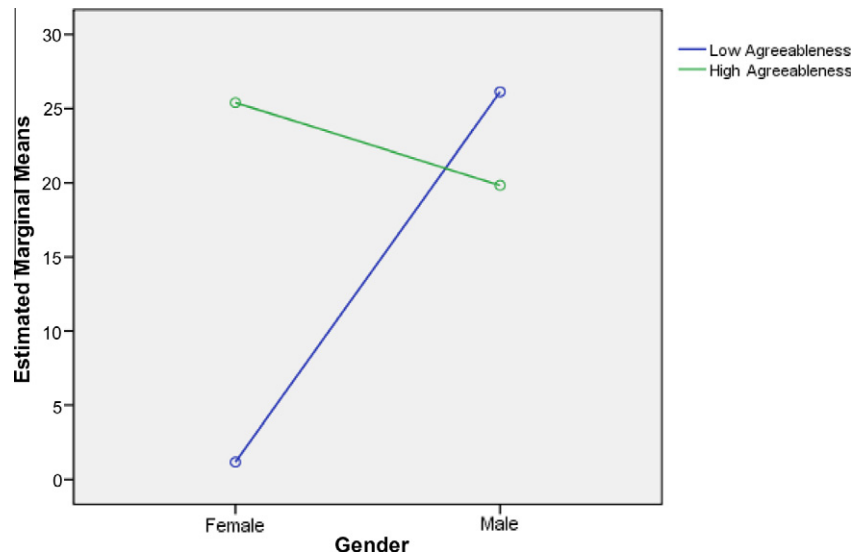


Fig. 1. Means of picture upload among high and low agreeableness in male and female groups.

Table 3

Summary of hierarchical regression analyses for variables predicting number of friends and uploading of personal information.

	Number of friends				Personal information			
	B	t-Value	R^2_{adj} (R^2_{cha})	F_{Cha}	β	t-Value	R^2_{adj} (R^2_{cha})	F_{Cha}
Control variables								
Gender	0.00	0.04			0.18*	2.74		
Δ Step 1			0.00	0.04			0.03**	7.52
Main effects								
Conscientiousness	0.11	1.32			0.04	0.51		
Agreeableness	-0.07	-0.98			-0.05	-0.68		
Openness	-0.08	0.10			0.18*	2.45		
Extroversion	0.24 [†]	2.27			-0.21*	-2.48		
Neuroticism	0.10	1.18			-0.02	-0.23		
Δ Step 2			0.07 [†]	2.86			0.05 [†]	1.97

For number of friends: after step 1 (1205) after step 2 (6200). For number of pictures and personal information: after step 1 (1230) after step 2 (6225).

* $p = 0.05$.

** $p = 0.01$.

Facebook use. However, unlike the results of Ross et al. which did not show a strong link between individual personality and Facebook use, this study demonstrated that such correlation indeed exists. The main difference between the two studies was in their methodological approach. While Ross et al.'s study relied on self-reports by participants, this study was based on more objective criteria.

As in the study by Ross et al. (2009), our hypothesis 1 suggests that individuals in the highly extroverted group would show a larger number of friends and would belong to more Facebook groups than individuals in the least extroverted group. This hypothesis was partially supported. Specifically, the data demonstrate that extroversion indeed has a positive effect on the number of friends, but no effect was found with regard to the use of Facebook groups. These findings are contrary to those of Ross et al. which suggest that extroverted personality has an effect on the use of Facebook groups, but not on the number of friends. In addition, the current findings indicate that a highly extroverted personality may demonstrate lower use of personal information than less extroverted personalities. It seems that introverts transfer their pattern of inverted behavior from the offline into the online world. This is reflected in the size of their social network which tends to be smaller than that of the extraverts. Interestingly, however, introverts place more personal information on their Facebook profiles as com-

pared with extroverts. This may be explained by the fact that extroverts rely on their social skills and so feel less need to promote themselves.

Hypothesis 2 suggests, as do Ross et al. (2009), that individuals who scored higher on the trait of neuroticism would be more willing to share personally-identifying information on Facebook, and less likely to use private messages. We examined this hypothesis by observing the use of self-pictures as an indicator of personally-identifying information sharing and the use of posting other pictures as an indicator of willingness to upload private information. Our results support hypothesis 2. Specifically, individuals in the highly neurotic group were found to be more inclined to post their photos on their Facebook profile than individuals in the less neurotic group. In addition, individuals in the highly neurotic group were less inclined to use the picture upload features than individuals in the less neurotic group. These findings are unlike those of Ross et al. (2009), which demonstrated that individuals in the highly neurotic group are less inclined to post their photos on their Facebook profile than individuals in the less neurotic group.

The current study revealed a U-shaped correlation between neurotic personality and the amount of basic information reported on Facebook. This result indicates that people with low or high levels of neuroticism were inclined to share more basic information

than people with moderate levels of neuroticism. This may indicate that the same behavior may stem from different motivations. While the emotionally secure individual focuses on self-actualization and expresses it by sharing more information with others from a secure base, the neurotic person who also strives to share more information, is motivated to do so by the need for self assurance. We recommend that this be examined in future research.

Hypothesis 3 suggests, as in Ross et al. (2009), that individuals who scored higher on agreeableness would have a greater number of “Facebook friends”. However, unlike Ross et al. (2009), our data demonstrates that agreeableness is related to features of Facebook use. Specifically, an interaction between agreeableness and gender was found to have an effect on uploading pictures. Individuals who scored higher on the trait of agreeableness used fewer page features than individuals who scored lower on the trait of agreeableness. In addition, a U-shaped correlation between agreeableness and the number of pictures uploaded to Facebook, as well as a U-shaped correlation between agreeableness and contact information upload to Facebook, were found. The fact that agreeableness does not correlate with having more friends demonstrates, we believe, the complexity of the motives that lie behind behavior on Facebook. It makes sense that the norm number of friends may have more of an impact on this specific result than agreeableness. However, it is also important to stress that, although this result runs contrary to our prediction, it nevertheless demonstrates that personality is relevant to Facebook behavior. The somewhat puzzling agreeableness outcomes should be the subject of future research in this field.

Hypothesis 4 suggests, as did Ross et al. (2009), that individuals who scored higher on the trait of openness to experience were expected to be more willing to use Facebook as a communication tool and to use a greater number of features. The hypothesis was indeed supported by the data. Specifically, individuals who scored higher on the trait of openness to experience used more features from the personal information section than individuals who scored lower on the trait of openness to experience. It seems that people who are more open are more expressive on their Facebook profile.

In contrast to Ross et al. (2009), our hypothesis 5 suggests that individuals who scored higher on the trait of conscientiousness would demonstrate a higher number of friends, while Ross et al. demonstrated that conscientiousness was unrelated to features of Facebook use. Results support our hypothesis. Specifically, the data demonstrates that individuals who scored higher on the trait of conscientiousness have a greater number of friends than individuals who scored lower on the trait of conscientiousness. In addition, individuals who scored higher on the trait of conscientiousness were also found to demonstrate less use of the picture upload features than individuals who scored lower on the trait of conscientiousness.

Overall, these results demonstrate very clearly that personality is, in fact, clearly linked to Facebook use. We have demonstrated that each of the personality factors examined was relevant to aspects of Facebook use. This is consistent with other studies that demonstrated the link between personality and the Internet in other areas, such as blog use (Guadagno et al., 2007); Wikipedia (Amichai-Hamburger, Lamdan, Madiel, & Hayat, 2008); and nostalgic websites (Amichai-Hamburger et al., 2008).

4.1. Limitations and future research

The results were not all in line with our predictions. It seems clear that other factors, besides that of personality, have a bearing on Facebook use. Such factors may, for example, include social norms. People function in social groups and organizations that have expectations as to how to use Facebook. These, in turn may create pressure on the individual as to what is appropriate to dis-

play on Facebook and how to behave there. How far these social norms impact on behavior on Facebook may well depend on personality influences. The participants of our study were students from a single university, and may be thought of as a fairly cohesive group and therefore it is likely that norms played a significant role. To study this in greater depth, it is important that we learn the specific norms of a particular group in terms of their Facebook use and its interaction with their personality. This will enable us to gain an understanding of how this effects their behavior on Facebook.

To further increase our knowledge as to how personality is relevant to behavior on Facebook, it is important to study how people design and change their Facebook profiles over a significant period of time. Such a study for example over the period of a year would enable us to increase our understanding of the long term interaction between personality and the Facebook dynamic.

An understanding of the relevance of personality to Facebook behavior may help to explain why some people are heavy users of a specific components of Facebook than others are not. Future studies may also help us to gain an understanding as to why some people get addicted to Facebook and others do not use Facebook at all.

4.2. Implications

The results of this study which elucidate the connection between personality and consumer behavior, may have implications for marketing practitioners. Recent, studies in marketing suggest the effectiveness of utilizing social networking for marketing purposes (Goldenberg, Han, Lehmann, & Hong, 2009; Kratzer & Lettl, 2009). Researchers encourage the identification within social networks of users who are innovators, lead users, opinion leaders, or have a large number of friends. Such people should be a primary segment targeted by marketing practitioners. Their object being the creation of positive vibes passed on through such sites concurrent with the launch of a new product. However the identification of consumers, who may be considered “early adopters” of new products, may be challenging.

Studies indicate that people are transferring their offline activities and interaction with friends to online environments. These studies encourage marketers to look for new ways to learn, characterize, and segment different groups of customers. Using Facebook or other social network applications for this purpose, may be particularly effective. First, because on Facebook marketing researchers can observe their potential customers in their own environments, devoid of any the pressures associated with traditional marketing research. Secondly, marketers can receive more comprehensive details of the consumers interactions with their environment.

Our study provides an instrument for achieving marketers' aims. Nov and Ye (2008) suggest that innovators are more open to experience than other customers. Thus by analyzing the profile of potential customers on Facebook, marketers can classify which customers are higher in openness and concentrate their efforts on that segment. Moreover, by using a Facebook environment, marketers can estimate the activity of each customer in the network (i.e. number of friends, general activity) and so manage their own efforts more efficiently.

This study has shown that personality is very much related to social network use. This finding has created new questions. These center on the interaction between personality and an additional variables that affect users' behavior on social networks. This is in the nature of pioneer research studies. It is important to further our understanding of the impact of personality on the use of social networks in order to enhance the psychological wellbeing of the surfer.

Appendix 1. Rules for encoding Facebook pages (abbreviated)

Variable	Value and value label
Number of Friends	R's Friend 0 – N/A – # of Friends
Number of Pictures	R's Pictures 0 – N/A – # of Pictures
Gender	R's Gender 0 – N/A 1 – Male 2 – Female
College	R's College 0 – Not stated 1 – Name
Self Picture	R's Self Picture 0 – N/A 1 – Name
Birthday	R's Birthday 0 – N/A 1 – Month, day, year
Group	R's Groups joined 0 – N/A – # of Groups joined
Album	R's Albums 0 – N/A – # of Albums

References

- Amichai-Hamburger, Y. (2002). Internet and personality. *Computers in Human Behavior*, 18, 1–10.
- Amichai-Hamburger, Y. (2005). Personality and the Internet. In Y. Amichai-Hamburger (Ed.), *The social net: Human behavior in cyberspace* (pp. 27–55). New York: Oxford University Press.
- Amichai-Hamburger, Y., & Barak, A. (2009). Internet and well-being. In Y. Amichai-Hamburger (Ed.), *Technology and Well-being* (pp. 34–76). Cambridge University Press.
- Amichai-Hamburger, Y., Fine, A., & Goldstein, A. (2004). The impact of Internet interactivity and need for closure on consumer preference. *Computers in Human Behavior*, 20, 103–117.
- Amichai-Hamburger, Y., Kaplan, H., & Dorpatcheon, N. (2008). Click to the past: The impact of extroversion by users of nostalgic website on the use of Internet social services. *Computers in Human Behavior*, 24, 1907–1912.
- Amichai-Hamburger, Y., Kinar, O., & Fine, A. (2007). The effects of need for cognition on Internet use. *Computers in Human Behavior*, 23, 880–891.
- Amichai-Hamburger, Y., Lamdan, N., Madiel, R., & Hayat, T. (2008). Personality characteristics of Wikipedia members. *Cyberpsychology & Behavior*, 11(6), 679–681.
- Amichai-Hamburger, Y., Wainapel, G., & Fox, S. (2002). On the Internet no one knows I'm an introvert: Extroversion, neuroticism, and Internet interaction. *Cyberpsychology & Behavior*, 2, 125–128.
- Boyd, D. (2007). Why youth (heart) social network sites?: The role of networked publics in teenage social life. In D. Buckingham (Ed.), *MacArthur Foundation Series on Digital Learning – Youth, identity, and digital media volume* (pp. 119–142). Cambridge, MA: MIT Press.
- Boyd, D. M., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13(1), article 11. Available from: <http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html>.
- Costa, P. T., & McCrae, R. R. (1992). *NEO PI-R. Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Donath, J., & Boyd, D. (2004). Public displays of connection. *BT Technology Journal*, 22(4), 71–82.
- Ellison, N., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook “friends”: Exploring the relationship between college students' use of online social networks and social capital. *Journal of Computer-Mediated Communication*, 12(3), article 1. Available from: <http://jcmc.indiana.edu/vol12/issue4/ellison.html>. Retrieved July 30, 2007.
- Goffman, E. (1959). *The presentation of self in everyday life*. New York: Doubleday.
- Goldenberg, J., Han, S., Lehmann, D. R., & Hong, J. W. (2009). The role of hubs in the adoption processes. *Journal of Marketing*, 73(2), 1–13.
- Guadagno, R. E., Okdie, B. M., & Eno, C. A. (2008). Who blogs? Personality predictors of blogging. *Computers in Human Behavior*, 24, 1993–2004.
- Hamburger, Y. A., & Ben-Artzi, E. (2000). The relationship between extraversion and neuroticism and the different uses of the Internet. *Computers in Human Behavior*, 16, 441–449.
- Kratzer, J., & Lettl, C. (2009). Distinctive roles of lead users and opinion leaders in the social networks of schoolchildren. *Journal of Consumer Research*, 36(4), 646–659.
- Kinar, O., & Amichai-Hamburger, Y. (2008). The effects of need for cognition on Internet use revisited. *Computers in Human Behavior*, 24, 361–371.
- Kraut, R., Lundmark, V., Patterson, M., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist*, 53, 1017–1031.
- Lin, S. S. J., & Tsai, C. C. (2002). Sensation seeking and Internet dependence of Taiwanese high school adolescents. *Computers in Human Behavior*, 18, 411–426.
- Marwick, A. (2005). *I'm a lot more interesting than a Friendster profile: Identity presentation, authenticity, and power in social networking services*. Paper presented at Internet Research 6.0, Chicago, IL.
- Nov, O., & Ye, C. (2008). Personality and technology acceptance: The case for personal innovativeness in IT, openness and resistance to change. In *Proceedings of the 41st Hawaii International Conference on System Sciences (HICSS 41)*. Hawaii, USA: IEEE Press.
- Pornsakulvanich, V., Haridakis, P. M., & Rubin, A. M. (2008). The influence of dispositions and Internet-use motivation on online communication satisfaction and relationship closeness. *Computers in Human Behavior*, 24, 2292–2310.
- Ross, C., Orr, E. S., Siscic, M., Arseneault, J. M., Simmering, M. J., & Orr, R. R. (2009). Personality and motivations associated with Facebook use. *Computers in Human Behavior*, 25, 578–586.
- Shakespeare, W. (1564–1616 reprinted 1978). *Eight Comedies*. Franklin Center, PA: The Franklin Library.
- Sundén, J. (2003). *Material virtualities: Approaching online textual embodiment*. New York: Peter Lang.
- Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior*, 24, 1816–1836.
- Zinman, A., & Donath, J. (2007). *Is Britney Spears spam?* Paper presented at the Fourth Conference on Email and Anti-Spam, Mountain View, CA.