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How do people compare themselves with others on social network sites?: The case of Facebook

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ABSTRACT

The social comparison theory and its subsequent studies say that comparing with others can influence an individual in several ways (e.g., evaluation of oneself, influence on self-esteem/self-confidence, and efficient decision making) and people compare with others when they are confronted with information of others. With the popularity of social network sites, many people acquire or are exposed to information of others on social network sites, which implies that people are likely to frequently engage in social comparison behavior on social network sites. The present paper examines social comparison behavior on social network sites (especially on Facebook) using a college students sample. We find that an individual's personality characteristics (i.e., social comparison orientation, self-esteem, self-uncertainty, and self-consciousness) influence the person's social comparison frequency on Facebook. A positive relationship between Facebook use intensity and social comparison frequency on Facebook is found. In addition, we find a positive association between social comparison frequency on Facebook and the frequency of having a negative feeling from comparison. Other findings are also reported in the paper.

1. Introduction

People often compare themselves with others (e.g., friends, parents, teachers, celebrities, and so on). Comparing with others can influence an individual in several ways. According to the social comparison theory (Festinger, 1954) and its subsequent studies, through comparison with others (i.e., social comparison), people evaluate their opinions and abilities (Festinger, 1954), emotions (Schachter, 1959), and personality traits (Thornton & Arrowood, 1966); and people also try to enhance their self-esteem and self-concept by comparing with others (Gibbons & Buunk, 1999). Furthermore, people can feel positively or negatively about themselves through comparison with others. How a person feels about herself through social comparison varies depending on several factors, such as the person's personal traits and who the person compares with (Buunk, Collins, Taylor, VanYperen, & Dakof, 1990; Buunk & Gibbons, 2006).

People compare with others when they acquire information of others (Mussweiler, Ruter, & Epstude, 2006). In this regard, Mussweiler et al. (2006) mentioned, "Whenever people are confronted with information about how others are, what others can and cannot do, or what others have achieved and have failed to achieve, people relate this information to themselves." This implies that social comparison takes place in our everyday lives almost all the time, because people are easily exposed to or can effortlessly obtain information of others through various routes; e.g., by directly interacting with others and by consuming media.

These days, one of the most commonly used means for interacting with others and acquiring information of others is the Internet. The Internet provides diverse sources from which people can obtain information of others such as email, instant message, and blogs. As people spend more time online and have been able to access the Internet ubiquitously, people likely engage in social comparison behavior more frequently on the Web than before.

On the Internet, social network sites (e.g., Facebook and Twitter) are one of the places where many people visit to interact with others and to see what and how others do. Thus, it is likely that people frequently compare themselves with others on social network sites, which also indicates that social network sites are an important venue where people can evaluate themselves (e.g., opinions, abilities, and emotions), develop their own identities, and where people also can feel happy/unhappy or satisfied/dissatisfied with themselves from comparison with others.

Even though many people likely engage in social comparison behavior on social network sites and the influence of social comparison on an individual can be significant, little research has examined social comparison behavior on social network sites. Accordingly, in this study, we examine social comparison behavior on social network sites, especially Facebook, based on the social

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comparison theory (Festinger, 1954) and its subsequent studies. Specifically, we examine the effects of an individual's psychological characteristics (i.e., social comparison inclination – the extent to which individuals pay attention to and base their own behavior on the way others behave, self-esteem, private/public-consciousness, and self-uncertainty) and Facebook use (i.e., Facebook use intensity and number of friends) on how often the person compares herself with others on Facebook and how the person feels from the comparison.

For this, we use a college student sample. A sample of college students has been chosen because students tend to more frequently engage in social comparison behavior than adults (Stipek & Tannatt, 1984), students are susceptible to peer influence (Garnier & Stein, 2002; Maxwell, 2002), and Facebook use among college students is pervasive and conspicuous (Ellison, Steinfield, & Lampe, 2007), which makes it easy to examine their behavior on Facebook.

This paper is organized as follows. In Section 2, prior literature on Facebook and social comparison is reviewed and hypotheses are developed. Section 3 explains methods and measurements. In Section 4, the results are reported. Section 5 discusses the results and concludes the paper.

2. Literature review

2.1. Prior studies about Facebook use

Facebook is one of the most popular online social network sites among college students. According to survey data in 2008, approximately 90% of undergraduates use Facebook (Steinfield, Ellison, & Lampe, 2008). Accordingly, Facebook is an important place for social life among college students (boyd, 2007). Most college students use Facebook everyday to interact with their friends and have a large number of friends on Facebook. According to a study by Pempek, Yermolayeva, and Calvert (2009), the average number of friends that a college student has on Facebook is 358. But their activities on Facebook are somewhat passive. That is, most of college students on Facebook spend more time observing (or reading) what others think and do rather than creating content (Pempek et al., 2009). As mentioned before, people tend to compare with others when they are confronted with information about how others are and what others have done. Thus, the frequent Facebook use among college students implies that they are likely to frequently engage in social comparison on Facebook.

Despite the possible frequent social comparison behavior of college students on Facebook, little research has investigated social comparison behavior of college students on Facebook. Instead, most studies about Facebook use have focused on other topics – e.g., social capital (Ellison et al., 2007; Steinfield et al., 2008), social well-being (Burke, Marlow, & Lento, 2010), identity (Zhao, Grasmuck, & Martin, 2008), self-presentation (Mehdizadeh, 2010; Strano, 2008), privacy issues (Tufekci, 2008), and the relationship between personality and Facebook use (Ross et al., 2009, Correa et al., 2010).

As will be reviewed in the following section in details, previous studies found that an individual's psychological characteristics (e.g., self-esteem, depression, and self-consciousness) exert an important influence on the person's social comparison behavior. Thus, if the general psychological characteristics of Facebook users were known, then it would be possible to infer the direction of the relationship between an individual's psychological characteristics and her Facebook use. However, little research has examined the relationship between a person's psychological characteristics (e.g., self-esteem, depression, and self-consciousness) and her Facebook use. There are some studies that have examined the relationship between a person's personality, measured by the Five Factor Model,[1] and the person's Facebook use (e.g., Amichai-Hamburger & Vinitzky, 2010; Bachrach, Kosinski, Graepel, Kohli, & Stillwell, 2012; Ross et al., 2009), but they did not consider other psychological traits such as self-esteem and depression. Even though Ellison et al. (2007) and Steinfield et al. (2008) used the construct of self-esteem in their studies, they did not explicitly examined the relationship between self-esteem and Facebook use, rather they focused on self-esteem as a moderator between Facebook use and social capital.

Because few prior studies have examined the relationship between Facebook use and social comparison behavior, and the relationship between Facebook use and psychological traits (e.g., self-esteem, depression, and self-consciousness), we do not propose a specific hypothesis, rather we develop the following research question:

> RQ1: How does a person's Facebook use relate to the person's social comparison frequency on Facebook?
> More specifically, we ask:
> RQ1-1: How does a person's Facebook use intensity relate to the person's social comparison frequency on Facebook?
> RQ1-2: How does the number of Facebook friends of a person relate to the person's social comparison frequency on Facebook?

2.2. Social comparison theory

Despite the pervasive comparison behavior of human beings, the term 'social comparison' has been used only after Festinger's work in 1954. Festinger posited that a person engages in social comparison behavior (i.e., behavior of comparing with others) due to her desire to evaluate her opinions and abilities, especially when there exist no objective standards for self-evaluation. The Festinger's social comparison theory has evolved into several different directions.

One strand of social comparison behavior research on which scholars have focused is about why people compare themselves with others. According to the studies in this strand, people compare themselves with others to evaluate their emotions (Schachter, 1959) and their personality traits (Thornton & Arrowood, 1966) as well as their opinions and abilities. People also compare themselves with others to enhance their self-esteem and self-concept (Gibbons & Buunk, 1999). In addition, people often engage in comparison behavior to make judgments and decisions more efficiently (Mussweiler et al., 2006).

Another branch of the social comparison research is about individual differences that correlate to different social comparison behaviors. Previous studies have identified several important individual differences that induce different social comparison behaviors. One important individual difference is the level of inclination to compare with others. Gibbons and Buunk (1999) developed a scale to assess social comparison orientation (SCO), which measures an individual's inclination to social comparison. In their study, SCO is defined as the extent to which individuals pay attention to and base their own behavior on the way others behave. According to the authors, an individual who has a high SCO score tends to be more inclined toward social comparison than an individual with a low SCO score. The positive relationship between a person's SCO level and the person's social comparison frequency has been confirmed by several studies (e.g., Buunk, Zurriaga, Gonzalez-Roma, & Subirats, 2003; Buunk, Zurriaga,

[1] The Five-Factor Model (FFM) separates the human personality into five different traits – neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. See Costa and MacCrae (1992) for more details.

Peíró, Nauta, & Gosalvez, 2005). Based on this prior research we propose our first hypothesis:

H1. A person's social comparison orientation will be positively related to the person's social comparison frequency on Facebook.

Some scholars have studied the relationship between self-uncertainty and social comparison. Butzer and Kuiper (2006) investigated the relationship between a person's social comparison frequency and self-uncertainty (i.e., the degree to which a person feels uncertain about herself), which consists of four sub-constructs: self-concept clarity, intolerance of uncertainty, anxiety, and depression. Self-concept clarity is the extent to which the contents of an individual's self-concept (e.g., perceived personal attributes) are clearly and confidently defined, internally consistent, and temporally stable (Campbell et al., 1996). Intolerance of uncertainty is defined as "a predisposition to react negatively to an uncertain event or situation, independent of its probability of occurrence and its associated consequences" (Ladouceur, Gosselin, & Dugas, 2000). Butzer and Kuiper found that people with high self-uncertainty are likely to engage in social comparison more frequently than people with low self-uncertainty. Weary, Marsh, and McCormick (1994) also found that a person who is less certain about her own opinions is more likely to be motivated to compare him/herself with others. Based on these studies, we propose the following hypothesis:

H2. A person's self-uncertainty will be positively related to the person's social comparison frequency on Facebook.

Other scholars have studied the influence of self-esteem on social comparison behavior. Morse and Gergen (1970) examined how the presence of socially desirable (or undesirable) people can influence a person's self-esteem. They found that when a person is present with socially desirable people, the level of the person's self-esteem decreases and when present with undesirable people, the opposite is true. With regard to the relationship between social comparison frequency and self-esteem, Campbell (1990) found that people with low self-esteem tend to engage in social comparison more frequently than people with high self-esteem and people with low self-esteem are more sensitive to social comparison information. Gibbons and Buunk (1999) also found a negative relationship between a person's self-esteem and her social comparison frequency. Thus, we propose the following hypothesis:

H3. A person's self-esteem will be negatively related to the person's social comparison frequency on Facebook.

A few scholars have examined the relationship between a person's self-consciousness and the person's social comparison frequency. Gibbons and Buunk (1999) found that people who more engage in reflection on their own thoughts and are more conscious of themselves in the presence of others tend to compare with others more frequently. Furthermore, they also found that people who are more interested in what others feel and care about tend to engage in social comparison more frequently than people who are less interested in what others feel and care about. Stapel and Tesser (2001) also found a positive relationship between a person's self-consciousness and the person's social comparison frequency. Thus, we propose the following hypothesis:

H4a. A person's self-consciousness will be positively related with the person's social comparison frequency on Facebook.

Prior studies of self-consciousness (e.g., Fenigstein, Scheier, & Buss, 1975; Scheier & Carver, 1985) found that people with high self-consciousness tend to more care about how they are viewed by others and be more interested in what others think of themselves than people with low self-consciousness. There have been no studies, to the best of our knowledge, that have examined the relationship between a person's self-consciousness and the person's internet use, especially use of social network sites. One of the main characteristics of social network sites, especially Facebook, is that users can leave postings and upload their photos, which will be viewed by others; and another main feature is that they can leave comments on other's postings. According to the studies of self-consciousness (Fenigstein et al., 1975; Scheier & Carver, 1985), it is possible that people with high self-consciousness more care about how others respond to their postings. Moreover, some studies of social comparison (e.g., Gibbons & Buunk, 1999; Stapel & Tesser, 2001) found a positive relationship between a person's self-consciousness and the person's social comparison frequency. Thus, we also propose the following hypothesis:

H4b. A person's social comparison frequency on Facebook will be positively related to the degree to which the person expects others to respond to his/her postings.

Another major stream of the social comparison research is about different affective consequences of social comparison. Most of the studies in this research area have focused on different affective consequences of social comparison depending on the directionality of comparison. For example, Buunk and Gibbons (2006) argued that individuals high in SCO tend to have negative affect from downward social comparison (i.e., comparison to a worse-off), but the affective consequences from upward social comparison (i.e., comparisons to a better-off) are not consistent (i.e., some people have negative affect from the upward comparison, while others have positive affect). Meanwhile, Buunk et al. (1990) found that people with high self-esteem are more likely to feel positively from comparison regardless of the direction of comparison (i.e., upward or downward comparison). Some scholars argued that affective consequences are dependent on the direction of comparison. They claimed that in general downward comparisons enhance self-esteem, generate positive emotions, and reduce anxiety (Amoroso & Walters, 1969; Morse & Gergen, 1970). In contrast, upward comparisons tend to generate negative affect (Marsh & Parker, 1984; Morse & Gergen, 1970).

However, no prior studies of affective consequences of social comparison examined the relationship between a person's social comparison frequency and the frequency of the person having a negative or positive affect from comparison. In this study, we are interested in examining how a person's social comparison frequency is related to the frequency that the person feels negatively from comparison on Facebook. Thus, we develop the following research question rather than proposing a specific hypothesis:

> RQ2: What is the relationship between a person's social comparison frequency on Facebook and the frequency of having a negative feeling from comparison on Facebook?

2.3. Social comparison among adolescents and youths

There are a variety of studies that have looked at social comparison behavior among adolescents and youths. Most of them have been conducted to investigate students' social comparison in class (or school). One of the primary topics of these studies has been why adolescents engage in social comparison. Several studies found that students use social comparison as a means of self-evaluation, especially with regard to school performance (e.g., Aboud, 1985; Butler, 1998). It has been also found that social comparison is an important factor influencing adolescents' identity development (Abrams & Hogg, 1988; Turner, 1975).

Some scholars looked at how social comparison behavior changes with age. For example, Frey and Ruble (1985) found that

comparisons related to personal aspects of peers reduced with age, whereas comparisons related to performance assessment increased with age. Aboud (1985) found that older students are more likely to engage in more sophisticated social comparison behavior than younger students. Stipek and Tannatt (1984) found that students compare themselves with their peers more frequently as they grow.

Meanwhile, several studies have examined whom adolescents compare themselves with. For example, Guldemond and Meijnen (2000) found that adolescents tend to compare themselves with a normative reference group (a source of norms, attitudes, and values) more often than a comparative reference group (a mere standard of comparison). Huguet, Dumas, Monteil, and Genestoux (2001) found that students tend to compare themselves more often with close friends. Regner and Monteil (2007) found that students compare with someone who is in a similar socioeconomic status.

3. Method

3.1. Sample

Data were collected from a purposive sample of 199 college students in two communication classes at Michigan State University through an online survey, which was administered in February, 2011. The students were given an extra credit for their participations in the survey. As mentioned in the introductory section, we used a sample of college students, because they tend to more frequently engage in social comparison behavior than adults (Stipek & Tannatt, 1984), students are susceptible to peer influence (Garnier & Stein, 2002; Maxwell, 2002), and Facebook use among college students is pervasive and conspicuous (Ellison et al., 2007), which makes it easy to examine their behavior on Facebook.

The sample consisted of 62% males and 38% females. The ages of the respondents ranged between 18 and 23, and their average age was 19.9. This age range falls into that of major Facebook users, which is between 18 and 29. The school years of respondents were distributed as follows: 1st year = 29%, 2nd year = 24%, 3rd year = 31%, and 4th year = 16%. Among 199 participants, 191 were Facebook users and 8 non-Facebook users were not included in the analysis.

3.2. Measures

In this section, we describe how the constructs used in this study were measured. The level of reliability of each scale (i.e., Cronbach alpha) is reported in the result section.

3.2.1. Frequency of social comparison on Facebook

To assess the frequency of social comparison on Facebook, the participants were asked the following question: "I think I often compare myself with others on Facebook when I am reading news feeds or checking out others' photos?" 5-point Likert scale was used, ranged from 1 (strongly disagree) to 5 (strongly agree). This question is a modified version of the question used by Buunk et al. (2005). The present study focuses on the comparison tendency that occurs when users are reading feeds and seeing friends' photos because those are the primary activities that people do on Facebook.

3.2.2. Frequency of having a negative feeling from comparison on Facebook

To assess how often a person thinks negatively when the person reads news feeds (or sees other's photos) on Facebook, respondents were asked the following questions: "When I read news feeds (or see others' photos), I often think that others are having a better life than me"; "When I read news feeds (or see others' photos), I often think that others are doing better than me"; and "When I read news feeds (or see others' photos), I often think that I am isolated from others" A 5-point Likert scale was used, ranging from 1 (strongly disagree) to 5 (strongly agree). These questions were derived from the questions used Buunk et al. (2005).

3.2.3. Number of friends on Facebook

To measure the number of friends of a person on Facebook, participants were asked the following question: "How many Facebook friends do you have?" In addition, they were also asked: "Approximately how many Facebook friends do you have at MSU?"; "Approximately how many of your Facebook friends do you consider actual friends?"; and "Approximately how many of your Facebook friends do you consider close friends?" These questions were drawn from Ellison, Steinfield, and Lampe (2011). According to them, friends on Facebook are considered as actual friends if they have offline connections as well.

3.2.4. Facebook use intensity

To assess a person's Facebook use intensity, 5 items developed by Ellison et al. (2007) were used. The scale was developed to obtain a better measure of Facebook usage than frequency or duration indices (Ellison et al., 2007). Some of examples of the scale are: "Facebook has become part of my daily routine"; and "I feel out of touch when I haven't logged onto Facebook for a while." The answer options varied from 1 (strongly disagree) to 5 (strongly agree).

3.2.5. Social comparison orientation

The present paper used the social comparison orientation scale developed by Gibbons and Buunk (1999). In their study, social comparison orientation is defined as "the extent to which individuals pay attention to and base their own behavior on the way others behave." This scale was developed to assess a person's inclination to compare him/herself with others. The scale consists of eleven 5-point Likert scale items ranging from 1 (strongly disagree) to 5 (strongly agree). Examples are: "I often compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing"; and "I always pay a lot of attention to how I do things compared with how others do things."

3.3. Individual personality characteristics

3.3.1. Self-uncertainty level

According to Butzer and Kuiper (2006), self-uncertainty construct, which measures the degree to which a person feels uncertain about herself, is composed of four different sub-constructs – self-concept clarity, intolerance of uncertainty, anxiety, and depression. To assess a person's self-concept clarity, twelve 5-point Likert scale items developed by Campbell et al. (1996) were used. Example items are: "My beliefs about myself often conflict with one another"; and "On one day I might have one opinion of myself and on another day I might have a different opinion." The answer options range from 1 (strongly disagree) to 5 (strongly agree).

In order to measure a person's intolerance of uncertainty, we used twelve 5-point Likert scale items developed by Carleton, Norton, and Asmundson (2007). This is a short version of the original version of intolerance of uncertainty, which was developed by Freeston, Rheaume, Letarte, Dugas, and Ladouceur (1994). Examples are: "Unforeseen events upset me greatly"; and "It frustrates me not having all the information I need."

Nine 5-point Likert scale items created by Costello and Comrey (1967) were used to access a person's anxiety level. Example items are: "I get rattled easily"; and "When faced with excitement or unexpected situations, I become nervous and jumpy."

Finally, to measure a person's depression level, we used twenty items developed by Radloff (1977). The items represent twenty different ways that a person might have felt during the past week. This scale asks how often a person has felt each way during the last week. The answer options range from 1 (rarely or none of the time (less than 1 day)) to 4 (most or all of the time (5–7 days)). Examples are: "I was bothered by things that usually don't bother me"; "I did not feel like eating; my appetite was poor"; and "I felt that I could not shake off the blues even with help from my family or friends."

3.3.2. Self-esteem

Self-esteem was measured using seven items from the Rosenberg self-esteem scale (Rosenberg, 1989). The answer options range from 1 (strongly disagree) to 5 (strongly agree). Example items are: "I feel that I'm a person of worth, at least on an equal plane with others"; and "I feel that I have a number of good qualities."

3.3.3. Private and public self-consciousness

Private and public self-consciousness were measured using a scale developed by Fenigstein et al. (1975). This scale consists of seventeen 5-point Likert scale items; ten for private self-consciousness and the other seven for public self-consciousness. Among ten items for private self-consciousness, one item was removed from this study, because it had reduced the reliability level (measured by Cronbach alpha) significantly. The item is asking "Generally, I'm not very aware of myself." Before taking the item out, the value of Cronbach alpha was .711 and after taking it out, the value increased to .782.

3.3.4. Expectation to others' responses

In order to measure the degree to which a person expects others to respond her postings, we have developed the following two 5point Likert scale items: "I expect others to respond to my postings when I compose the postings"; and "If no one responded to my postings then it would be sad."

4. Results

In order to test hypotheses from H1 to H4b, correlation coefficient values are obtained. The results for hypotheses H1 to H4b are reported in the gray cells of Table 1. All hypotheses are supported.

We have found that a person's social comparison orientation is positively correlated with her social comparison frequency (SCF) on Facebook (H1, correlation coefficient = 0.47, $p < 0.01$). A person's self-uncertainty, measured by four different constructs (i.e., self-concept clarity, intolerance of uncertainty, anxiety, and depression), has been found to be positively correlated to the person's comparison frequency on Facebook (H2). The correlation coefficient between self-concept clarity, which is negatively correlated to self-uncertainty, and SCF is −0.54 ($p < 0.01$); the correlation between intolerance of uncertainty and SCF is 0.25 ($p < 0.01$); the correlation between anxiety and SCF is 0.32 ($p < 0.01$); and the correlation coefficient between depression and SCF is 0.31 ($p < 0.01$).

Self-esteem has been found to be negatively correlated with social comparison frequency on Facebook (H3, −0.29, $p < 0.01$). A person's social comparison frequency on Facebook is positively correlated with both private and public self-consciousness (H4a; 0.45, $p < 0.01$; 0.46, $p < 0.01$, respectively). We have also found that a person who more frequently compares with others on Facebook tends to more expect others to respond to her postings (H4b; 0.49, $p < 0.01$).

In order to answer research question 1 (RQ1), the correlation coefficient value between social comparison frequency and the frequency of having a negative feeling from comparison on Facebook was obtained. The result is reported in Table 2. In addition to the correlation, we also report the correlations between the frequency of having a negative feeling from comparison on Facebook, and social comparison orientation and self-esteem.

It turns out that there is a positive relationship between a person's social comparison frequency (SCF) and the frequency of having a negative feeling from comparison on Facebook (0.41, $p < 0.01$). This result indicates that a person who compares with others more frequently is more likely to feel negatively when she compares with others on Facebook. Furthermore, the results in Table 2 suggest that the frequency of having a negative feeling from comparison on Facebook might be correlated with other personality characteristics as well – four uncertainty constructs and private/public self-consciousness. Thus, the correlation coefficients between them are obtained (see Table 3).

We found that the frequency of having a negative feeling from comparison on Facebook is negatively correlated with self-concept clarity (−0.54, $p < 0.01$) and it is positively correlated with anxiety and depression (0.40, $p < 0.01$; 0.50, $p < 0.01$, respectively).

Table 1
Correlation coefficients, Cronbach's alpha, and descriptive statistics.

Variable	1	2	3	4	5	6	7	8	9	10
1. SCF	–									
2. SCO	0.47**	–								
3. SE	−0.29**	−0.07	–							
4. SCC	−0.54**	−0.36**	0.56**	–						
5. IU	0.25**	0.18*	−0.32**	−0.38**	–					
6. AXT	0.32**	0.16	−0.33**	−0.43**	0.62**	–				
7. DPR	0.31**	0.10	−0.56**	−0.6**	0.38**	0.50**	–			
8. PSC	0.45**	0.46**	−0.20*	−0.59**	0.25**	0.25**	0.37**	–		
9. PUSC	0.45**	0.43**	−0.28**	−0.54**	0.30**	0.34**	0.36**	0.60**	–	
10. EXP	0.49**	0.40**	−0.08	−0.40**	0.29**	0.26**	0.21**	0.33**	0.39**	–
M	2.79	3.37	3.90	4.20	2.79	2.48	1.78	3.49	3.40	3.07
SD	0.90	0.51	0.64	0.72	0.50	0.63	0.45	0.59	0.66	0.88
Alpha	–	0.77	0.87	0.89	0.83	0.83	0.89	0.79	0.76	0.63

SCF = Social Comparison Frequency on Facebook (rated 1–5), SCO = Social Comparison Orientation (rated 1–5), SE = Self-Esteem (rated 1–5), SCC = Self-Concept Clarity (rated 1–5), IU = Intolerance of Uncertainty (rated 1–5), AXT = Anxiety (rated 1–5), DPR = Depression (rated 1–4), PSC = Private Self-Consciousness (rated 1–5), PUSC = Public Self-Consciousness (rated 1–5), EXP = Expectation to others' responses (rated 1–5).

* $p < .05$.

** $p < .01$.

Table 2
Correlations with the frequency of having a negative feeling from comparison on Facebook.

Variable	SCF	SCO	SE	Mean	SD	Alpha
NCF	.41**	.32**	-.52**	2.41	.91	.83

NCF = Frequency of having a negative feeling from comparison on Facebook (rated 1–5), SCF = Social Comparison Frequency on Facebook (rated 1–5), SCO = Social Comparison Orientation (rated 1–5), SE = Self-Esteem (rated 1–5). The mean value, standard deviation size, and Cronbach alpha are for the NCF scale.
** $p < .01$.

Table 3
Correlations between NCF (frequency of having a negative feeling from comparison on Facebook) and other constructs.

Variable	SCC	IU	AXT	DPR	PSC	PUSC
NCF	−.54**	.30**	.40**	.50**	.39**	.46**

NCF = Frequency of having a negative feeling from comparison on Facebook (rated 1–5), SCC = Self-Concept Clarity (rated 1–5), IU = Intolerance of Uncertainty (rated 1–5), AXT = Anxiety (rated 1–5), DPR = Depression (rated 1–4), PSC = Private Self-Consciousness (rated 1–5), PUSC = Public Self-Consciousness (rated 1–5).
** $p < .01$.

Table 4
Correlation between SCF, and FUI and number of friends.

Variable	FUI	TF #	AF #	CF #
SCF	.39**	−.02	−.002	−.01

SCF = Social Comparison Frequency on Facebook, FUI = Facebook Use Intensity (rated 1–5), TF# = number of total friends on Facebook, AF# = number of actual friends on Facebook, CF# = number of close friends on Facebook.
** $p < .01$.

4.1. Facebook use and social comparison frequency

In order examine the second research question (RQ2, How does a person's Facebook use[2] relate to the person's social comparison frequency on Facebook?), we first obtained correlation coefficients between social comparison frequency, and Facebook use intensity and the number of friends on Facebook. The results are presented in Table 4.

In turns out that a person's social comparison frequency is positively correlated to the person's Facebook use intensity (0.39, $p < 0.01$). This result implies that as a person regards Facebook as more important and uses it more frequently, the person more frequently compares with others on Facebook. But it has been found that a person's social comparison frequency is not correlated with the number of friends on Facebook.

4.2. Regression analysis

In order to see the unique contribution of each variable to explaining social comparison frequency on Facebook, we also ran a few regressions in addition to the bivariate correlation analyses. First, we ran a regression to assess the potential unique contribution of each psychological characteristic to social comparison frequency. The results are reported in Table 5.

It turns out that a person's social comparison orientation and self-uncertainty are significant predictors of social comparison frequency when others are controlled for. This result indicates that when other things are equal, a person who has high scores in social comparison orientation and self-uncertainty is more likely to compare with others.

[2] We focus on a person's Facebook use intensity and number of friends.

Table 5
Regression of social comparison frequency on Facebook on personal psychological characteristics.

Variable	SCO	SE	SU	PSC	PUSC
Coefficient	.52**	-.15	.44*	.07	.25*

Dependent variable = SCF, Social Comparison Frequency on Facebook (rated 1–5). SCO = Social Comparison Orientation (rated 1–5), SE = Self-Esteem (rated 1–5), SU = Self-Uncertainty, composed of four constructs, PSC = Private Self-Consciousness (rated 1–5), PUSC = Public Self-Consciousness (rated 1–5). (R^2 = .345, F-statistic = 18.63, $p < .001$).
* $p < .05$.
** $p < .01$.

In addition, we also ran a hierarchical regression to see the contribution of Facebook use-related variables (i.e., Facebook use intensity and the number of friends on Facebook) and socio-demographic variables (i.e., gender and school year) in improving the regression model of social comparison frequency on Facebook. The results are reported in Table 6.

The results show that the contribution of the new variables (i.e., FUI, TF#, Gender, and School year) in improving the model fit is significant (F statistic change = 6.01, $p < .001$). It turns out that the influence of the SCO (social comparison orientation) and FUI (Facebook use intensity) are the most significant when other variables are controlled for.

5. Discussion

In this study, we have studied how college students compare themselves with others on Facebook. Specifically, we looked at the relationship between Facebook use and social comparison frequency; how an individual's psychological characteristics influence the person social comparison frequency on Facebook; and how an individual's social comparison frequency is related to the frequency of having a negative feeling from comparison on Facebook.

We first found that an individual's social comparison orientation plays an important role in explaining the person's social comparison frequency (SCF) on Facebook. The regression results in Tables 5 and 6 support this finding. The positive coefficient value of the 'social comparison orientation' variable (i.e., 0.36, $p < .01$)

Table 6
Hierarchical regression of social comparison frequency on Facebook.

Variable	Model 1		Model 2	
	Coefficient	Standard error	Coefficient	Standard error
SCO	.52**	.14	.36**	.14
SE	−.16	.12	−.20	.12
SU	.44*	.19	.40*	.18
PSC	.07	.13	.18	.13
PUSC	.25*	.13	.16	.10
FUI			.33**	.08
TF#			−.0004*	.0002
Gender			−.14	.13
School year			.06	.06
R^2	.35		.43	
F statistic change	18.63**		6.01**	

Dependent variable = SCF, Social Comparison Frequency on Facebook (rated 1–5). SCO = Social Comparison Orientation (rated 1–5), SE = Self-Esteem (rated 1–5), SU = Self-Uncertainty, composed of four constructs, PSC = Private Self-Consciousness (rated 1–5), PUSC = Public Self-Consciousness (rated 1–5), FUI = Facebook Use Intensity (rated 1–5), TF# = number of total friends on Facebook.
* $p < .05$.
** $p < .01$.

in the regression analysis can be interpreted that a person who is more inclined toward social comparison is more likely to compare herself with others on Facebook, which is similar to the findings of Gibbons and Buunk (1999).

The regression results in Table 6 also show that the coefficient value of the 'Facebook use intensity' variable is positive and statistically significant (i.e., 0.33, $p < .01$). But it is difficult to determine the direction of the causal relationship between 'Facebook use intensity' and 'Social comparison frequency on Facebook' based on the regression analysis. The positive and statistically significant coefficient value of the variable in the regression simply means that the variable explains more of the variation in the dependent variable than do other explanatory variables. Either variable can cause the other variable.

There can be two possible scenarios for the causal relationship between these two variables: (1) a person who has a high inclination toward social comparison is more likely to use Facebook intensely, and (2) a person who uses Facebook more frequently (or thinks it more importantly) is more likely to engage in social comparison on Facebook. But it is not sure which case is correct. If the first scenario is correct, then we can possibly conclude that people use Facebook as a place where they can compare with others and if the latter scenario is correct, then we can say that Facebook use makes people engage in more social comparison. If Mussweiler et al. (2006)'s claim, which says "Whenever people are confronted with information of others, they engage in social comparison behavior", is valid, then the latter scenario is plausible, because as a person uses Facebook more frequently, it is likely that the person is exposed to more information of others. In order to investigate the accurate causal link, a longitudinal study should be conducted by measuring social comparison orientation and Facebook use intensity at several time points – before starting a social network site and while using the site.

From the regression analysis, we also found an individual's self-uncertainty is an important factor explaining the person's social comparison frequency, which means that a person who is less certain about herself more frequently compares with others on Facebook. According to Gibbons and Buunk (1999), it is likely that a person with high self-uncertainty engages in more social comparison, in order to enhance self-concept through social comparison.

In addition to the regression analysis, we also obtained correlations between social comparison frequency (SCF) and psychological traits. The relationships between those variables found in offline environments by prior studies were also found on Facebook. For example, we found that a negative relationship between self-esteem and SCF on Facebook, which is similar to the findings of Buunk and Gibbons (2006). Moreover, as Buunk and Gibbons (2006) argued, a person who is more aware of herself in the presence of others tends to engage in social comparison more frequently on Facebook.

We also studied the relationship between social comparison frequency and the frequency of having a negative feeling from comparison on Facebook. We have found that a positive correlation between social comparison frequency on Facebook and the frequency of having a negative feeling from comparison (i.e., think others are having a better life and doing better than the comparer). This positive correlation can be due to several different reasons. First, there can be a third factor that influences both comparison frequency and the frequency of having a negative feeling. An individual's psychological traits can be this third factor. For example, people with low self-esteem and high self-uncertainty can engage in more comparison and have more negative feelings from comparison than people with high self-esteem and low self-uncertainty. Second, it is possible that Facebook users post more good things about themselves on Facebook than bad things. If this is the case, it is likely that people feel more negatively when they engage in more comparison, because according to Marsh and Parker (1984), and Morse and Gergen (1970), people tend to feel negatively when they engage in upward social comparison.

We have also found that a person's expectation to others' responses to her postings is positively correlated to the person's social comparison frequency on Facebook. But, we cannot draw any causal relationship between these two variables from our finding because it is just a correlation. On the one hand, it is possible that as a person more frequently compares with others on Facebook, the person more expects others to respond to her postings and on the other hand, the opposite is also possible. Nonetheless, according to the findings on the relationship between psychological characteristics and social comparison frequency in our study, the positive relationship between those two variables implies that students with low self-esteem, high self-uncertainty, and high self-consciousness are more likely to expect their friends to respond to their postings and feel sad if not.

6. Limitations

One of the difficulties in social comparison research is the fact that people are reluctant to admit that they have engaged in social comparison (Buunk & Gibbons, 2006). In this sense, it might be possible that the actual comparison frequency of college students on Facebook is higher than what they reported.

Another weakness of the present study is that we did not take into account the valence of postings (i.e., whether a posting contains positive or negative content) that the respondents had read (or seen) when we measured the frequency of having a negative feeling from comparison. It is possible that a person who reads more postings that boast is more likely feel negatively. That is, the valence of the postings that respondents read can influence how they feel and how often they feel positively or negatively.

In the present study, the focus is on the factors that might affect social comparison frequency on Facebook. However, we did not examine how the frequent social comparison behavior on Facebook can influence its users (in terms of, for example, psychological/physical health, academic performance, etc.). In this regard, it would be interesting to investigate the consequences of social comparison behavior on Facebook on its users.

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