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Facebook use and individual well-being: Like me to make me happier!

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Facebook use and individual well-being: Like me to make me happier!

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Abstract

This paper aims to study how Facebook use influences individual well-being. We use a survey conducted on a representative sample of 2,000 French Facebook users. Our results show that Facebook interferes with subjective well-being through its effects on friendships and self-esteem. Hence we find a positive relation between receiving a great number of Likes and comments from Facebook friends and the level of life satisfaction. By contrast, people that would like to receive more Likes tend to be more unsatisfied with their life. The latter result suggests that Facebook use can exacerbate frustration and envy. Finally, the time spent on Facebook, the intensity of online interactions as well as the number of Facebook friends have no direct impact on life satisfaction. All these findings underlines the ambivalence of Facebook use with both positive and negative psychological effects on well-being.

Keywords : Facebook, self esteem, well-being, Internet, online sociability

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Introduction

74 % of internet users have at least one social network account (Facebook, Twitter, LinkedIn, ...) (26 % of the global population). Facebook with its 1.35 billion monthly active users is the most popular and profitable social network site. Facebook is used for personal as well as professional motives. In 2013, the company had revenues of 7.87 billion of dollars (an increase of 55% year-over-year) and profits of 1.5 billion. Facebook popularity raises questions about its influence on sociability and happiness. For instance, a Facebook research team has created a "Gross National Happiness index" in 18 countries, based on the number of positive and negative words in status updates. The underlying idea is that the content of status updates may reflect the mood of Facebook users day-to-day. But to what extent does Facebook use affect our mood and happiness?

Few studies have paid attention to the impact of Facebook on individual happiness. There are some studies that focus on the relationship between online social networks and happiness, but either they are not focusing on Facebook or they use small and non representative samples of Facebook users. Most of them conduct their surveys or experiments on groups of american students. For instance, Kim and Lee (2011) analyzed the effects of the number of Facebook friends on the subjective well-being of students. But, this study is based on 391 college students. Sabatini and Sarricino (2014) use a large representative sample of the Italian population to analyze the impact of social network uses like Facebook, Twitter and other SNSs on well-being, but their data don't allow them to isolate the effects of Facebook, and to control for the number of Facebook's friends and the intensity of online sociability.

The originality of our study is to examine the relationship between the usage of Facebook and individual happiness using a representative sample of 2,000 French Facebook users. We conjecture that Facebook can influence life satisfaction directly and indirectly through its effects on emotions and sociability. Our results show that Facebook has significant impact on individual well-being either by reinforcing individuals' self-esteem or by exacerbating social comparison. Hence we find a positive relation between receiving a great number of Likes or comments from friends and the level of life satisfaction. By contrast, people that would like to receive more Likes tend to declare a lower level of well-being. The latter result reflects the frustration or envy that Facebook may generate.

Finally, the time spent on Facebook, the intensity of online interactions as well as the number of Facebook friends have no direct impact on life satisfaction. All these findings underlines the ambivalence of Facebook use with both positive and negative psychological effects on well-being.

Our paper is related to the literature on happiness. This literature aims to explain what makes people more satisfied with their life. Research on happiness has made progress in identifying the determinants of happiness (Blanchflower and Oswald, 2004; Christoforou, 2011; Dolan, Peasgood and Whife, 2008; Easterlin, 2001; Helliwell, 2006; Ferrer-i Carbonell and Frijters, 2004; Frey and Stutzer, 2002, 2010; Fritjers, Johnson and Shields, 2011; Oswald, 1997). The main predictors of happiness are health, employment status, marital status, sociability, income and education. In particular, poor health, unemployment and lack of sociability are strongly associated with low well-being. Our paper suggests that social network sites like Facebook can also affect well-being.

The remaining of this article is organized as follows : Section 1 presents the literature review and the research hypotheses; Section 2 describes the data and the methodology; Section 3 comments on the econometric results.

1 Literature review and research hypotheses

1.1 Relationship between Internet use and well-being

A few of studies have investigated the impact of the Internet on happiness, but all of them agree that the Internet has welfare effects. Kavetsos and Koutroumpis (2011) analyze the impact of information technology on subjective well-being, using a pooled cross-sectional data set of European countries. They find that having a cell phone, a PC or an Internet connection at home is associated with higher levels of well-being. Similarly, using an Italian household survey from 2008, Sabatini (2011) finds a positive relation between online shopping and subjective well-being. From a survey of 7,000 retired persons, Ford and Ford (2009) show that Internet use by elderly Americans leads to about a 20% reduction in depression; in other words, the Internet increases their mental well-being. Using Luxemburgish data, Penard et al. (2013) find evidence that non users are less satisfied in their life than Internet users. Moreover, the positive influence of Internet use is stronger for individuals who are young or have difficult living conditions.

However, Internet use may also have detrimental effects on well-being. Kraut et al. (2002) find that for people who have few friends, Internet use tends to strengthen social isolation. The time spent online can actually reduce the time available for face-to-face interaction (Nie, Hillygus and Erbring, 2002).

1.2 Relationship between online sociability and life satisfaction

The growing use of social network sites (Facebook, Twitter,...) has increased the role of online sociability in the daily life, especially for younger generations. Several studies have shown that the Internet is a means of building and maintaining social relations or social capital (Franzen, 2003; Penard and Poussing, 2010; Shklovski, Kiesler and Kraut, 2006). Individuals can complement their face-to-face interactions with their family and friends with computer-mediated interactions. They can also interact online with people they have never met physically and make new "virtual friends". But some studies underline the ambiguous impact of social networks on individual life satisfaction. Social network sites can create envy and bitterness because people are exposed to happy times and positive images of their friends. By social comparison, they could feel more depressed or frustrated (Festinger (1954), Clark and Selnik (2004)). Facebook increases transparency, but it provides a distorted perception of real life and overexposes people to the judgments of other users (through "Likes" and comments).

Mukesh and Gonçalves (2013) examine how the number of online friends affects life satisfaction. Traditionally, there is a positive relationship between the number of friends and individual well-being. But, this relation is more ambiguous with Facebook friends. The experiments conducted by Mukesh and Gonçalves (2013) show that more Facebook friends induce more ostentatious posts and updates, which decreases life satisfaction. Valenzuela et al. (2009) find a positive, but weakly significant, relationships between intensity of Facebook use and college students' life satisfaction or social trust. Ellison and al. (2011) conducted a survey on a sample of 267 undergraduated students at a Midwestern University. They show that Facebook use enhances bridging social capital (weak ties), but with greater benefits for users who have lower self-esteem and lower life satisfaction. Kross et al. (2013) also focused their experiments on young adults. But they show that Facebook use may undermine well-being, rather enhancing it. This negative effect is worse when the young subjects spend more time on Facebook.

Berger and Buechel (2012) show that Facebook can have a therapeutic role. Through several experiments, they observe how people share their emotions after a negative affective experience. Emotionally unstable users tend to share more their emotions on Facebook and feel better after.

The study of Sabatini and Sarracino (2014) is the closest to our study in terms of methodology. They use a representative sample of the Italian population, and analyze the impact of social network sites on sociability and well-being. They observe that using online social networks like Facebook and Twitter has a positive impact on face to face interactions while it decreases social trust. They argue that the use of social networking sites threatens subjective well-being by exposing people to negative online experiences (aggressive behaviors, hate speech, frustration,...).

1.3 Hypotheses

The literature review shows that Internet use in general is positively correlated with individual well-being. But the usage of online social networks has more ambiguous effects, and the causal relation is complex. For instance, the presence on social network sites can be explained by offline sociability that is a strong predictor of well-being. So the possibility of reverse causality implies to be cautious in our empirical analysis of the interactions between social network sites and happiness. Based on the literature review, we formulate five hypotheses about the relationships between sociability, Facebook use and life satisfaction. Literature on happiness has shown that offline sociability has a strong influence on individual well-being. The frequency of face-to-face meeting with friends or the participation to voluntary organizations are positively correlated with happiness (Becchetti, Pelloni and Rossetti, (2008), Helliwell (2006)).

H1 : Offline sociability increases individual well-being.

Sabatini and Sarracino (2014) find that using social network sites like Facebook strengthens offline sociability. Moreover, Mukesh and Gonçalves (2013) show that having more online interactions with friends increases happiness. So we expect a positive correlation between online sociability and well-being. More precisely, individuals who have a lot of Facebook's friends and use intensively Facebook to interact with their friends, should be happier.

H2 : Online sociability on Facebook increases individual well-being.

Facebook use can also increase self-esteem. On Facebook, people tend to post news and photos that give a favorable image of themselves. Through these posts, Facebook users show ostentatious consumption and happy events like vacations, party with friends, ... and in return, they expect to receive positive comments and likes from their friends. Several studies find that Facebook's Likes reinforce or promote self-esteem (Berger and Buechel (2012)). By contrast, Facebook can have negative effects on well-being for individuals who don't attract the attention of the others or don't receive their approbation. In other words, Facebook use can exacerbate social comparison and frustration if your exposure to others' happiness is not counterbalanced by positive feedback (Likes, comments) (Mukesh and Gonçalves (2013)).

H3 : By enhancing self-esteem, Facebook use increases individual well-being.

Finally the experiences that Facebook users have had through their online interaction with their friends, can influence their well-being. Facebook experience can be positive when it enables to strengthen the existing ties with friends or create new ties (Penard and Poussing, (2010)). For instance, Facebook helps us to stay in touch with distant friends. It also facilitates the organization of social activities or the coordination of communities. However, Facebook can also deteriorate relations with some friends by highlighting divergent views on politics, religion or values, or by provoking jealously (Sabatini and Sarracino (2014)).

H4 : Positive social experiences (i.e. strengthening ties with friends and acquaintances) on Facebook increase individual well-being.

H5 : Negative social experiences (i.e. damaging some friendships) on Facebook decrease individual well-being.

2 Data and methodology

2.1 Description of data

We use an online survey conducted by Harris Interactive in 2013, to test our hypotheses. The 2,000 respondents are a representative sample of French Facebook users aged above 15. They were selected according to quota sampling (quota by gender, age, socioeconomic class and income). The questionnaire contains questions about the motives to use Facebook, the nature and intensity of usage and the perceived impact of Facebook use on sociability and life satisfaction. We also have detailed information about the socio-demographic characteristics and offline sociability.

The mean age of the respondents is 36 (min. 15 and max 86). 51 % of the respondents are female and only 22.05 % live alone. 21.95 % have a primary education level, 44.45 % a secondary education level and 33.6 % have a post secondary degree (tertiary education). Moreover, 21.8 % live in a rural area or in small cities (less than 2000 inhabitants), 51.65 % in a medium-sized city (<100 000) and 26.55 % in a large city (>100 000). Concerning income, our survey provides a subjective measure of living conditions. 36.2% declare comfortable living conditions, while 20.1% think that their living conditions are difficult and 43.6% have living conditions that are just sufficient to support their needs. Finally, 35 % are in upper socio-professional categories, 31 % in lower socio-professional categories and 34 % are either students, housewife or unemployed.

Table 1 presents the frequency of Facebook use. Most of the respondents (67.8 %) declared they are connected to Facebook every day. Only 5.35% are irregular Facebook users (less than once a month).

Table 1: Frequency of Facebook use

Frequency	**Percent**	**Cumulative**
< once a month	5.35	5.35
1 to 3 times a week	6.15	11.50
Weekly	5.90	17.40
Several times a week	14.80	32.20
Daily	21.50	53.70
Several times a day	39.70	93.40
In continuous	6.60	100.00
TOTAL	100.00	

Now we present the dependent and independent variables used in our econometric models, and the expected effects for each explanatory variable.

2.2 Dependent variable

The survey provides a subjective measure of life satisfaction. Participants were asked to estimate their life satisfaction ("*Do you agree with the statement "I am satisfied with my life ?"*) on a 7-point Likert scale (Diener's Satisfaction With Life Scale). They could choose from 1 (strongly disagree) to 7 (strongly agree). The distribution of answers is rather skewed. Table 2 shows that the responses are concentrated on the values 4, 5 and 6 with few responses at both extremes of the scale. Only 5.9 % of the respondents strongly agree that they are satisfied with their life and 4.3% strongly disagree.

Table 2: Distribution of Life Satisfaction (7-point Likert Scale)

Likert Scale	**Percent**	**Cumulative**
1	4.30	4.30
2	7.30	11.60
3	10.08	22.40
4	18.35	40.75
5	19.75	60.50
6	33.60	94.10
7	5.90	100.00
TOTAL	100.00	

We choose to recode Life Satisfaction into a three-level variable. The variable LIFESATISACTION takes the value "1" if participants "very disagreed" (1), "disagreed" (2) or "disagreed somewhat" (3) that they are satisfied. LIFESATISACTION is equal to "2" if the respondents were "undecided" (4) or "agreed somewhat" (5), whereas it is equal to "3" when they "agreed" (6) or "strongly agreed" (7). Table 3 presents the new distribution of this variable.

Table 3: Distribution of LIFE SATISFACTION (3-point scale)

	Percent	**Cumulative**
1	22.40	22.40
2	38.10	60.50
3	39.50	100.00
TOTAL	100.00	

2.3 Independent variables

The explanatory variables are grouped into 5 categories.

- **Set 1: socio-demographic variables**

The first set of variables corresponds to the socio-demographic characteristics : gender, age, occupational status, household size ([1]) and living conditions. Previous works have found a U-shaped curve between well-being and age: happiness tends to decrease until it reaches a minimum level around 40 years, and then increases with age (Dolan et al. (2008)). Regarding gender, women seem to report higher happiness, but this result is not very robust (Blanchflower and Oswald (2004)). Being single (especially if recently separated or divorced) should decrease happiness (Helliwell (2003)). Having a high occupational status or comfortable living conditions tends to be positively correlated with well-being (Frey and Stutzer (2002), Helliwell (2003), Clark and Oswald (1994)).

- **Set 2: offline sociability**

The second set of variables measures the intensity of offline sociability. The first variable OFFLINESOCIABILITY indicates the frequency of spontaneous meetings with friends. This binary variable is equal to one if the individuals has face to face meetings at least once a week (55.2% of the respondents). We also introduce a variable that measures the frequency of cultural outings (at least once a week) and the active participation to voluntary organizations. These three variables are used to test hypothesis 1 (*Offline sociability increases individual well-being*).

- **Set 3: online sociability**

A third set of variables measures the nature and intensity of Facebook usage. First, we control for the number of Facebook friends (less than 20, between 20 and 100 and above 100). 19.4% of the respondents have less than 20 friends and 41.1% have more than 100 friends.

We also distinguish between a passive and active usage of Facebook. The survey contains questions about the Facebook activity of the respondents and the frequency of posting news or photos on their own wall, viewing their friends' wall, posting comments on friends' walls, chatting with friends. We build a variable named "INTERACTIVEUSE" by summing the number of regular interactive use (regular interaction on their own wall ; regular interaction on the friends' walls and regular

[1] Unfortunately, we have no information about the marital status or the number of children

chatting). This variable ranges from 0 to 3. The average score is 0.9

We construct another binary variable "PASSIVEUSE" that equals "1" if the respondents often look at the walls of their friends without interacting with friends (INTERACTIONUSE=0)[2]. This variable helps us to identify people who don't use Facebook for self-promotion or to develop online sociability (19.5% of the respondents).

We expect a positive impact of the number of Facebook friends on individual well-being (Kim and Lee (2011)). The score of INTERACTIVEUSE should also be psoitively correlated with life satisfaction (Hypothesis 2). By contrast, PASSIVEUSE may have the opposite effect because the lack of social interaction on Facebook increases the probability of negative feelings (envy or frustration).

- **Set 4: Self-esteem and envy**

Hypothesis 3 is tested by two variables related to Facebook Likes. Facebook users can react to a status update, a link or a photo posted by a friend, by clicking on the "I like" button . They can also comment or share it with their friends. 69.8% declare that their Facebook activity generates a lot of Likes and comments from their friends(FACEBOOKLIKES). The expected effect on individual well-being is positive as comments and Likes reinforce self-esteem. The second variable LIKESENVY is a binary variable equal to 1 if the individual complains of receiving not enough Likes (42.8% of the respondents). This variable is a psychological measure of frustration or envy caused by Facebook use and should be negatively correlated with life satisfaction.

Finally, we introduce three binary variables that measure the quantity of personal photos or videos posted on Facebook (no photos/videos, small or large number of photos/videos). It provides a measure of interactive use of Facebook. It is also a form of self-promotion that reinforces the ego and increases well-being (hypothesis 3).

[2]For each value of INTERACTIONUSE variable the distribution is : 0 (= 47,9 %) ; 1 (= 22,9 %) ; 2 (=17,25 %) and 3 (= 11,95 %)

- **Set 5: Social ties and social experiences**

The litterature review has underlined that Facebook can impact social trust and social ties.
We build on the Granovetter (1973) theory of strong and weak ties. We create several variables that indicate whether Facebook's users have had good or bad experiences from their online interactions. Strong ties refer to close friends and are important to provide support and emotional aid. Weak ties represents acquaintances or friends of friends. They can serve to access new ideas or resources that are not present in our social circle (Granovetter (2005)). Clearly, Facebook use may help to maintain or intensify existing social ties with close friends and family (strong-tie), but also to create new ties with virtual acquaintances (weak-tie).

In our survey, we know whether respondents have seen their friends more often, their ability to communicate with them has been improved and they have had more friends, since they use Facebook. They had three possible answers (positive impact, negative impact, no impact). For the three questions, we sum the number of positive answers and we create a variable "POSITIVESTRONGTIES" that ranges from 0 (if the individual has less friends, meets them less frequently and the ability to communicate with them has been reduced) to 3 (if Facebook has strengthened the existing ties with friends). Similarly, the variable "NEGATIVESTRONGTIES" is created by summing the negative answers. A score of 3 means that Facebook has damaged the existing ties with friends. We also introduced a binary variable "POSITIVEWEAKTIES" that is equal to 1 if respondents declare that Facebook has enabled them to make new acquaintances or create new ties.

We also create two binary variables "POSITIVEEXPERIENCES" and "NEGATIVEEXPERIENCES" that respectively indicates whether Facebook use has strengthened their friendships or has damaged some of their friendships.

We test hypothesis 4 with the variables POSITIVESTRONGTIES (or POSITIVEEXPERIENCES) and POSITIVEWEAKTIES and hypothesis 5 with NEGATIVESTRONGTIES (or NEGATIVE-EXPERIENCES).
Table 4 provides descriptive statistics of the dependent and independent variables used in the econometric models. Table 5 presents the expected effects of the explanatory variables and how they are related to our research hypotheses:

Table 4: Definition and descriptive statistics of variables (1/2)

Variables	**Description**	**Mean and S.E.**	Min	max
LIFESATISFACTION	"Do you agree with the statement that you are satisfied with your life ?", 1="strongly disagree", "disagree", "somehow disagree" ; 2="undecided", "somehow agree" ; 3="agree" and "strongly agree"	2.171 (0.768)	1	3
GENDER	0=male ; 1=female	0.502 (0.500)	0	1
AGE	Continuous variable	36.6945 (14.22)	15	86
HIGHSTATUS	"1" for upper occupational categories (managers, engineers, entrepreneurs,...) ; 0 if "not"	0.351 (0.478)	0	1
HOUSEHOLD	Number of persons in the household	2.593 (1.315)	1	10
LOWINCOME	"Do you think that your living conditions are "very difficult" or "difficult" ?" (binary)	0.201 (0.401)	0	1
MEDIUMINCOME	"Do you think that your living conditions are just sufficient to support your lifestyle ?" (binary)	.4365 (.496)	0	1
HIGHINCOME	"Do you think that your living conditions are "comfortable" or "very comfortable" ?" (binary)	0.362 (0.481)	0	1
VOLUNTEER	Active participation in voluntary organizations (binary)	0.345 (0.475)	0	1
OFFLINESOCIABILITY	"How frequently do you meet friends?" : "1" if at least once a week ; 0 if not	0.552 (0.497)	0	1
CULTURALOUTINGS	"How often do you have cultural outings ?" : 1 if at least once a week ; 0 if not	0.128 (0.334)	0	1
SMALLFRIENDS	"How many friends do you have on Facebook?" : 1 if the number is <20 (very few friends)	0.194 (0.396)	0	1
MEDIUMFRIENDS	1 if the number of friends is [20;100]	0.3945 (.4888)	0	1
LARGEFRIENDS	1 if the number of friends is >100	0.411 (0.492)	0	1

Table 5: Definition and descriptive statistics of variables (2/2)

Variables	**Description**	**Mean and S.E.**	Min	max
INTERACTIONUSE	Score for the intensity of interactive uses on Facebook (Chat, online interactions with friends, etc.)	0.933 (1.061)	0	3
PASSIVEUSE	Passive use of Facebook (only "read" or view friends' wall)	.195 (0.396)	0	1
NOPHOTOS	No personal photos/videos posted on Facebook	0.153 (0.360)	0	1
PHOTOS1	Small number of personal photos/videos posted on Facebook [1;50]	.576 (0.494)	0	1
PHOTOS2	Large number of personal photos/videos posted on Facebook (>50)	0.271 (0.445)	0	1
FACEBOOKLIKES	1 if the individual receives a lot of "Likes" or positive comments.	0.698 (0.459)	0	1
LIKESENVY	1 if the individual would like to obtain more "Likes" or comments.	0.428 (0.495)	0	1
POSITIVESTRONGTIES	score indicating to what extent Facebook has contributed to improve relations with close friends	0.630 (0.800)	0	3
NEGATIVESTRONGTIES	score indicating to what extent Facebook has damaged relations with close friends	0.132 (0.487)	0	3
POSITIVEWEAKTIES	1 if the individual has made new acquaintances thanks to Facebook.	0.380 (0.486)	0	1
POSITIVEEXPERIENCES	1 if Facebook use has helped to strengthen friendships	0.213 (0.409)	0	1
NEGATIVEEXPERIENCES	1 if Facebook use has damaged some friendships	0.123 (0.329)	0	1

Table 6: Hypotheses and expected results

Hypotheses	**Variables**	**Expected sign**
H1 : Offline sociability increases individual well-being	VOLUNTEER	+
	OFFLINESOCIABILITY	+
	CULTURALOUTINGS	+
H2 : Online sociability on social network sites	FRIENDS	+
(e.g. Facebook) increases individual well-being	INTERACTIONUSE	+
	PASSIVEUSE	-
H3 : By enhancing self-promotion and self-esteem Facebook use	PHOTOS	+
increases individual well-being	FACEBOOKLIKES	+
	LIKESENVY	-
H4 : Positive social experiences on Facebook increase	POSITIVEEXPERIENCES	+
individual well-being and	NEGATIVEEXPERIENCES	-
	POSITIVESTRONGTIES	+
H5 : Negative social experiences on Facebook decrease	NEGATIVESTRONGTIES	-
individual well-being	POSITIVEWEAKTIES	+

2.4 The econometric model

Our empirical strategy is to estimate the effects of Facebook use on Life Satisfaction. As our dependent variable LIFESATISFACTION is ordinal, we use an ordered logit model. For each individual *i=1, ..., 2000*, there is a latent variable Y_i^* that corresponds to the actual level of life satisfaction. But we only observe the discrete ordered variable Y_i that takes the values 1, 2 or 3. We suppose that life satisfaction is influenced by a set of independent variables X_i. The relation between life satisfaction and these independent variables can be written as $Y_i^* = \beta' X_i + \varepsilon_i$ with β the vector of coefficients associated to the explanatory variables and ε_i the error term. Then we have $Y_i = 1$ if $Y_i^* \leq \alpha 1$, $Y_i = 2$ if $\alpha 2 \leq Y_i^* \leq \alpha_3$ and $Y_i = 3$ if $\alpha 3 \leq Y_i^*$. Given $F(.)$ the logistic distribution function of the error term ε, we have $P(Y_i = 1) = F(\alpha 1 - \beta' X_i)$, $P(Y_i = 2) = F(\alpha 2 - \beta' X_i) - F(\alpha 3 - \beta' X_i)$ and $P(Y_i = 3) = 1 - F(\alpha 3 - \beta' X_i)$. Coefficients *beta* and cut-points α_j are obtained by Maximum Likelihood Estimation (MLE) of the ordered logit model $ln(L) = \sum_{i=1,N} \sum_{j=0,3} I_{ij} ln(P(Y_i = j)$ with $I_{ij} = 1$ if $Y_i = j$ and 0 otherwise.

We also conducted ordinary least squared (OLS) regressions on the initial life satisfaction variable (7- point Likert scale). The results are qualitatively similar to those obtained with the ordered logit model, but are more questionable given the ordinal nature of our dependent variable (see appendix in Table 8).
Our strategy is to estimate our econometric model step by step by introducing sequentially the 5 sets of variables :
- Model 1 : sociodemographics (control) variables
- Model 2 : Sociodemographics, offline sociability variables
- Model 3 : Sociodemographics, offline sociability, online sociability variables
- Model 4 : Sociodemographics, offline sociability, online sociability, self-esteem variables
- Model 5 : Sociodemographics, offline sociability, online sociability, self-esteem, social experiences/social ties variables.

Model 2 allows us to test hypothesis 1, Model 3 to test hypothesis 2 ; Model 4 to test hypothesis 3 and Model 5 to test hypotheses 4 and 5.

3 Results

Table 7 displays the results of the econometric estimations. We start by the first column of results (M1). We find consistent results with previous studies on the determinants of happiness. Age, income and household size have a positive impact on life satisfaction. Moreover a high occupational status increases well-being.

The second column (M2) indicates that offline sociability increases life satisfaction. Frequent meeting with friends, but also participation to voluntary organizations are positively correlated with life satisfaction. However, volunteering are no more significant when we control for online sociability. Finally, cultural outings have no impact on individual well-being.

The third column (M3) introduces the variables of online sociability. There is no significant relationship between the number of Facebook's friends and life satisfaction. However the intensity of Facebook activity ("INTERACTIONUSE") is positively correlated with LIFESATISFACTION, but this effect disappears when we introduce the variables that measures self-esteem effects and social experiences.

Table 7: The determinants of life satisfaction with Ordered Logit estimation

Dependent variable : LIFESATISFACTION

	m1	**m2**	**m3**	**m4**	**m5**	**m5 bis**
GENDER	-0.040	-0.065	-0.080	-0.111	-0.117	-0.114
	(-0.45)	(-0.73)	(-0.88)	(-1.21)	(-1.28)	(-1.25)
AGE	0.006*	0.007**	0.011***	0.011***	0.011***	0.011***
	(1.92)	(2.18)	(2.94)	(2.92)	(2.84)	(2.81)
HIGHSTATUS	0.241***	0.257***	0.260***	0.241**	0.244***	0.238**
	(2.62)	(2.77)	(2.80)	(2.57)	(2.59)	(2.54)
HOUSEHOLD	0.126***	0.129***	0.127***	0.128***	0.129***	0.128***
	(3.81)	(3.88)	(3.81)	(3.82)	(3.83)	(3.83)
LOWINCOME	-1.353***	-1.355***	-1.377***	-1.398***	-1.390***	-1.394***
	(-11.36)	(-11.34)	(-11.47)	(-11.58)	(-11.51)	(-11.55)
MEDIUMINCOME	REF.	REF.	REF.	REF.	REF.	REF.
HIGHINCOME	0.978***	0.950***	0.956***	0.961***	0.957***	0.962***
	(9.84)	(9.50)	(9.54)	(9.55)	(9.49)	(9.55)
VOLUNTEER		0.163*	0.147	0.148	0.149	0.149
		(1.75)	(1.56)	(1.57)	(1.57)	(1.58)
OFFLINESOCIABILITY		0.363***	0.333***	0.319***	0.304***	0.319***
		(4.03)	(3.67)	(3.50)	(3.32)	(3.50)
CULTURALOUTINGS		-0.082	-0.123	-0.101	-0.109	-0.103
		(-0.62)	(-0.92)	(-0.75)	(-0.81)	(-0.76)
SMALLFRIENDS			-0.192	-0.164	-0.155	-0.162
			(-1.49)	(-1.20)	(-1.12)	(-1.18)
MEDIUMFRIENDS				REF.	REF.	REF.
LARGEFRIENDS			0.032	0.022	0.013	0.020
			(0.31)	(0.20)	(0.11)	(0.19)
INTERACTIONUSE			0.107**	0.074	0.060	0.075
			(2.17)	(1.40)	(1.09)	(1.39)
PASSIVEUSE			0.019	0.018	0.009	0.015
			(0.15)	(0.14)	(0.07)	(0.12)
NOPHOTOS				0.201	0.209	0.201
				(1.42)	(1.47)	(1.42)
PHOTOS2				0.127	0.123	0.133
				(1.11)	(1.08)	(1.16)
FACEBOOKLIKES				0.431***	0.410***	0.433***
				(3.88)	(3.67)	(3.90)
LIKESENVY				-0.254***	-0.250***	-0.253***
				(-2.68)	(-2.59)	(-2.66)
POSITIVESTRONGTIES					0.069	
					(1.10)	
NEGATIVESTRONGTIES					-0.185**	
					(-2.10)	
POSITIVEWEAKTIES					-0.038	
					(-0.36)	
POSITIVEEXPERIENCES						0.016
						(0.14)
NEGATIVEEXPERIENCES						-0.110
						(-0.81)
cons	-0.739***	-0.479**	-0.302	-0.111	-0.159	-0.131
	(-3.98)	(-2.42)	(-1.35)	(-0.47)	(-0.67)	(-0.55)
cons	1.223***	1.501***	1.685***	1.891***	1.849***	1.872***
	(6.57)	(7.50)	(7.46)	(7.94)	(7.71)	(7.82)

* p<0.10, ** p<0.05, *** p<0.010

The fourth column (M4) introduces the variables about the "Likes" and comments received from friends and the number of photos or videos released. We find no relationship between the volume of personal photos and videos and life satisfaction. As expected, Facebook users that receive a lot of Likes/comments are more satisfied with their life. This suggests that individuals are very sensitive to the judgment of their friends. In offline sociability, others' judgments are less immediate or visible.

By contrast, Facebook Likes and comments convey instantaneous social approval (or disapproval) whenever your friends choose (or not) to share or like your posts or status update. This is confirmed by the fact that individuals who receive not enough Likes declare lower life satisfaction. This finding highlights the ambiguous effects of Facebook. Social network sites may exacerbate self-esteem and envy through mechanisms of social feedback (Likes, Share, Retweet, favorite,...).

Finally, the two last columns concern the impact of positive and negative social experiences on Facebook. In column 5, we find that individuals for which Facebook use has reduced the quality of relationships with existing friends (NEGATIVESTRONGTIES) declare lower well-being. But this result is weakly supported by our estimations since in column 6, a negative experience with Facebook (i.e. Facebook use has damaged some of your friendships) is no more significant. Finally, a positive experience of Facebook on strong ties or weak ties doesn't improve well-being. Probably, this effect is already captured by the variable OFFLINESOCIABILITY.

The following table summarizes our results.

Hypotheses	**Results**
H1 : Offline sociability increases individual well-being.	H1 **confirmed**
H2 : Online sociability on Facebook increases individual well-being.	H2 **not confirmed**
H3 : By enhancing self-esteem Facebook use increases individual well-being.	H3 **confirmed** with the variables LIKESENVY and FACEBOOKLIKES
H4 : Positive social experiences on Facebook increase individual well-being.	Not confirmed
H5 : Negative social experiences on Facebook decrease individual well-being.	H5 **confirmed** with « NEGATIVE-STRONGTIES »

4 Conclusion

Our paper contributes to the literature on the effects of virtual sociability and social network sites. The results show that offline sociability is the main predictor of life satisfaction and that real friends counts more than Facebook friends (Helliwell and Huang (2013)). Facebook use, and more generally Internet use, has a smaller impact on individual well-being. However we find that individuals are very sensitive to the Facebook Likes they receive. Facebook Likes are a form of social approbation that reinforces self-esteem. Conversely, an individual that receives not enough Likes can feel frustrated and interpret it as a lack of friendships. Social network sites like Facebook serve to reveal the opinion that the others have on oneself.

Our study presents several limitations. Our data are cross-sectional and make causal inference more difficult. Although we observe significant correlation between life satisfaction and some of our independent variables, we need to be cautious about the interpretation. Indeed some individuals can increase their intensity of Facebook use because they are more satisfied with life and want to show it. Nevertheless, this paper provides a better understanding of the interactions between online and offline sociability and the impact of online social networks on well-being.

5 Annex

5.1 Results with OLS

Table 8: The determinants of life satisfaction with OLS estimation

Dependent variable : LIFESATISFACTION ([1;7])

	m1	**m2**	**m3**	**m4**	**m5**	**m5 bis**
GENDER	-0.016	-0.025	-0.028	-0.039	-0.041	-0.040
	(-0.50)	(-0.79)	(-0.85)	(-1.20)	(-1.26)	(-1.22)
AGE	0.002**	0.003**	0.004***	0.004***	0.004***	0.004***
	(1.99)	(2.20)	(3.03)	(2.97)	(2.90)	(2.89)
HIGHSTATUS	0.087***	0.094***	0.095***	0.089***	0.089***	0.089***
	(2.63)	(2.84)	(2.87)	(2.69)	(2.68)	(2.66)
HOUSEHOLD	0.049***	0.049***	0.049***	0.048***	0.049***	0.048***
	(4.09)	(4.13)	(4.07)	(4.06)	(4.08)	(4.06)
LOWINCOME	-0.520***	-0.514***	-0.519***	-0.522***	-0.517***	-0.521***
	(-12.32)	(-12.23)	(-12.34)	(-12.44)	(-12.31)	(-12.40)
MEDIUMINCOME	REF.	REF.	REF.	REF.	REF.	REF.
HIGHINCOME	0.348***	0.336***	0.338***	0.340***	0.338***	0.339***
	(9.88)	(9.56)	(9.60)	(9.68)	(9.63)	(9.67)
VOLUNTEER		0.065*	0.058*	0.058*	0.059*	0.059*
		(1.94)	(1.73)	(1.75)	(1.76)	(1.76)
OFFLINESOCIABILITY		0.125***	0.114***	0.107***	0.100***	0.107***
		(3.86)	(3.49)	(3.28)	(3.07)	(3.28)
CULTURALOUTINGS		-0.033	-0.047	-0.038	-0.041	-0.039
		(-0.69)	(-0.99)	(-0.81)	(-0.86)	(-0.82)
SMALLFRIENDS			-0.071	-0.062	-0.059	-0.061
			(-1.55)	(-1.27)	(-1.21)	(-1.25)
MEDIUMFRIENDS				REF.	REF.	REF.
LARGEFRIENDS			0.019	0.013	0.010	0.012
			(0.49)	(0.33)	(0.26)	(0.31)
INTERACTIONUSE			0.033*	0.020	0.016	0.020
			(1.85)	(1.08)	(0.84)	(1.06)
PASSIVEUSE			0.003	0.003	0.000	0.002
			(0.06)	(0.07)	(0.01)	(0.05)
NOPHOTOS				0.083	0.085*	0.084
				(1.63)	(1.66)	(1.64)
PHOTOS2				0.050	0.049	0.051
				(1.24)	(1.23)	(1.27)
FACEBOOKLIKES				0.154***	0.146***	0.155***
				(3.88)	(3.66)	(3.89)
LIKESENVY				-0.085**	-0.084**	-0.085**
				(-2.53)	(-2.47)	(-2.53)
POSITIVESTRONGTIES					0.022	
					(0.97)	
NEGATIVESTRONGTIES					-0.070**	
					(-2.16)	
POSITIVEWEAKTIES					-0.012	
					(-0.32)	
POSITIVEEXPERIENCES						0.010
						(0.25)
NEGATIVEEXPERIENCES						-0.029
						(-0.61)
cons	1.916***	1.822***	1.755***	1.682***	1.699***	1.687***
	(28.83)	(25.77)	(21.89)	(20.05)	(20.14)	(20.01)

* p<0.10, ** p<0.05, *** p<0.010

5.2 Alternative estimations with LIFE CHANGE as dependent variable

To complete our empirical investigation, we have estimated our model using an alternative measure of well-being. The questionnaire contains the following question "If you had the chance to live your life over again, nothing will change" and the respondents had to answer on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). We created a dependent variable, named "LIFECHANGE", with the same three-level classification as "LIFESATISFACTION". The distribution of the values for LIFECHANGE is displayed in Table 9. 40.3% of the respondents would like to change their life whereas 26.2% don't want to change the way they live.

Table 9: New dependent variable distribution

LIFECHANGE	**Percent**	**Cum.**
1	40.35	22.40
2	33.40	60.50
3	26.25	100.00
TOTAL	100.00	

The results of the ordered logit regression are given by table 10. The results are rather similar to those obtained with LIFESATISFACTION and confirm the main findings summarized in Table 6.

Table 10: Results with Ordered Logit Regression - LIFECHANGE dependent variable

Dependent variable : LIFECHANGE

	m1	**m2**	**m3**	**m4**	**m5**	**m5 bis**
GENDER	0.052	0.040	0.039	0.032	0.022	0.023
	(0.59)	(0.45)	(0.44)	(0.36)	(0.24)	(0.26)
AGE	0.004	0.005	0.007*	0.006	0.006	(0.005)
	(1.28)	(1.64)	(1.79)	(1.49)	(1.54)	(1.24)
HIGHSTATUS	0.112	0.109	0.100	0.083	0.082	0.076
	(1.24)	(1.21)	(1.11)	(0.91)	(0.90)	(0.83)
HOUSEHOLD	0.063**	0.066**	0.064**	0.060*	0.060*	0.059*
	(1.97)	(2.06)	(1.98)	(1.85)	(1.87)	(1.84)
LOWINCOME	-0.721***	-0.709***	-0.710***	-0.724***	-0.722***	-0.715***
	(-6.04)	(-5.93)	(-5.92)	(-6.02)	(-5.99)	(-5.93)
MEDIUMINCOME	REF.	REF.	REF.	REF.	REF.	REF.
HIGHINCOME	0.708***	0.685***	0.687***	0.697***	0.692***	0.699***
	(7.49)	(7.22)	(7.23)	(7.31)	(7.24)	(7.31)
VOLUNTEER		0.117	0.115	0.112	0.114	0.118
		(1.29)	(1.26)	(1.23)	(1.25)	(1.29)
OFFLINESOCIABILITY		0.247***	0.244***	0.232***	0.229**	0.233***
		(2.81)	(2.76)	(2.61)	(2.57)	(2.62)
CULTURALOUTINGS		0.223*	0.225*	0.247*	0.252*	0.237*
		(1.75)	(1.75)	(1.92)	(1.95)	(1.83)
SMALLFRIENDS			-0.222*	-0.181	-0.189	-0.177
			(-1.76)	(-1.35)	(-1.41)	(-1.32)
MEDIUMFRIENDS				REF.	REF.	REF.
LARGEFRIENDS			-0.083	-0.029	-0.017	-0.032
			(-0.82)	(-0.27)	(-0.16)	(-0.30)
INTERACTIONUSE			0.007	0.005	0.013	0.004
			(0.15)	(0.09)	(0.24)	(0.07)
PASSIVEUSE			0.008	-0.000	-0.003	-0.007
			(0.07)	(-0.00)	(-0.02)	(-0.06)
NOPHOTOS				0.037	0.034	0.042
				(0.27)	(0.24)	(0.30)
PHOTOS2				-0.176	-0.179	-0.163
				(-1.59)	(-1.62)	(-1.47)
FACEBOOKLIKES				0.284***	0.290***	0.287***
				(2.60)	(2.64)	(2.62)
LIKESENVY				-0.195**	-0.184*	-0.196**
				(-2.12)	(-1.96)	(-2.12)
POSITIVESTRONGTIES					0.053	
					(0.87)	
NEGATIVESTRONGTIES					0.044	
					(0.51)	
POSITIVEWEAKTIES					-0.153	
					(-1.51)	
POSITIVEEXPERIENCE						0.097
						(0.87)
NEGATIVEEXPERIENCE						-0.278**
						(-2.09)
cons	0.069	0.311	0.281	0.314	0.313	0.265
	(0.39)	(1.62)	(1.29)	(1.37)	(1.36)	(1.15)
cons	1.586***	1.837***	1.809***	1.849***	1.850***	1.803***
	(8.64)	(9.34)	(8.16)	(7.93)	(7.87)	(7.69)

* p<0.10, ** p<0.05, *** p<0.010

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