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Gender effects and cooperation styles in the Facebook community: A quasi-experimental assessment

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ABSTRACT

This paper examines gender effects reported in a quasi-experimental implementation of a social dilemma using Facebook profile owners as subjects. By sending personal invitations via Facebook interest groups, we were able to recruit a fairly large number of participants ($N = 216$) who participated in a "one-shot" variation of the Voluntary Contribution Mechanism (VCM). In addition to participating in the social dilemma, participants provided information about their online profile and their attitude towards Facebook. We observed gender effects on the cooperation style of participants who use Facebook frequently in order to communicate not only with friends and family but also with work colleagues and business acquaintances.

1. Introduction

The comparison of the altruistic behaviour of males to that of females has been a matter of debate in the literature due to the profound implications that it has for the study of cooperation and teamwork. When the latter relates to a recruitment decision, bringing altruists onto a team project can be a significant factor for its success (Carli & Eagly, 1999). A quite prominent way of evaluating altruistic behaviour among individuals is observing their behaviour in online communities and online social networking sites (SNSs), mainly due to the fact that these provide a rich repository of recorded social interactions which can be related to other aspects of behavioural research (Boyd & Ellison, 2008). While the sense of "community" established by exhibiting cooperative behaviour (e.g. contributing to a common good) is fuzzy to conceptualise on SNSs, participant's behaviour on these sites can be considered as a proxy for other behavioural attitudes such as communication and use of language.

Nonetheless, information sharing on these websites has been a significant contributing factor in their success, shifting the overall focus to social media as a primary source of information and knowledge sharing (Wodzicki, Schwämmlein, & Moskaliuk, 2012). In that context, behavioural intentions to share information depend on the willingness of SNS users to cooperate with others with whom they might hold strong or weak social connections depending on their "offline" interaction and their position in an individual profile owner's network (Park, Choi, Hwang, & Paek, 2012). The latter has been addressed in the literature as a digital case of social capital (Lin, 2002).

From a theoretical perspective, the case of "social capital" and its formation by participation can be considered a theoretical viewpoint, whereas cohesive interactions between strangers contribute to a *public good* (Portes & Vickstrom, 2011). In that context, this *participatory behaviour* is an important aspect that characterises the potential of an individual to cooperate with others in working towards a common good (Bakker & de Vreese, 2011; Scheufele, 2002). This cooperative attitude can be influenced by the nature and use of the communication medium and can lead to the creation of digital commons that become synonymous with a public good, as in the context of any other digital community (Kollock & Smith, 1996, 2002). In that context, the evaluation of gender differences in altruistic or cooperative behaviour on social media can provide an interesting insight into how and why they are used (Tang, Ross, Saxena, & Chen, 2011; Wang, Burke, & Kraut, 2013). In addition, examining behavioural aspects in the context of an online social networking site is essential in order to assess how willing individuals are to cooperate with complete strangers, as well as the influence that the medium exerts on them to cooperate in pursuit of a common or *public* good.

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While gender differences in altruistic behaviour for the sake of the public good have been the subject of many studies on behavioural and experimental economics (for a review see Croson and Gneezy (2009)), we believe it is important to examine how such differences are manifested in the context of online social networks formed and sustained through the Internet. In particular, the objective of this study is to investigate gender differences in the cooperation styles of Facebook profile owners, taking into account the intended communication usage (labelled as "intention to use") and the intensity of Facebook use (labelled as "intensity of use").

This study contributes to the literature by examining gender differences in the context of a social dilemma. The cooperation scenario that we used in this study is based on a quasi-experimental use of the Voluntary Contribution Mechanism (VCM) introduced by Isaac and Walker (1988). By implementing an online version of the VCM and inviting Facebook profile owners to participate, we were able to match individuals to groups and assess their cooperation styles in connection with two basic constructs that relate to Facebook use, namely intention (in a professional or personal manner) and intensity (based on the construct of Ellison, Steinfield, & Lampe (2007)). To this end, this paper is structured as follows: Section 2 describes the theoretical model, the constructs, and the rationale for the analysis and the theoretical hypotheses; Section 3 provides the analysis of the data collected using the survey instrument and hypotheses testing; a discussion of the results is provided in Section 4, along with how they compare with previous literature; and the study is concluded in Section 5 with a discussion of limitations and issues for future research.

2. Study design

Gender differences with regard to altruistic behaviour have been studied extensively in cases of online information seeking (Garbarino & Strahilevitz, 2004; Hargittai & Shafer, 2006; Large, Beheshti, & Rahman, 2002). An early study by Sheehan (1999) found that women are in general more concerned about their privacy than men when it comes to sharing personal information with others. In that direction, a study by Hoy and Milne (2010) also found that women are more private and proactive than men regarding their Facebook communications. In a similar fashion in the field of online communities a review by Chermak and Krause (2002) outlined that gender matters when participants know the roles that they are going to play. Their study also revealed that women are more generous (i.e. they contribute more) than men.

As aforementioned in the introduction, this study aims to assess the interplay of four distinct elements of social and online behaviour: (a) cooperation styles derived from an individual's behaviour in the context of a social dilemma; (b) the *intensity* of Facebook use measured by a set of different elements related to an individual's own Facebook activity; (c) the role of communication *intention* in relation to Facebook use (business contacts/family and friends); and finally (d) the effect this has on gender differences with respect to altruistic behaviour. We outline the experimental variables in the sections that follow.

2.1. Variables

As mentioned in Section 1, the social dilemma that was used in order to assess cooperative behaviour in our model was a non-payment configuration of the VCM, also known in the literature as the *public goods game* (Isaac & Walker, 1988).

In the public goods game, a participant is assigned to a group along with other subjects and is given a certain number of tokens. The participant then faces the dilemma of deciding how many of those tokens (which can also be real money) to contribute (or not) to a public pot. Once every subject has made his/her decision, the remaining tokens from their initial contributions are added to an even split of the sum of tokens that have been contributed by the group members to the public pot. This type of social dilemma theorises two types of participants/players: the *altruists* (those who contribute all the tokens given to them to the pot) and the *free riders* (those who contribute none of their tokens to the public pot).

According to game theory, the Nash equilibrium of this dilemma dictates that every participant will contribute nothing to the public pot, as the calculation of the payoff for each individual subject participating in the game is maximised when the individual contribution is zero. For the contribution to be "irrational" for the participant, a multiplication factor (α) is usually added to the pot. The amount of tokens given to each participant can be denoted as P_e. From this amount, an amount $P_c \leqslant P_e$, can be contributed to the public pot. For a participant (i) taking part in the social dilemma, his/her payoff can be expressed as follows:

$$\pi_i = P_{e(i)} - P_{c(i)} + a_i \sum_i P_{c(i)} \quad (1)$$

The multiplication factor for each participant (α_i) describes the benefit that the participant receives from contributing to the public pot. On the above equilibrium, if no one contributes, then the payoff for each participant will be $\pi_i = P_{e(i)}$, while if everyone contributes the payoff will be $\pi_i = a_i \overline{P}_e$, where $\overline{P}_e$ denotes the average contribution per participant. If the benefit received from each participant in the social dilemma (α_i) is less than one, then the solution to $\max(\pi_\iota)$ implies that the value of the multiplication factor is less than one ($a_i < 1$). Depending on the amount contributed to the pot and the type of decision (whether one individual has prior information about the other individuals' contributions or not), we can classify the altruistic behaviour of the participants in a social dilemma (Croson, 2007) formalised using the VCM as follows.

2.1.1. Altruists (AL)

Altruists are the class of participants in the social dilemma who contribute all the tokens they have for the sake of the public good as represented by the public pot in the game ($P_e - P_c = 0$). According to theory, altruists may also apply reciprocity in the belief that contributing to the common good will benefit them if the amount in the pot is maximised.

2.1.2. Free riders (FR)

Free riders, or defectors, are the class of participants in the social dilemma who contribute none of the tokens that have been given to them, expecting to maximise their profits following the rational approach and complying with the Nash equilibrium of the cooperation game. In that case, the defectors can be identified by the value of their contribution ($P_c = 0$).

2.1.3. Conditional and unconditional cooperators (CC and UC)

Another approach to understanding how cooperation evolves in the social dilemma is to make use of the so-called "strategy method" to elucidate the choice of the participants. This can be seen as a theoretical case of information asymmetry on the part of the participant where he/she is better informed about the contribution of the others and can decide to contribute after all the contributions from the other participants have been revealed. In that case, the social dilemma is configured in states where the average contribution P_{cs} at stage s is displayed to the participant, who then decides on a contribution P_{cjs} taken from the initial amount. For each individual stage $S = \{1, 2, 3, \ldots\}$ and contribution P_{cj}, the sum of the contributions for each stage can be seen as: $C_i = \sum_{s=1}^{s=k} P_{c(i)} - P_{c(s)}$. If the value of C is zero, then the participants at any given stage contribute to the average contribution of the others. However, if the value is constantly below zero then the individual is classified as an unconditional cooperator.

2.2. Controls

2.2.1. Control A: Intention of Facebook use

Intention of Facebook use is a construct that denotes whether the Facebook user maintains a profile to communicate only with friends and family, or with work colleagues and professional contacts as well. The difference in intention of use can have a moderating effect on the intensity of use, because it is expected that profile owners who also use Facebook to communicate with their professional contacts will use Facebook more and exhibit more open behaviour in order to grow their networks and increase access to social capital.

2.2.2. Control B: Intensity of Facebook use

Intensity of Facebook use represents how often a profile owner uses Facebook to communicate and how emotionally attached he/she is with this type of communication. The way in which intensity classifies attachment to Facebook for a profile owner is defined by a set of different constructs which relate to: (a) the number of friends this profile owner has registered a connection with; (b) the number of hours this profile owner uses Facebook; (c) the sense of efficacy; and finally (d) the profile owner's emotional attachment to Facebook use.

Having summarised our theoretical constructs, we will continue with the description of our model.

2.3. Treatments and hypotheses

Having described our theoretical constructs, we discuss the research design which we used to delineate the research questions to be analysed.

Fig. 1 depicts the design used in our analysis. The difference between male and female profile owners for each cooperation style is the dependent variable. The intention and intensity of Facebook use form the independent variables, with gender becoming the moderator. The intention of Facebook use and the intensity of use affect the gender differences in cooperation styles in the social dilemma of the profile owners. In particular, we seek to test whether the male or female population will demonstrate a significant difference in both the conditional and unconditional choice cooperation styles, taking into account (a) the individual's high or low intensity of Facebook use, along with (b) the individual's intention to communicate with only friends/family or with colleagues as well.

For each one of the values of the independent variables, we tested the effect on cooperation styles by forming 12 distinct groups with the characteristics of the cooperation styles and the classification of the moderating variables (Intention: Colleagues and Friends vs. Only Friends; Intensity: High vs. Low). The contingency table containing the tested hypotheses is provided in the following table: (see Table 1).

In particular, the hypotheses to be tested can be formed as follows based on the combination of the values of our categorical constructs:

H1. Intention to **communicate with colleagues and friends** and **low** intensity of Facebook use will produce gender effects on the cooperation styles in the social dilemma.

H2. Intention to **communicate with colleagues and friends** and **high** intensity of Facebook use will produce gender effects on the cooperation styles.

H3. Intention to **communicate only with friends/family** and **low** intensity of Facebook use will produce gender effects on the cooperation styles.

Table 1
The contingency table containing the hypotheses constructed from our model. Abbreviations for the cooperation styles are as follows: AL (altruist); FR (free rider); CC (conditional cooperator); UC (unconditional cooperator).

Intention to use	Intensity of use	Cooperation style	Examination of gender effects
Colleagues and friends/family	Low	AL FR UC CC	H1
	High	AL FR CC UC	H2
Only friends/family	High	AL FR CC UC	H3
	Low	AL FR CC UC	H4

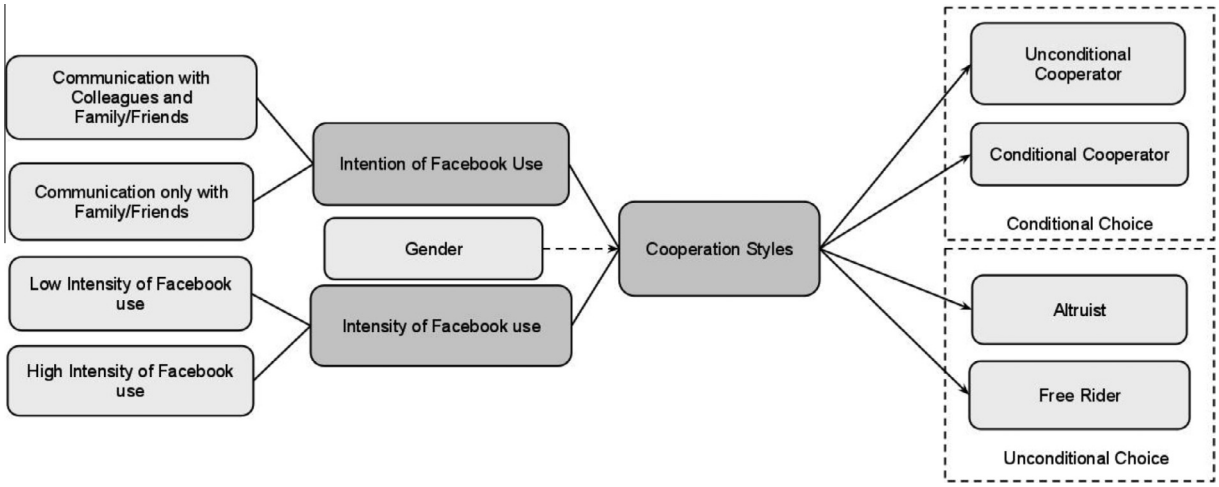

Fig. 1. The model used in this study.

H4. Intention to **communicate only with friends/family** and **high** intensity of Facebook use will produce gender effects on the cooperation styles

Having described the hypotheses that we are going to test with our model, we provide a description of the data collection instrument, the methods and the results in the following section.

3. Data, methods and results

The data were collected using an online system to host the social dilemma and the questions about Facebook use. Subjects were recruited from a mailing list of professionals who had previously participated in a training course. Participants were invited to participate via email. The web-based experiment was active over a two-month timeframe from November to December 2012. A printout of the instructions and the questions is provided on the appendix.

3.1. Experiment flow and subject recruitment

The experiment was hosted online on the university's web server in order to ensure credibility and anonymity. In total, 320 subjects participated, of which $N_{\text{facebook}} = 257$ (80.3%) responded that they had a profile on Facebook. From this number (N_{facebook}), we excluded those respondents who did not correctly answer the control questions introduced after the instructions on the social dilemma. Therefore, our analysis was limited on this sample of the 216 individuals ($N = 216$).

The experiment was divided into four (4) parts. The first part (Part 1) had to do with the participants' individual backgrounds (e.g. age and gender). The second part (Part 2) contained the social dilemma, where subjects were asked to participate in a one-shot public goods game without real money as compensation. The third part (Part 3) had to do with the participants' online communication characteristics (e.g. how often they communicate with others, etc.). The last question of the third part asked each individual whether he/she had an account in an online social network. If the individual answered no, the questionnaire was finished. If the individual answered yes, then a question displaying a list of popular online social networking websites was shown. If the individual selected Facebook, then he/she was rerouted to Part 4 of the experiment, which included questions relevant to the use of Facebook and the individual's behaviour towards it. The factors that we included on this part were derived from the study done by Ellison et al. (2007) and replicated in Ross et al. (2009). We discuss the factors relevant to this aspect of the study in the following section.

3.2. Variables and analysis

Having described the theoretical constructs and model, we describe the constructs and the demographics that are included in our dataset. Table 2 describes the demographic data that were gathered with the survey instrument used in our analysis.

3.2.1. Demographics and internet use

Our sample consisted of participants with an average age of 35.1 years and a standard deviation of 11.3, which in practical terms indicates that teenagers were not represented in our sample.

Subject recruitment was focused on experts, mainly from the IT industry, with roughly 6.5 h of Internet use per day and a reported use of Facebook for 2 h per day, which actually represents roughly 30% of their online activity. With respect to their socioeconomic characteristics, the average self-reported income of the participants was centred between 30 and 40,000 Euro per year, which can be considered a predicted average for OECD member countries.

Table 2
Demographics of our sample ($N = 216$).

	Mean or % (N)	Std.dev.
Gender		
Male	55.09% (119)	
Female	44.91% (97)	
Age	35.1	11.3
Income[a]	3.4	2.16
Employed		
Yes	81.43% (171)	
No	18.57% (39)	
Sector (if employed)[b]	2 (Median)	
Hours per Internet use per day	6.4	4.06
Hours per Facebook use per day	2.03	3.07
Use of Facebook to communicate with colleagues at work		
Yes	72.69% (157)	
No	27.31% (59)	
Use of Facebook to communicate with friends and family		
Yes	98.15% (212)	
No	(4)	

[a] *Notes:* Income is a categorical variable on the following scale: 1: Below 10,000 Euro; 2: 10–20,000 Euro; 3: 20–30,000 Euro; 4: 30–40,000 Euro; 5: 40–50,000 Euro; 6: 50–60,000 Euro; 7: 60,000 Euro and above.
[b] The median sector value corresponds to information technology, $N = 216$.

Our subject recruitment procedure yielded a statistically equal representation of both genders in our sample (55% men and 45% women).

3.2.2. Intention of Facebook use

As reported above, 73% of Facebook profile owners used Facebook to communicate with their colleagues at work, while 98.2% used it to communicate with friends and family. However, of those who use it to communicate with colleagues at work, what is the percentage of those who communicate only with friends and family and those who also communicate with colleagues at work? The following table provides the tabulation needed (see Table 3).

3.2.3. Intensity of Facebook use

Intensity of Facebook use was measured using the construct provided by Ellison et al. (2007).

The intensity scale discussed in Section 2 of this study contains elements associated with profile characteristics such as profile activity (registration of friends) and emotional attachment. Table 4 shows the descriptive statistics of the scale borrowed from Ellison et al. (2007) on intensity of Facebook use. Cronbach's alpha for the reliability of the scale was measured at alpha = 0.77, which provides a fair level of internal consistency according to Nunnally, Bernstein, and Berge (1967). In order to classify the intensity of Facebook use in a bimodal way (high or low), we linearised the scale following the same procedure from Ellison et al. (2007):

$$\begin{aligned}\text{Intensity} = {} & (\text{scale level of number of friends}) \\ & + (\text{number of hours on Facebook}) \\ & + 1/5(\text{Facebook is part of my everyday activity} + \cdots \\ & + \text{I will be sorry if Facebook shut down})\end{aligned}$$

Table 3
Tabulation of Facebook intention to use.

	Communication with colleagues as well as friends and family	Communication only with friends and family
Communication with colleagues	YES	NO
Communication with friends and family	YES	YES
Count	157	55
Percentage	72.68%	25.46%

Table 4
Summary statistics of Facebook intensity ($N = 216$).

Facebook intensity (Cronbach's alpha = 0.77)	Mean	Std.dev
About how many total Facebook friends do you have?[a]	5.72	2.48
In the past week, on average, approximately how many hours per day have you spent on Facebook?[b]	2.30	3.07
Facebook is part of my everyday activity	3.38	1.54
I am proud to tell people I'm on Facebook	2.70	1.12
Facebook has become part of my daily routine	3.26	1.54
I feel out of touch when I haven't logged onto Facebook	2.33	1.36
I feel I am part of the Facebook community	2.71	1.28
I would be sorry if Facebook shut down	3.07	1.28

[a] *Notes:* Number of Facebook friends is a categorical variable on the following scale: 1: 10 or less; 2: 11–50; 3:51–100; 4: 101–150; 5: 151–200; 6: 201–250; 7: 251–300; 8: 301–400; 9: more than 400.
[b] Number of hours spent on Facebook: 0: less than 1; 1–16 (corresponds to actual hours of Facebook use).

Since the fit for a normal distribution is highly significant ($p = 0.000$, $\chi^2 = 90.85$), once we linearised the intensity scale, we split the intensity variable to two categories with a split criterion, $c = 5$ (see Fig. 2).

3.2.4. Cooperation in the social dilemma

Having discussed the significance of the intensity of use, we will proceed with a description of the contribution rates in the social dilemma. Table 5 summarises the results from the social dilemma. The average contribution was 10.74 Euro, with a standard deviation of 6.77 Euro.

Conditional contributions follow the pattern expected given the strategy method. For each contribution level, we observe an increase in the number of contributions at quite equal levels, as can also be observed from the graph in Fig. 3.

Fig. 3 shows the average conditional contributions of the respondents in the social dilemma as expected given the theory (Falk & Fischbacher, 2006; Fehr & Fischbacher, 2003; Fischbacher, Gächter, & Fehr, 2001). Our respondents are slightly conditional cooperators, with their contributions amounting on average to 70% of the average theoretical contributions from the other three members of the group that they were assigned to.

In order to classify the participants for our analysis, we created four (4) categorical variables based on the following criteria. For the unconditional choice: (a) if the unconditional contribution was equal to zero, then the participant was classified as a free rider (FR); (b) if the unconditional contribution was equal to 20, which was the maximum contribution, then the participant was classified as an altruist (AL). For the conditional choice: (a) if the conditional contribution on all levels was equal to the average of the other three participants in the group, the participant was classified as a conditional cooperator (CC); (b) if the conditional contribution on all levels was equal to zero, then the participant was classified as an unconditional cooperator (UC).

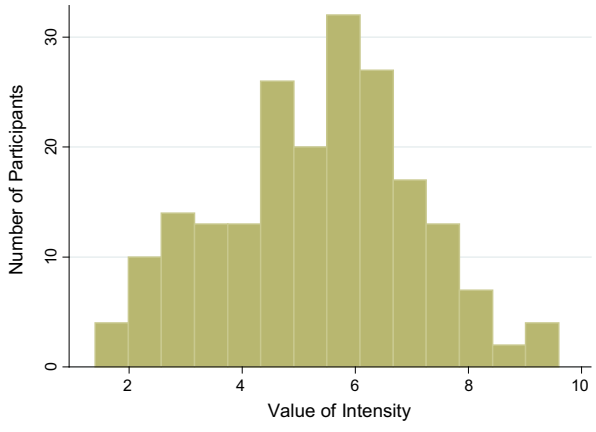

Fig. 2. Distribution of the linearised intensity scale in our sample.

Table 5
Summary statistics of the public goods game/social dilemma ($N = 216$).

Contribution type	Mean	Std.dev
Own contribution/unconditional contribution	10.74	6.77
Conditional contribution if others put 0 Euro	3.07	5.78
Conditional contribution if other put 10 Euro	9.80	5.09
Conditional contribution if others put 15 Euro	12.69	5.95
Conditional contribution if others put 20 Euro	16.14	7.11

Note: Minimum: 1, maximum: 20.

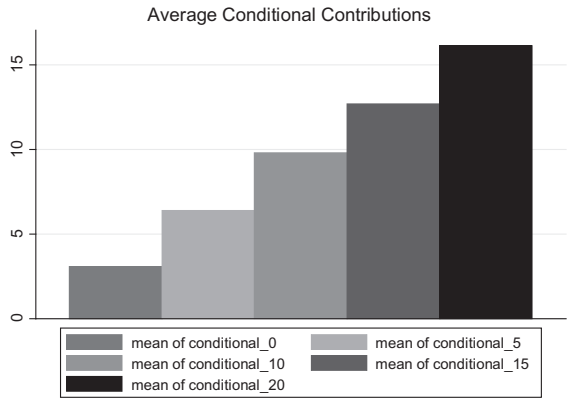

Fig. 3. Average conditional contributions for the subjects in our dilemma.

If the participant's contribution for each contribution level was equal to the average of the other participants, as predicted by the strategy method, then the participant was labelled a CC. Having provided the descriptive statistics for the data that were collected using our survey, we will continue to provide contingency tables for the results for each of the theorised categories for our model. We will then examine moderating gender effects in the resulting populations (a) between FRs and ALs and (b) between CCs and UCs. We outline the result on the section that follows.

3.3. Results

3.3.1. Testing for gender effects on the unconditional and the unconditional choice

Before examining the effects of our constructs on gender effects and on conditional and unconditional choice, we first have to make sure that without the addition of the constructs discussed in Section 2, we will not observe gender effects on both unconditional choice and the contribution levels of unconditional choice. In order to ensure robustness we ran the Mann–Whitney test, as was done with the initial hypothesis: participant's own contribution both in the conditional and unconditional choice does not differ between men and women. For the unconditional choice, the results showed that no significant difference existed in contributions from men and women ($Z = 1.127$, $p = 0.259$).

For the conditional contribution, we ran the same procedure for the five contribution levels (conditional contributions equalled 0, 5, 10, 15 and 20 respectively), and again, we found no significant difference between men and women (conditional (0): $Z = -0.107$, $p = 0.9$; conditional (5 Euro choice): $Z = -1.214$, $p = 0.22$; conditional (10 Euro choice): $Z = 0.9$, $p = 0.36$; conditional (15 Euro choice): $Z = 1.118$, $p = 0.26$; conditional (20 Euro choice): $Z = 1.567$, $p = 0.11$).

Table 6
Classification of cooperation styles in the social dilemma based on our constructs.

Type of choice in the social dilemma	Cooperation style	Count (#)	Intention to use		Intensity of Facebook use		Gender	
			Communication with colleagues and friends/family	Communication only with friends/family	Low	High	Men	Women
Conditional choice	Altruists (AL)	53	43	10	26	27	35	18
	Free riders (FR)	163	118	45	60	103	84	79
Unconditional choice	Conditional cooperators (CC)	86	72	14	40	46	56	30
	Unconditional cooperators (UC)	20	14	6	5	15	15	5

3.3.2. Testing for gender effects on conditional and the unconditional choice based on Facebook intention and intensity of use

Taking the classification of cooperation styles listed in Table 6, and assuming equal variances between the groups of male and female participants, we ran a two-sided *t*-test for each of the four cooperation styles derived from the types of cooperation style observed in the social dilemma. For each of the comparisons, we took into account the intention of Facebook use (whether for Colleagues and Friends/Family or only Friends/Family) and the intensity of Facebook use obtained from the linearised scale of Facebook intensity. The initial hypothesis was that there is no moderating gender effect; we then tested the alternatives, (a) that the difference is other than zero, and (b) that the difference is positive or negative.

Table 7 summarises the results of the two-tailed *t*-test that we performed in order to examine gender effects on the cooperation styles by including our constructs (intention and intensity). The results that were obtained were significant at a 95% confidence interval ($a = 0.05$). From what we can observe, our constructs do not produce gender effects on the distribution of cooperation styles among men and women when the intention to use Facebook is for colleagues as well as friends/family and the intensity of use is low. The same result was obtained in the case of the user's intention being to communicate only with friends/family when the intensity of use was also low. We provide with a more thorough discussion of the results in the section that follows.

4. Discussion

4.1. Findings

4.1.1. Using Facebook to communicate with colleagues and friends/family with strong intensity affects gender differences in the behaviour displayed in the social dilemma

Revisiting our initial hypothesis, we found significant differences in the behaviour of men vs. that of women in the social dilemma, while a previous examination of the contribution levels (in the unconditional and conditional choice) did not confirm gender differences when our theoretical constructs were not taken into account.

In particular, men demonstrate more altruistic behaviour in the social dilemma than women when they both make frequent use of Facebook to communicate with colleagues at work as well as friends and family ($p < 0.05$); more women than men become FRs in that case ($p < 0.05$). In the case of conditional choice in the social dilemma, men are again more often CCs than women ($p < 0.05$) when the intention and intensity are the same (high intensity of use, communication also with colleagues). However, we cannot confirm that women are more often UCs than men. This result may also be associated with the concern for privacy that women demonstrate when using Facebook (Hoy & Milne, 2010).

4.1.2. Using Facebook to communicate only with friends/family with strong intensity partially affects gender differences in the social dilemma

In this case, we observed significant gender differences in the population of the UCs, with men being UCs more often than women ($p < 0.005$) when the intention to use changes to communication only with friends/family. However, we found no significant difference in the case of women being FRs more often than men when the intention changed from communicating with colleagues and friends/family to only friends/family.

4.1.3. Intention of use does not produce any gender differences in the social dilemma when the intensity of Facebook use is low

As mentioned above, we did not observe any significant gender differences in the conditional and unconditional choice in the social dilemma when the intensity of Facebook use was low. This can be attributed to the fact that these Facebook profile owners are not used to exchanging their profile view and information with people they have not met in person or have worked with.

Table 7
Results of the two-sided *t*-test for moderating gender effects between men and women on the unconditional and conditional cooperation styles in the social dilemma.

Intention to use	Intensity of use	Cooperation style	Moderating gender effects significance
Colleagues and friends/family	Weak	AL	NO ($t = -0.03$, $p = 0.97$)
		FR	NO ($t = 0.03$, $p = 0.48$)
		CC	NO ($t = 0.17$, $p = 0.86$)
		UC	NO ($t = 1.57$, $p = 0.11$)
	Strong	AL	YES ($t = 2.08$, $p = 0.04$). Men are more altruistic than women ($p < 0.05$)
		FR	YES ($t = -2.08$, $p = 0.04$). Women are more often free riders than men ($p < 0.05$)
		CC	YES ($t = 2.01$, $p = 0.04$). Men are more often conditional cooperators than women ($p < 0.05$)
		UC	NO ($t = 0.62$, $p = 0.53$)
Only with friends	Weak	AL	NO ($t = 0.09$, $p = 0.92$)
		FR	NO ($t = 0.09$, $p = 0.92$)
		CC	NO ($t = 0.03$, $p = 0.76$)
		UC	NO ($t = 1.55$, $p = 0.11$)
	Strong	AL	NO ($t = 0.38$, $p = 0.70$)
		FR	NO ($t = 0.38$, $p = 0.70$)
		CC	NO ($t = 0.65$, $p = 0.51$)
		UC	YES ($t = 1.99$, $p < 0.05$). Men are more often unconditional cooperators than women ($p < 0.05$)

AL: altruist; FR: free rider; CC: conditional cooperator; UC: unconditional cooperator.

Therefore, when they encounter a social dilemma in which they have to cooperate with unknown persons, women and men display the same kind of behaviour.

4.2. Positioning with previous research

Similar studies in the literature have reported gender effects on Facebook samples. A study by Shen, Lee, Cheung, and Chen (2010) also confirmed gender effects on a Facebook sample. In particular, their results indicated that group norms on we-intentions were more significant for men than women. In our study, we examined this aspect more closely and validated their results using the public goods game as a tool to elicit our participants' intentions. Another study by Kefi, Mlaiki, and Kalika (2010) also found similar gender effects by using the theory of planned behaviour as an instrument to measure and predict usage intention based on the gender of the profile owner. In this study, we took this one step further by trying to combine intention of use and intensity of use as a predictor of gender differences in cooperation styles in social dilemmas.

In relation to gender effects in the social dilemma, our study found no-direct gender effects on the contribution levels in either the conditional or unconditional choice before taking into account the intention and intensity of Facebook use, which aligns with the majority of meta studies in relation to gender differences in cooperation styles (Croson & Gneezy, 2009).

Another interpretation of the findings can be attributed to the fact that Facebook defines the word "friend" in such generic and to some extent ambiguous terms (from family, real friends, work colleagues and even clients) that in our view influences the style of cooperation. In our case, it can alter the context, in the sense that having someone as a friend on a profile does not necessarily mean that the profile owner is willing to cooperate with that person towards a common good. This ambiguity of the meaning of the word "friend" is the result of a design choice in Facebook, where interaction between "friends" is frequent, fast and easy. In connection with the results, when intensity of Facebook use is low and colleagues at work are also listed as "friends", then this ambiguity of the meaning of "friends" seems to have created a less cooperative style among Facebook users. The opposite seems to be true when someone uses Facebook with high intensity and communicates only with friends and family as "friends"; we tend to see differences in altruistic behaviour between male and female Facebook profile owners in this scenario.

5. Limitations and future research

While the study was homogeneous in regard to the participant's background, a certain limiting factor for the external validity of the results is the sample size. An additional limitation of this study was the fact that behaviour in the public goods game is often studied in experiments where participants are given extrinsic rewards as motivation (Chaudhuri, 2011). Nevertheless, in that case, and related to our intention to study cooperation styles and the use of Facebook in an exogenous manner, we believe that motivating subject participation with material compensation will not make any difference because profile owners do not receive any real compensation for putting more information on their profiles.

To our knowledge, this is the first study to use the approach of trying to involve behaviour in a cooperation game with Facebook behaviour. We believe that the VCM provides an easy-to-comprehend test-bed for using Facebook subjects in experiment-based behavioural research. Future studies could also consider the case of collective reciprocity as a future extension (Wu & Korfiatis, 2013) as well as studying gender effects on online rating systems (Korfiatis & Poulos, 2013).

References

Bakker, T. P., & de Vreese, C. H. (2011). Good news for the future? Young people, Internet use, and political participation. *Communication Research, 38*, 451–470.

Boyd, D., & Ellison, N. (2008). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*, 210–230.

Carli, L. L., & Eagly, A. H. (1999). Gender effects on social influence and emergent leadership. In *Handbook of gender and work* (pp. 203–222). Thousand Oaks, CA, US: Sage Publications Inc.

Chaudhuri, A. (2011). Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature. *Experimental Economics, 14*, 47–83.

Chermak, J. M., & Krause, K. (2002). Individual response, information, and intergenerational common pool problems. *Journal of Environmental Economics and Management, 43*, 47–70.

Croson, R. (2007). Theories of commitment, altruism and reciprocity: Evidence from linear public goods games. *Economic Inquiry, 45*, 199–216.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature, 47*, 448–474.

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook friends: Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*, 1143.

Falk, A., & Fischbacher, U. (2006). A theory of reciprocity. *Games and Economic Behavior, 54*, 293–315.

Fehr, E., & Fischbacher, U. (2003). The nature of human altruism. *Nature, 425*, 785–791.

Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters, 71*, 397–404.

Garbarino, E., & Strahilevitz, M. (2004). Gender differences in the perceived risk of buying online and the effects of receiving a site recommendation. *Journal of Business Research, 57*, 768–775.

Hargittai, E., & Shafer, S. (2006). Differences in actual and perceived online skills: The role of gender. *Social Science Quarterly, 87*, 432–448.

Hoy, M. G., & Milne, G. (2010). Gender differences in privacy-related measures for young adult Facebook users. *Journal of Interactive Advertising, 10*, 28–45.

Isaac, R. M., & Walker, J. M. (1988). Group size effects in public goods provision: The voluntary contributions mechanism. *The Quarterly Journal of Economics, 103*, 179–199.

Kefi, H., Mlaiki, A., & Kalika, M. (2010). Shy people and Facebook continuance of usage: Does gender matter? In *Proceedings of the 16th Americas conference on information systems (AMCIS 2010), Lima, Peru* (p. 27).

Kollock, P., & Smith, M. (1996). Managing the virtual commons. *Computer-mediated communication: Linguistic, Social, and Cross-Cultural Perspectives*, 109–128.

Kollock, P., & Smith, M. (2002). *Communities in cyberspace*. Routledge.

Korfiatis, N., & Poulos, M. (2013). Using online consumer reviews as a source for demographic recommendations: A case study using online travel reviews. *Expert Systems with Applications, 40*, 5507–5515. http://dx.doi.org/10.1016/j.eswa.2013.03.046.

Large, A., Beheshti, J., & Rahman, T. (2002). Gender differences in collaborative web searching behavior: An elementary school study. *Information Processing & Management, 38*, 427–443.

Lin, N. (2002). *Social capital: A theory of social structure and action*. Cambridge University Press.

Nunnally, J. C., Bernstein, I. H., & Berge, J. M. F. (1967). *Psychometric theory*. New York: McGraw-Hill.

Park, S., Choi, Y., Hwang, D., & Paek, M. (2012). Do different types of SNS have different impacts on participatory social capital? In *Advancing Democracy, Government and Governance* (pp. 231–241). Springer.

Portes, A., & Vickstrom, E. (2011). Diversity, social capital, and cohesion. *Annual Review of Sociology, 37*, 461–479.

Ross, C., Orr, E. S., Sisic, M., Arseneault, J. M., Simmering, M. G., & Orr, R. R. (2009). Personality and motivations associated with Facebook use. *Computers in Human Behavior, 25*, 578–586.

Scheufele, D. A. (2002). Examining differential gains from mass media and their implications for participatory behavior. *Communication Research, 29*, 46–65.

Sheehan, K. B. (1999). An investigation of gender differences in on-line privacy concerns and resultant behaviors. *Journal of Interactive Marketing, 13*, 24–38.

Shen, A. X. L., Lee, M. K. O., Cheung, C. M. K., & Chen, H. (2010). Gender differences in intentional social action: We-intention to engage in social network-facilitated team collaboration. *Journal of Information Technology, 25*, 152–169.

Tang, C., Ross, K., Saxena, N., & Chen, R. (2011). What's in a name: A study of names, gender inference, and gender behavior in Facebook. In *Database Systems for Advanced Applications* (pp. 344–356). Springer.

Wang, Y.-C., Burke, M., & Kraut, R. E. (2013). Gender, topic, and audience response: An analysis of user-generated content on facebook. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 31–34). ACM.

Wodzicki, K., Schwämmlein, E., & Moskaliuk, J. (2012). "Actually, I Wanted to Learn": Study-related knowledge exchange on social networking sites. *The Internet and Higher Education, 15*, 9–14.

Wu, P. F., & Korfiatis, N. (2013). You scratch someone's back and we'll scratch yours: Collective reciprocity in social Q&A communities. *Journal of the American Society for Information Science and Technology*. http://dx.doi.org/10.1002/asi.22913.