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### ► **To cite this version:**

Lannoy Severine, Chatard Armand, Leila Selimbegović, Tello Nina, Linden Martial van Der, et al.. Too good to be cautious: High implicit self-esteem predicts self-reported dangerous mobile phone use. *Computers in Human Behavior*, 2020, 103 (2), pp.208-213. <10.1016/j.chb.2019.09.018>. <hal-02440383>

**HAL Id: hal-02440383**

**<https://hal.science/hal-02440383v1>**

Submitted on 20 Jul 2022

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## Too good to be cautious:

### High implicit self-esteem predicts self-reported dangerous mobile phone use

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**Declarations of interest**

None.

**Role of the funding source**

None.

## **Acknowledgment**

We would like to thank Christine Mauron-Pillonel for her help in data collection.

1

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1 **Abstract**

2 Mobile phone use and misuse have become a pressing challenge in today's society. Dangerous  
3 mobile phone use, such as the use of a mobile phone while driving, is widely practiced, **though**  
4 **banned in several jurisdictions. Research aiming at unfolding** the psychological predictors of  
5 dangerous mobile phone use **have so far been scarce**. Especially, researchers have never taken  
6 the role of self-esteem into account, which is unfortunate **given prior** research linking self-  
7 esteem to addictive mobile phone use. In the present study, we evaluated the associations  
8 between both explicit and implicit self-esteem and dangerous mobile phone use, with a  
9 particular focus on phoning while driving. **To do so**, we assessed implicit self-esteem among  
10 95 participants (89 females) via the Implicit Association Test and explicit self-esteem via a self-  
11 reported measure. Problematic mobile phone use and demographic data were assessed with  
12 self-reported measures. Implicit self-esteem predicted dangerous mobile phone use, even after  
13 we controlled for demographic data and mobile phone dependence. Explicit self-esteem,  
14 however, was related to neither dependence nor dangerous use of the mobile phone, thereby  
15 supporting the importance of distinguishing between **explicit and implicit self-esteem**. Our  
16 results set the scene for new research avenues regarding mobile phone use while driving.

17 *Keywords:* Mobile phone, Driving, Self-esteem, Implicit, Explicit, Risk assessment.

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## 1        **1. Introduction**

2            Mobile phone use has seen a worldwide increase over the two last decades. Along with  
3 the blossoming research about the influence of mobile communication in human behaviors, a  
4 continually growing number of studies have shown some beneficial impacts of mobile use, such  
5 as communication optimization (Geser, 2004) and the development of mobile-based  
6 applications to improve mental and physical health (Blake, 2008; Fjeldsoe, Marshall, & Miller,  
7 2009; Khazaal, Favrod, Sort, Borgeat, & Bouchard, 2018; **see also Heeren, 2018**). On the other  
8 hand, mobile phone use may also yield adverse consequences (for comprehensive reviews, see  
9 Billieux, 2012; Billieux, Maurage et al., 2015). Adverse consequences include addiction-like  
10 symptoms (Bianchi & Phillips, 2005; Long et al., 2016), mobile phone-mediated antisocial  
11 behaviors (e.g., “phubbing”: snubbing someone in a social setting by concentrating on one’s  
12 phone instead of talking to the person directly; Chotpitayasunondh & Douglas, 2016),  
13 cyberbullying (Nicol & Fleming, 2010), and adolescent sexting (De Graaf, Verbeek, Van den  
14 Borne, & Meijer, 2018).

15            **On top of that**, one of the most challenging issues in contemporary research is the  
16 dangerous use of the mobile phone, which mainly encompasses its use while driving (Collet et  
17 al., 2010; Ortiz et al., 2018; Oviedo-Trespalacios et al., 2017). Indeed, **between 60% and 85%**  
18 of individuals used their mobile phone while driving and almost 40% of drivers considered this  
19 habit a non-dangerous activity (for a review, see Lipovac, Đerić, Tešić, Andrić, & Marić, 2017).  
20 However, driver distraction is responsible for about 25% of car crashes (Lipovac et al., 2017).  
21 Accordingly, laboratory studies have shown that mobile phone use affects numerous aspects of  
22 driving performance, such as attentional and psychomotor abilities (e.g., Svenson & Patten,  
23 2005), which, in turn, strongly increase the risk of car crashes (Collet et al., 2010). Likewise,  
24 texting when driving has become a key predictor of car accidents, as it negatively affects  
25 attention (e.g., maintaining vigilance) and monitoring (e.g., maintaining a consistent speed,

1 responding to traffic events) abilities (Caird, Johnston, Willness, Asbridge, & Steel, 2014).  
2 Nonetheless, although a few studies have unraveled positive associations between dangerous  
3 mobile phone use and various sociodemographic factors, including being a male (Billieux et  
4 al., 2008; Lipovac et al., 2017), young (Brusque & Alauzet, 2008), and highly educated  
5 (Márquez, Cantillo, & Arellana, 2015), uncertainty still abounds regarding the mechanisms that  
6 trigger such use, **especially while driving**.

7 To date, one of the most common explanations of mobile phone use while driving  
8 focuses on personality traits. **Personality dispositions**, such as heightened sensation-seeking  
9 traits (Billieux et al., 2008), a tendency to have low self-control, high impulsivity (Hayashi,  
10 Rivera, Modico, Foreman, & Wirth, 2017), or compromised delay discounting (Hayashi, Russo,  
11 & Wirth, 2015), are related to phoning while driving. Yet, despite increasing research linking  
12 personality dispositions and dangerous mobile phone use, none has focused on self-esteem,  
13 which comes as a surprise given prior research bridging self-esteem to actual and problematic  
14 mobile phone use.

15 Self-esteem is defined as the way an individual evaluates him- or herself (Leary &  
16 Baumeister, 2000) and can be assessed both explicitly and implicitly. Explicit self-esteem is  
17 measured by self-reported questionnaires that ask people how satisfied they are with  
18 themselves. Although **self-reported** measures are informative about explicit cognitions,  
19 scholars have argued that they have limited sensitivity for identifying individual differences  
20 (Greenwald & Farnham, 2000). Moreover, they are likely to yield evaluation bias (Bosson,  
21 Swann, & Pennebaker, 2000). In contrast, implicit self-esteem is assessed with indirect  
22 measures in order to understand the automatic and unconscious nature of self-esteem. The  
23 Implicit Association Test (IAT) is currently one of the most commonly used research tools to  
24 capture implicit cognitions (e.g., Bar-Anan & Nosek, 2014; Roachat, Maurage, Heeren, &  
25 Billieux, 2019). It relies on categorization between a target concept (e.g., me, others) and an

1 attribute (e.g., positive, negative) and provides an index of the strength of the implicit  
2 association on the basis of response latencies (Greenwald, McGhee, & Schwartz, 1998).  
3 Current research underlines the importance of combining explicit and implicit measures, which  
4 may reflect distinct concepts (Bosson et al., 2000; Rochat et al., 2019).

5         Of note, prior research has highlighted the role of self-esteem vis-à-vis mobile phone  
6 use. First, individuals with low self-esteem prefer indirect communication to face-to-face  
7 communication. Second, low self-esteem is a strong predictor of problematic behaviors  
8 (Billieux, 2012). Indeed, low self-esteem is associated with increased problematic mobile  
9 phone use, although inconsistently, with small-to-medium effect sizes and mainly with explicit  
10 measures (for a review, see De-Sola Gutiérrez et al., 2016). Nevertheless, to date, no research  
11 has directly explored the links between self-esteem and dangerous mobile phone use, which is  
12 unfortunate, as mobile phone use while driving has been frequently observed among individuals  
13 with high driving confidence (Struckman-Johnson, Gaster, Struckman-Johnson, Johnson, &  
14 May-Shinagle, 2015) and high education levels (Márquez et al., 2015). This observation hence  
15 brings into question the involvement of low self-esteem. Indeed, low self-esteem is related to  
16 addictive use of the mobile phone, but it is likely that self-esteem plays a different role in  
17 relation to dangerous use, for example, with higher levels relating to risky driving. Such a view  
18 aligns with studies suggesting that high self-esteem is associated with violence or risky  
19 behaviors (e.g., high self-esteem individuals seem to be particularly confident that they would  
20 win a fight and are therefore more willing to engage in it; Baumeister, Smart, & Boden, 1996).

21         Given the literature outlined above, the present study aimed at revealing the relations  
22 between, on the one hand, explicit and implicit self-esteem and, on the other hand, dangerous  
23 mobile phone use, with a particular focus on phoning while driving. To this purpose, we used  
24 both explicit and implicit measures of self-esteem and capitalized on a validated self-reported

1 questionnaire to assess problematic use of the mobile phone (Billieux et al., 2008) in order to  
2 best capture dangerous use.

3

## 4 **2. Method**

### 5 ***2.1. Participants***

6 We recruited 95 French-speaking volunteers (89 women, 93.7%) who owned a mobile  
7 phone. Participants were between 18 and 42 years old ( $M = 22.09$ ,  $SD = 3.57$ ) and 63.2% of  
8 them had a driver's license. All participants included in the study had answered at least one  
9 item of the subscale that measured dangerous mobile phone use. Participants were recruited  
10 from the community via media and listserv advertisements inviting people to participate in the  
11 study. The study was conducted in 2008<sup>1</sup>, according to the Declaration of Helsinki. Informed  
12 consent was obtained from all participants in the study.

13

### 14 ***2.2. Procedure***

15 Participants first performed the IAT (Greenwald, McGhee, & Schwartz, 1998). The task  
16 was programmed and presented by using E-Prime 2 Professional (Psychology Software Tools,  
17 Pittsburgh, PA, USA). Participants then filled in the self-reported measures in paper form,  
18 including demographic information, explicit self-esteem (the Rosenberg Self-Esteem Scale  
19 [RSE]; Rosenberg, 1965), and mobile phone use (Problematic Mobile Phone Use Questionnaire  
20 [PMPUQ]; Billieux et al., 2008). We used the validated French version of these scales (RSE:  
21 Vallière & Vallerand, 1990; PMPUQ: Billieux et al., 2008). To avoid a carryover effect (i.e.

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<sup>1</sup> This project was initiated in the context of a master thesis conducted at the University of Geneva. Because this project was not part of a PhD or a funded research program, its finalization and publication has been delayed until 2018.

1 the possible effect of one measure on the following ones), we counterbalanced the order of  
2 completion of the self-reported measurement tools across participants.

3

### 4 2.3. Measures

#### 5 2.3.1. Implicit self-esteem

6 The IAT (Greenwald et al., 1998) was used to assess implicit self-esteem. This measure  
7 constitutes a widely used test (Bar-Anan & Nosek, 2014), particularly adapted to measure  
8 constructs such as self-esteem (Greenwald & Banaji, 1995). The IAT is a computerized task  
9 that assesses the strength of the association between two concepts, in this case “me/other” and  
10 “positive/negative.” The score is based on latencies to classify stimuli that appear in the center  
11 of the screen into one of the two target categories: “me” (e.g., *I, me, mine, my-self, my*) or  
12 “other” (e.g., *they, other, them, their, him*) and/or into one of the two attribute categories:  
13 “positive” (e.g., *beauty, success, peace, family*<sup>2</sup>) or “negative” (e.g., *death, pain, prison,*  
14 *poverty*<sup>3</sup>). The name of the categories appeared at the upper right or left of the screen. In order  
15 to assign stimuli to the correct category, participants were instructed to press the “E” key for  
16 the category presented in the upper right corner of the screen and the “I” key for the category  
17 presented in the upper left corner of the screen. The IAT used in the current study consisted of  
18 five blocks: Blocks 1, 2, and 4 were practice blocks and thus not taken into account in the final  
19 score. Block 3 was a congruent block, meaning that the target category “me” shared the  
20 response key with the “positive” attribute (both presented in the upper left corner of the screen),  
21 whereas the target category “other” shared the response key with the “negative” attribute (both  
22 presented in the upper right corner of the screen). Block 5 was an incongruent block, in which  
23 the category “me” shared the response key with the “negative” attribute (upper left corner of  
24 the screen), and the category “other” shared the response key with the “positive” attribute

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<sup>2</sup> French translation: beauté, succès, paix, famille

<sup>3</sup> French translation: mort, douleur, prison, pauvreté

1 (upper right corner of the screen). Faster correct responses in the congruent block than in the  
2 incongruent one indicate that participants more strongly associate positive than negative stimuli  
3 to the self (i.e., high implicit self-esteem). IAT scores were computed from the scoring  
4 algorithm proposed by Greenwald, Nosek, and Banaji (2003), a validated procedure presenting  
5 robust psychometric properties compared to traditional methods (e.g., Back, Schmukle, &  
6 Egloff, 2005). Error responses were discarded. Responses of lower than 300 ms were replaced  
7 by 300 ms and responses of higher than 3000 ms were replaced by 3000 ms. The average  
8 response times of Block 5 were subtracted from the average response times of Block 3. The  
9 resulting score was divided by the standard deviation of all correct response times in Blocks 3  
10 and 5. The reliability of the IAT has been supported by a good split-half internal consistency ( $r$   
11 = .69; Bosson et al., 2000) and a good test-retest reliability (median  $r = .56$ ; for a review, see  
12 Nosek, Greenwald, & Banaji, 2007). In the current study, we also found good reliability  
13 coefficients (i.e., correlation between the two experimental blocks:  $r = .75$ ,  $p < .001$  and  
14 correlations between trials: all  $r_s > .49$ , all  $p_s < .001$ ; Rosenthal & Rosnow, 1991).

15

### 16 2.3.2. *Explicit self-esteem*

17 The RSE (Rosenberg, 1965) is the most commonly used tools to assess self-esteem (e.g.,  
18 Donnellan, Ackerman, & Brecheen, 2016). This scale is a 10-item self-report questionnaire that  
19 assesses the cognitive and affective facets of explicit self-esteem (e.g., “On the whole, I am  
20 satisfied with myself”). Participants answered each item on a four-point Likert scale, higher  
21 scores indicating higher self-esteem. In this study, we used the French version of the RSE  
22 (Vallière & Vallerand, 1990), which has good internal consistency ( $\alpha = .89$ ) as well as good  
23 test-retest reliability ( $r = .85$ ). In the current sample, the reliability of the RSE was supported  
24 by reliability coefficients (i.e., correlations between each item and the total score: all  $r_s > .50$ ,  
25 all  $p < .001$ ) and a good internal reliability, with a Cronbach’s alpha of .85.

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2.3.3. Problematic mobile phone use

The PMPUQ (Billieux et al., 2008) is a comprehensive measure of mobile phone use, widely used (e.g., Kuss et al., 2018), and including specific items to assess dangerous use. This scale is a 30-item self-report questionnaire that evaluates mobile phone use through four dimensions of potential misuse (i.e., dangerous use, prohibited use, dependence, and financial problems). In the current study, the dangerous use subscale (e.g., “While driving, I find myself in dangerous situations because of my mobile phone use”) was the main dependent variable, whereas the dependence subscale (e.g., “I get irritated when I am forced to turn my mobile phone off”) was used as a control variable of the model. The dangerous use subscale is based on five items, the first being a general question and the other four concerning phoning while driving. One item therefore assesses unspecific dangerous mobile phone use (“I use my mobile phone in situations that would qualify as dangerous”). The two other subscales of the PMPUQ (i.e., prohibited use and financial problems) were not used for the current study. For each item, participants were asked to respond on a four-point Likert scale, higher scores indicating higher levels of mobile phone misuse. The PMPUQ has good psychometric properties, including good structural validity and internal reliability (with a Cronbach’s alpha of .73 for dangerous use score and of .84 for the dependence score; Billieux et al., 2008). The current study aligns with those observations, with Cronbach’s alpha of .70 for dangerous use score and of .82 for the dependence score. Likewise, the correlations between the four factors (all  $r_s > .27$ , all  $p_s < .01$ ) as well as of those factors with the total score (all  $r_s > .59$ , all  $p_s < .001$ ) were significant and medium-to-large.

Prior to completing the PMPUQ, all participants were asked to answer several general questions regarding their mobile phone use; i.e., how long had they owned a mobile phone (1 = “less than one year,” 2 = “from 1 to 5 years,” 3 = “more than 5 years”), how many phone

1 calls did they make per day (1 = “from 0 to 2 calls,” 2 = “from 3 to 5 calls,” 3 = “more than 5  
2 calls”), how much time did they spend on the phone per day (1 = “from 0 to 10 min,” 2 = “from  
3 10 to 30 min,” 3 = “more than 30 min”), and how many text messages did they send per day (1  
4 = “from 0 to 3 SMS,” 2 = “from 4 to 10 SMS,” 3 = “more than 10 SMS”).

5

### 6 **3. Results**

#### 7 ***3.1. Correlation analyses***

8 An initial correlation matrix is provided in Table 1. We used the Benjamini–Hochberg  
9 false-discovery procedure (Benjamini & Hochberg, 1995) to hold the expected proportion of  
10 falsely rejected null hypothesis at 5% for the 45 correlations we computed. A few significant  
11 pairwise correlations stood out after applying this correction: dangerous mobile phone use was  
12 positively associated with the number of daily calls made ( $r = .39$ ), the duration of daily calls  
13 ( $r = .30$ ) as well as implicit self-esteem ( $r = .31$ ). Other significant relationships were observed  
14 between variables related to actual and problematic mobile phone use (see Table 1 for details).

15

16 --- Table 1 about here ---

17

#### 18 ***3.2. Regression analyses***

19 We computed a hierarchical linear model to predict dangerous mobile phone use from  
20 the demographic variables in Step 1 (sex and age), variables related to the actual use of the  
21 mobile phone in Step 2 (the number of years the participants had a mobile phone, the number  
22 of phone calls per day, the duration of phone calls, and the number of text messages sent per  
23 day), mobile phone dependence in Step 3 (the dependence dimension of the PMPUQ, used as  
24 a control variable), and explicit and implicit self-esteem in Step 4. The full model (see Table 2)  
25 accounted for 32% of the variance in dangerous mobile phone use ( $R^2 = .03, .24, .25, \text{ and } .32$

1 for Steps 1 to 4, respectively). In the first step, no significant predictor was found. In the second  
2 step, age ( $B = .25, p = .011$ ) and number of daily calls made ( $B = .34, p = .003$ ) were observed  
3 as significant predictors. In the third step, mobile phone dependence did not significantly  
4 predict dangerous use ( $B = .06, p = .591$ ) after we controlled for demographic variables and  
5 variables related to actual mobile phone use. In the last step, whereas explicit self-esteem did  
6 not predict mobile phone use while driving ( $B = -.15, p = .121$ ), implicit self-esteem did ( $B =$   
7  $.26, p = .007$ ) over and above demographic data, actual use, and mobile phone dependence  
8 (Table 2).

9 --- Table 2 about here ---

10

#### 11 **4. Discussion**

12 The main aim of this study was to examine the relationship between dangerous mobile  
13 phone use, the most representative example being phoning while driving, and both explicit and  
14 implicit self-esteem. Younger age, an elevated number of daily calls made, and high implicit  
15 self-esteem emerged as significant predictors of dangerous mobile phone use. Notably, **these**  
16 **relations** remained after we controlled for demographic data, actual mobile phone use, and  
17 mobile phone dependence.

18 Perhaps the most striking finding was the observation that high implicit self-esteem  
19 predicts dangerous mobile phone use. Given previous findings linking problematic mobile  
20 phone use (especially addictive use) to lower levels of explicit self-esteem (Bianchi & Phillips,  
21 2005; De-Sola Gutiérrez et al., 2016; Elhai et al., 2017), our findings may appear at odds with  
22 prior research. However, **these results** should not come as a surprise.

23 First, although prior research has suggested that low self-esteem may trigger excessive  
24 mobile phone use via a “reassurance pathway,” whereby the need to maintain relationships and  
25 obtain reassurance from others drives mobile phone (over)use (Billieux et al., 2015; Billieux,

1 Philippot, et al., 2015; Wang et al., 2018), individuals using mobile phone while driving have  
2 been identified as exhibiting high self-confidence (Struckman-Johnson et al., 2015). **Therefore,**  
3 it is not surprising that high implicit self-esteem is at play in the present study. **Especially, one**  
4 **cannot exclude** a functionally distinct role of high versus low self-esteem in problematic mobile  
5 phone use — that is, a differential function between people who use a mobile phone while  
6 driving and those who excessively use their mobile phone. **This perspective** strongly aligns with  
7 Baumeister and colleagues’ proposal (1996) that individuals with high self-esteem are more  
8 prone to engaging in dangerous behaviors (e.g., they may tend to think that they can manage  
9 the double task of phoning and driving).

10         Second, our findings dovetail with previous studies pointing out the role of high self-  
11 esteem in risky behaviors, although most **earlier** works relied on explicit measures of self-  
12 esteem (i.e., the RSE and the Single-Item Self-Esteem Scale). For instance, high self-esteem  
13 has been associated with extreme physical activity (Ertl et al., 2018), alcohol use among college  
14 students (Inandi et al., 2009), stronger commitment in Facebook groups (Lo Coco et al., 2018),  
15 and specific patterns of video game involvement (Billieux, Thorens, et al., 2015). Likewise,  
16 individuals with high self-esteem make more risky choices during decision-making tasks,  
17 especially in loss situations (Zhang, Chen, Gao, Liu, & Liu, 2018). From a conceptual  
18 perspective, explicit and implicit self-esteem are considered to be related yet distinct constructs  
19 (Gawronski & Bodenhausen, 2006), with **explicit self-esteem** referring to propositional  
20 processes (i.e., conscious evaluations and beliefs) and **implicit self-esteem** to associative  
21 processes (i.e., activated beyond subjective truth or falsity). In the current study, **the distinct**  
22 **nature of these processes** has been supported by the tools used (De Houwer & Moors, 2012):  
23 for explicit evaluation, participants were asked to assess how they consider themselves; on the  
24 other hand, for implicit evaluation, participants were not directly instructed to make  
25 associations between the self and the concepts proposed (positive and negative). Accordingly,

1 high explicit self-esteem refers to an intentional positive self-evaluation, whereas high implicit  
2 self-esteem reflects spontaneous associations between the self and positive thoughts  
3 (Gawronski & Bodenhausen, 2006; Koole & DeHart, 2007). Considering both explicit and  
4 implicit evaluations, a specific association between implicit self-esteem and dangerous mobile  
5 phone use was observed, whereas explicit self-esteem was not related to any variables after the  
6 Benjamini–Hochberg correction. This observation thus reinforces the idea that explicit and  
7 implicit measures of self-esteem tap into distinct and non-isomorphic psychological constructs  
8 (Bosson et al., 2000; Zhao et al., 2017). Moreover, **it** also suggests that mobile phone use while  
9 driving may be better predicted by automatic affective reactions toward the self than by  
10 conscious propositional self-evaluation processes. **These results raise** the likelihood that the  
11 underlying constructs that have the potential to explain this relationship are not conscious or  
12 directly accessible. Future studies should thus further investigate the possible role of high self-  
13 esteem in risky behaviors by using both explicit and implicit self-esteem measurements.

14 In follow-up research, several issues require further examination. First, an important  
15 limitation is the cross-sectional nature of the data, precluding strong inferences regarding the  
16 cause-effect relationships among the variables (Maurage, Heeren, & Pesenti, 2013). To best  
17 capture the causal and temporal relationships between self-esteem and dangerous mobile phone  
18 use, longitudinal and experimental methods are warranted. Second, **our study was not**  
19 **preregistered and participants were relatively young and predominantly female. Preregistered**  
20 **replications, including a better-balanced gender-ratio and age-distribution, are thus clearly**  
21 **needed to examine whether the relations between self-esteem and dangerous mobile phone use**  
22 **differ across gender and age. Third, the study was conducted in Switzerland. Future studies**  
23 **should thus extend this investigation in different countries, particularly in countries where using**  
24 **the mobile phone while driving is a predominant behavior or where driving licenses can be**  
25 **obtained at younger ages (e.g., 16 years old), such as in the United States (Centers for Disease**

1 Control and Prevention, 2013). Fourth, although sample sizes like those of the present study  
2 are usually not regarded as small in this research field, a simulation study has revealed that a  
3 sample of about 250 participants is usually considered as adequate to achieve stable estimates  
4 for correlations (Schönbrodt & Perugini, 2013). However, a power analysis (setting the level  
5 of  $\alpha$  at 0.05, power  $[1 - \beta]$  at .80) based upon previous correlational studies linking self-esteem  
6 and mobile phone use (Hong, Chiu, & Huang, 2012; Walsh, White, Cox, & Young, 2011)  
7 indicated that a total sample size of at least 84 participants yields enough power to detect small-  
8 to-medium effect sizes ( $r = .30$ ) in the present study. Fifth, although the present study focuses  
9 on self-esteem and dangerous mobile phone use among individuals with a mobile phone and  
10 driving experience, we did not quantify the latter construct (e.g., number of kilometers per day,  
11 average time spent in traffic jams). This issue is particularly important given that some of our  
12 participants did not hold a definitive driver's license. Future studies should thus further take  
13 driving characteristics into account. Finally, we mainly focused on mobile phone use while  
14 driving. However, many researchers have suggested that the study of dangerous mobile phone  
15 use can transcend driving and be extended to other situations (e.g., phoning while involved in  
16 climbing, phoning while cooking).

17

## 18 **5. Conclusion**

19 This study evaluates the role of self-esteem in dangerous mobile phone use beyond the  
20 recognized involvement of self-esteem in addictive use of a mobile phone. These results show  
21 that high implicit self-esteem predicts dangerous mobile phone use, and this association remains  
22 after controlling for sociodemographic data, actual use of the mobile phone, and dependence  
23 symptoms.

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7

**Table 1.** Summary of first-order correlations among the study variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Sex	-	-	-	-	-	-	-	-	-
2. Age	-0.05	-	-	-	-	-	-	-	-
3. MP-Years	0.11	0.11	-	-	-	-	-	-	-
4. MP-Daily Calls	0.12	-0.11	0.21	-	-	-	-	-	-
5. MP-Daily Duration	0.05	-0.24	0.21	0.55*	-	-	-	-	-
6. MP-SMS	0.17	-0.21	0.13	0.41*	0.57*	-	-	-	-
7. PMPUQ-Dependence	0.09	-0.26	0.14	0.37*	0.52*	0.41*	-	-	-
8. PMPUQ-Dangerous use	-0.09	0.17	0.06	0.39*	0.30*	0.19	0.18	-	-
9. RSE	0.01	0.09	0.17	-0.02	-0.17	-0.27	-0.14	-0.15	-
10. IAT-SE	0.05	-0.07	0.16	0.24	0.19	0.24	0.10	.31*	0.07

*Note.* \* Correlations were significant at  $p < .05$ , corrected for multiple correlations by using the false discovery procedure (Benjamini–Hochberg procedure). Sex (1 = female, 2 = male); MP-Years = numbers of years of mobile phone ownership; MP-Daily Calls = daily calls made with the mobile phone; MP-Daily Duration = daily duration of calls made with the mobile phone; MP-SMS = number of text messages sent daily; PMPUQ-Dependence = Problematic Mobile Phone Use Questionnaire – Dependence subscale; PMPUQ-Dangerous use = Problematic Mobile Phone Use Questionnaire – Dangerous use subscale; RSE-SE = Rosenberg Self-Esteem Scale; IAT-SE = Implicit Association Test – Self Esteem (D score; Greenwald et al., 2003).

**Table 2. Hierarchical linear model** predicting dangerous use of the mobile phone (i.e., PMPUQ score, mobile phone while driving) from demographic variables (sex and age), actual use of mobile phone variables (number of years participant has had a mobile phone, number of calls made per day, mean duration of calls made, and number of text messages sent per day), dependence on mobile phone, explicit self-esteem, and implicit self-esteem.

Predictor	B	SE(B)	$\beta$	$R^2$
Step 1				.03
Intercept	1.71	0.16		
Sex	-0.25	0.33	-0.08	
Age	0.06	0.02	0.16	
Step 2				.24***
Intercept	1.78	0.15		
Sex	-0.40	0.30	-0.12	
Age	0.06	0.02	0.25*	
Number of years participant has had mobile phone	-0.14	0.20	-0.07	
Number of calls made per day	0.39	0.13	0.34**	
Mean duration of calls	0.18	0.14	0.17	
Number of text messages sent per day	0.05	0.14	0.04	
Step 3				.25**
Intercept	1.78	0.15		
Sex	-0.40	0.31	-0.13	
Age	0.06	0.02	0.26*	
Number of years participant has had mobile phone	-0.15	0.20	-0.07	
Number of calls made per day	0.39	0.13	0.34**	
Mean duration of calls	0.16	0.14	0.15	
Number of text messages sent per day	0.04	0.15	0.03	
Dependence on mobile phone	0.08	0.15	0.06	
Step 4				.32***
Intercept	1.77	0.15		
Sex	-0.38	0.29	-0.12	
Age	0.06	0.02	0.27**	
Number of years participant has had mobile phone	-0.15	0.20	-0.07	
Number of calls made per day	0.36	0.13	0.31**	
Mean duration of calls	0.14	0.14	0.13	
Number of text messages sent per day	-0.07	0.15	-0.05	
Dependence on mobile phone	0.09	0.14	0.07	
Explicit self-esteem	-0.25	0.16	-0.15	
Implicit self-esteem	1.22	0.44	0.26**	
Total $R^2$				.33

Note. PUMPUQ = Problematic Mobile Phone Use Questionnaire.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .