

The Interpersonal Effects of Smartphone Use

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Abstract

In their social encounters, humans are often confronted with the presence of smartphones. The presence of smartphones has a variety of effects on humans. In the present study, the interpersonal effects of smartphone use were explored. Participants ($N = 175$) were randomly assigned to conditions, in which they had to imagine a scenario in which their friends were focused on their smartphones and did not pay attention to the participants. The number of friends that engaged in this behavior differed per condition. Because this behavior is similar to the act of ostracism, it was expected that the interpersonal effects of smartphone use would threaten the four fundamental needs, and that these negative effects would increase as the number of people who ostracized the participant increased. The results show that only the fundamental need of belongingness, and perceived group cohesiveness follow this expected pattern. However, no positive interpersonal effects of smartphone use were found.

Keywords: interpersonal effects, smartphones, ostracism

The Interpersonal Effects of Smartphone Use

From the moment they wake up in the morning to the moment they go to sleep at night, people have many social encounters. Travelling to school or work, doing groceries and hanging out with friends, all examples of situations that have something in common: chances are that people are exposed to cellphones, either using one themselves or seeing one being used by other people. Indeed, most people nowadays own a cellphone. For example, the Global Mobile Consumer Survey was used to ask a sample of 2000 Dutch participants if they owned a cellphone. Of these participants, 93% reported that they indeed owned a cellphone (Consultancy, 2018).

Knowing that cellphones are so prevalent, it seems logical that they must have effects on the lives of human beings. First of all, using cellphones can have a lot of positive effects. For example, a study performed by Gikas and Grant (2013) looked at the effects of cellphone use for educational purposes. In this study, they looked at teachers that integrated the use of cellphones in their courses. They then asked the students of these teachers whether they thought that the use of cellphones in their education was beneficial. These students found it highly useful to work with cellphones, it enabled them to communicate more quickly, they were more engaged with the content of the course and they were able to interact more easily with experts on the subject at hand. Moreover, the study performed by Hunter, Hooker, Rohleder and Pressman (2018) tested whether smartphones could influence psychological and physiological responses to social stress. When being actively excluded, participants who had access to their phones reported lower feelings of exclusion and had lower levels of the stress hormone sAA than participants who did not have access to their phones. These results indicate that cellphones can act as a buffer to social stress, for example, when the owner of the cellphone is being excluded.

These previous examples indicate that cellphones can be beneficial for humans. However, a growing body of research illustrates that the effects of cellphones are not purely positive. For instance, it is well known that drunk drivers are a danger on the road. Strayer, Drews and Crouch (2006) have shown that participants who use their cellphone while driving were slower to react and were more likely to be involved in traffic accidents. This study suggests that using a cellphone while driving might be just as dangerous as driving while being drunk. Cellphones can also have negative effects on people's psychological well-being and social interactions. Dwyer, Kushlev and Dunn (2018) have found that the mere presence of a cellphone during social interactions distracted participants. Because of this distraction by the cellphone, participants reported that they enjoyed these social interactions less than if no cellphone was present. Another study (Kushlev, Dwyer, & Dunn, 2019) found that cellphone use distracts people, resulting in them feeling less socially connected and them having lower feelings of meaning. This study also found that people who use their cellphones to pass time are less likely to engage in positive interactions with strangers. The study performed by Kushlev, Hunter, Proulx, Pressman and Dunn (2019) has shown that pairs of participants who had access to their cellphones while they were waiting for an experiment to start were 30% less likely to smile than pairs of participants who did not have access to their cellphones while waiting.

All of these previous examples illustrate that the presence of their smartphone can have a variety of effects on people, which can be both positive and negative. However, the possible effects of cellphone use by others have received much less attention. One result of smartphone use is that people often ignore the people with whom they are interacting. This phenomenon is known as "phubbing" and it has been shown that being "phubbed" has a negative effect on perceived communication quality and relationship satisfaction (Chotpitayasunondh & Douglas,

2018). The phenomenon known as phubbing can be seen as form of ostracism, the act of ignoring and excluding someone.

The negative effects of ostracism can be explained in light of the need threat theory of ostracism (Williams, 1997). According to this theory, humans have four fundamental needs that are threatened by the act of ostracism. The first fundamental need is that of belonging, humans have a desire for interpersonal attachments (Baumeister & Leary, 1995). Humans also have the desire to be in control (Burger, 1992), they have the desire to have self-esteem (Steele, 1988) and they have the desire to have meaningful existence (Pyszczynski, Greenberg, Solomon, & Hamilton, 1990). According to the theory by Williams (1997) ostracism threatens the fundamental needs because people who are ostracized feel less like they belong, their self-esteem will be lower, they feel less as if they are in control and they feel like their life has less meaning.

The idea that ostracism threatens the four fundamental needs has been studied and supported in a variety of ways. For example, the ball-tossing game by Williams (1997) is a well-known paradigm. In this paradigm, participants are asked to wait in a room until a researcher returns. Two confederates, who are present in the same room as the participant, then start tossing a ball to each other. At first, the participants are also included in this game. After a while, things change. Confederates will no longer toss the ball to the participants that are assigned to the ostracism condition. Another well-known method to study ostracism is the Cyberball paradigm that was first used by Williams, Cheung and Choi (2000). Cyberball is a virtual version of the ball-tossing game. In the Cyberball paradigm, participants are told that they are playing a ball-tossing game with a few other players over the Internet. Again, participants will be included in the beginning but, after some time has passed, they will be excluded from the game by the other players.

These ostracism studies above often place participants in a situation where they are being ostracized by strangers. However, the study performed by Arriaga, Cappelz, Reed, Wesselmann, and Williams (2014) also looked at the effects of ostracism performed by a romantic partner. It was expected that being ostracized by a romantic partner would lead to more negative relationship evaluations than being ostracized by a stranger. However, the results showed the negative effects of being ostracized were comparable when looking at romantic partners versus strangers. This study suggests that it doesn't matter who is ostracizing you, the negative effects are comparable.

Other research on ostracism has focused on group effects. In a study performed by Tobin, McDermott and French (2018) participants were placed in an online group with confederates. With this online group, they had to perform an introduction activity. Ostracism was manipulated by using likes, the confederates were given instructions to give the participants likes or to not do so. The results show that participants who were ostracized by a larger group, by not getting likes from this larger group, react more negatively than participants who were ostracized by smaller groups. The study performed by Sandstrom et al. (2017) used the Cyberball paradigm to examine the roles of the number of people who ostracize other group members and the number of people who actively include other group members. The results of this study indicate that ostracism has more negative effects as the number of ostracizers (those who ostracize other group members) in a group increase. So far, the previously mentioned studies are the only two studies to look at what the role of group sizes in ostracism is. A possible explanation for this comes from Latané (1981) and his theory of social impact. This theory focuses on three principles of social impact, of which one is also known as the "light bulb theory of social relations". As the number of sources of light increases, the level of illumination increases as well. According to light bulb

theory of social relations, social impact works in a similar way. For ostracism this means that the perceived intensity of ostracism increases as the number of ostracism sources increase.

In both studies on group size, participants had to engage in an activity that was performed in an online setting. In the study by Tobin et al. (2018) participants either got likes or they did not and in the study by Sandstrom et al. (2017) participants had to play a game in which they were ostracized or included. No attention has been paid to the role of group size in ostracism in a setting that more closely resembles real-life.

As mentioned before, using a cellphone in the presence of others might lead to feelings of ostracism in these other persons (Chotpitayasunondh & Douglas, 2018). Even though this cellphone induced ostracism is a realistic event that people might experience, it has received minimal attention in literature. So far, the study performed by Hales, Dvir, Wesselmann, Kruger, and Finkenauer (2018) is the only one that looked into cellphone induced ostracism. The participants in this study had to recall a time when a friend was checking his or her phone during a conversation. The results show that the negative effects of ostracism were higher for participants who had to recall a time in which a friend used a phone instead of paying attention, than for participants who recalled a conversation without cellphone use. The results of this study indicate cellphone induced ostracism has comparable effects to ostracism performed in another way. This study relies on participants ability to correctly recall the situation. However, there might be other factors that could have influenced the memory and therefore the reported effects of ostracism.

To summarize, using a smartphone can have a variety of effects on human beings. The use of smartphones by others, however, might have mostly negative effects as it can elicit feelings of being ostracized, as was shown by Hales et al. (2018). In this study, the participants

had to recall when they were being ostracized because a friend was using a cellphone instead of paying attention to them. Even though this is a realistic scenario to happen, it remains to be seen if these effects are the same if cellphone induced ostracism is manipulated in another way. Moreover, studies on group size (Tobin et al., 2018; Sandstrom et al., 2017) suggest that the negative effects of ostracism increase as the number of ostracizers increases. As cellphone use by others can result in ostracism, the present study aims to see if the use of cellphones by others has similar negative effects for different group sizes.

To fill in these gaps in the literature, the present study aims to explore what the interpersonal effects of smartphone use are and whether these effects change if an increasing number of people are using a cellphone in one's presence. Based on the previously discussed research, it is expected that the smartphone use by others will result in feelings of exclusion. Therefore, the interpersonal effects of smartphone are hypothesized to be negative as it is expected that smartphone use by others will threaten the four fundamental needs. Moreover, it is also expected that these negative interpersonal effects increase as the number of people who use a smartphone in one's presence increases.

Method

Participants

To test the hypotheses, an online survey was conducted. The survey was spread via the online platforms of Facebook and WhatsApp. In total, 326 participants took part in the survey. Anyone who filled in less than 100% of the questions was omitted from the analyses. In total, 175 participants remained, of whom 62 were men, 111 were female and 1 participant chose the category of "other". The age of the participants varied from 17 to 66 ($M = 29.51$; $SD = 12.11$). A sensitivity power analysis conducted with G*Power (Faul, Erdfelder, Buchner, & Lang, 2009)

has shown that given the sample size of 175, a power level of 80% and an alpha level of 0.05, it was possible to detect an effect size of 0.24.

Materials and procedures

This study was performed as part of a larger survey. The participants were asked to complete a questionnaire. The questionnaire started with a consent form. Participants were informed they would be asked about their social life and their well-being. They were told that participating in the study was completely voluntary, that they could withdraw from the study at any time, that their data was completely anonymous and would be stored for at least ten years. Contact information was provided for the supervisor of this study.

Participants were randomly assigned to one of three conditions. In each of these conditions, they were first presented with a small text that they had to read. This text was used to manipulate cellphone induced ostracism.

In the control condition ($N = 58$), the following text was presented: “Imagine the following: you have a free afternoon and would like to spend it with friends. You decide to ask five of your best friends to hang out with you. They all agree and you meet up at your house. You spend the afternoon talking and after a couple of hours, your friends decide it’s time to leave and go home.”

In the partial smartphone use condition ($N = 55$), the following text was presented: “Imagine the following: you have a free afternoon and would like to spend it with friends. You decide to ask five of your best friends to hang out with you. They all agree and you meet up at your house. You spend the afternoon together, but two of your friends are more focused on their smartphones than on anything else. After a couple of hours, your friends decide it’s time to leave and go home.”

In the full smartphone use condition ($N = 62$), the following text was presented: “Imagine the following: you have a free afternoon and would like to spend it with friends. You decide to ask five of your best friends to hang out with you. They all agree, and you meet up at your house. You spend the afternoon together, but all of your friends are both more focused on their smartphones than on anything else. After a couple of hours, your friends decide it’s time to leave and both go home.”

After reading the text, participants were asked to answer a few questions to measure the effects of the cellphone induced ostracism. This was done by using the scale from Williams et al. (2000). Four questions were used to measure the threat to the fundamental needs. The answers were given on a 9-point Likert scale, which ranged from “not at all” to “very much”. To assess self-esteem, the question “To what extent would you think your friends value you as a person?” was asked. This item was reverse scored and then reverse coded during the analyses, which means that higher scores corresponded to lower reported levels of self-esteem. To assess control, the question “How true would you believe the statement: ‘I am in control of my life’ is?” was asked. This item was also reverse scored and then reverse coded. Because of this, higher scores corresponded to lower perceived control. To assess meaningful existence, the question “How true would you believe the statement: ‘Life is meaningless’ is?” was asked. To assess belongingness, the question “How much do you feel you would have belonged to the group?” was asked. This item was also reverse scored and reverse coded during the analyses, meaning that higher scores corresponded to lower reported levels of belongingness.

The scale that was used also assessed the aversive impact of ostracism by establishing the intensity of the ostracism and the perception of group cohesiveness. Intensity of ostracism functioned as a manipulation check and was measured with the following two items: “To what

extent would you feel that you were being ignored or excluded by your friends?” and “To what extent would you feel that you were being noticed or included by your friends?”. Answers to these items were given on a 9-point Likert scale that ranged from “not at all” to “very much so”. Intensity of ostracism was reverse scored. During the analyses, this item was reverse coded, meaning that in the end, higher scores corresponded to higher levels of perceived intensity of ostracism. Perceived group cohesiveness was also measured with two items, which were “How much would you like your friends?” and “How much would your friends like you?”. The answers to these items were also given on a 9-point Likert scale that ranged from “not at all” to “very much so”. Perceived group cohesiveness was also reverse scored and then reverse coded during the analyses. Because of this, higher scores corresponded to lower levels of perceived group cohesiveness.

At the end of the survey, some questions were asked about demographic information. Participants were asked about their gender, their age, what their occupation is and what the highest level of education was that they received.

Results

To analyze the data, six separate one-way ANOVAs were conducted. This means that for each dependent variable, a one-way ANOVA was conducted. Moreover, correlations between all six variables were computed.

Manipulation Check

A one-way between subjects ANOVA was conducted to compare the effect of smartphone induced ostracism on the perceived intensity of ostracism in the control, partial smartphone use, and full smartphone use conditions. A significant effect of smartphone induced ostracism on perceived intensity of ostracism was found for the three conditions [$F(2, 172) = 17.81, p < .001, f$

= 0.45]. Post hoc comparisons were conducted using the Tukey HSD test. These comparisons indicated that the mean score for the control condition ($M = 3.56$, $SD = 1.16$) was significantly lower than the mean of the partial smartphone use ($M = 4.62$, $SD = 1.42$, $p < .001$) and full smartphone use ($M = 5.12$, $SD = 1.71$, $p < .001$) conditions. No significant difference was found between the partial smartphone use and full smartphone use conditions ($p = .152$). These results are displayed in figure 1. These results suggest that smartphone induced ostracism does have an effect on the extent to which participants feel the intensity of ostracism. However, it does not seem that the intensity of ostracism significantly increases as the number of ostracizers in a group increases.

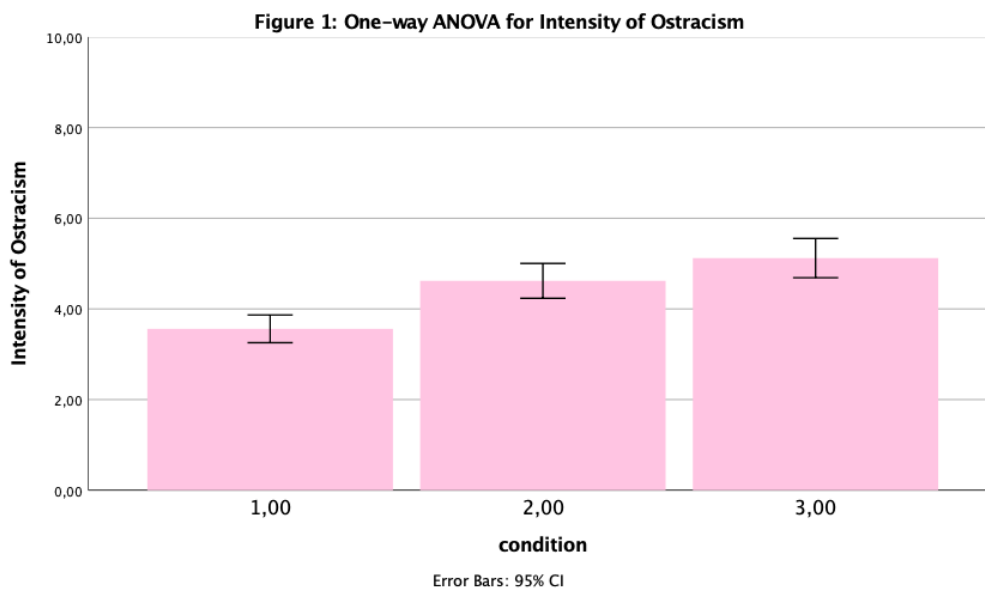


Figure 1. One-way ANOVA for intensity of ostracism.

Perceived Group Cohesiveness

A one-way between subjects ANOVA has shown that there was a significant effect of smartphone induced ostracism on perceived group cohesiveness when comparing the three conditions [$F(2, 172) = 19.61$, $p < .001$, $f = 0.48$]. Post hoc comparisons were conducted using

the Tukey HSD test. These comparisons indicated that the mean score for the control condition ($M = 4.09$, $SD = 0.84$) was significantly lower from the means of the partial smartphone use ($M = 4.88$, $SD = 1.38$, $p = .003$) and full smartphone use ($M = 5.54$, $SD = 1.47$, $p < .001$) conditions. These comparisons also indicated that the mean of the partial smartphone use was significantly lower than the mean of the full smartphone use condition ($p = .015$). These results are displayed in figure 2. Taken together, these results suggest that smartphone induced ostracism does have an effect on the extent to which participants perceive the groups' cohesiveness. After a manipulation, participants perceive the group to be less cohesive than if there was no manipulation of smartphone induced ostracism. Moreover, this effect of smartphone induced ostracism seems to be larger as the number of ostracizers increases.

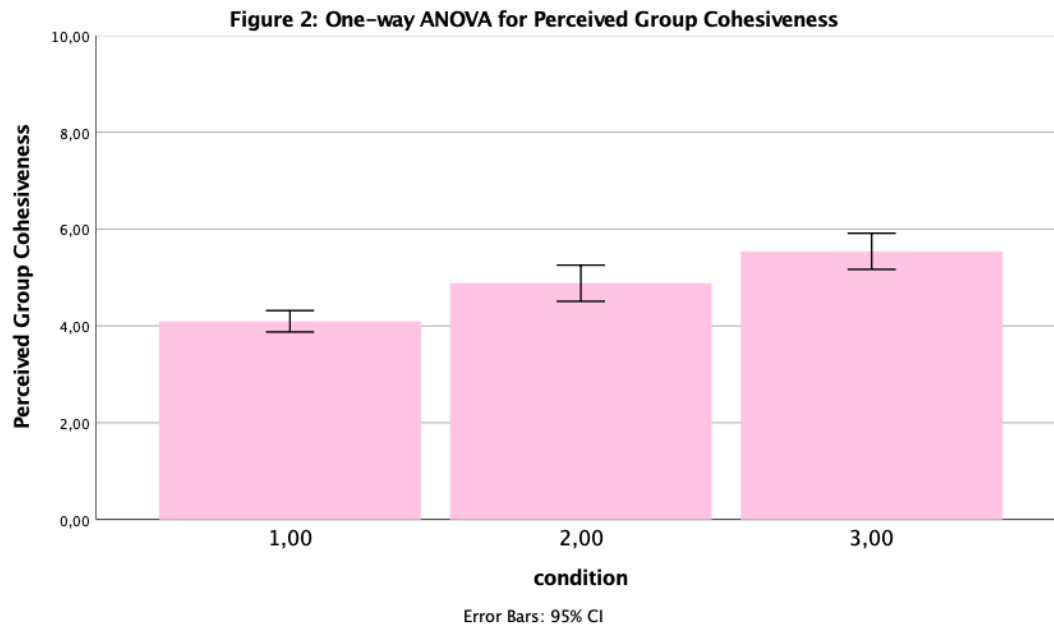


Figure 2. One-way ANOVA for perceived group cohesiveness.

Threatened Belongingness

The results of a one-way between subjects ANOVA indicate that there was a significant effect of smartphone induced ostracism on belongingness across the three conditions [$F(2, 172) = 57.03, p < .001, f = 0.81$]. Post hoc comparisons were conducted using the Tukey HSD test. These comparisons showed that the mean score for the control condition ($M = 4.45, SD = 1.45$) was significantly lower than the means of both the partial smartphone use ($M = 5.35, SD = 1.47, p = .005$) and the full smartphone use ($M = 7.29, SD = 1.55, p < .001$) conditions. These comparisons also indicated that the means of the partial smartphone use and full smartphone use conditions were significantly different ($p < .001$). These results are displayed in figure 3. These results suggest that smartphone induced ostracism does have an effect on the extent to which participants feel like they belong. When ostracized, participants report higher levels of threatened belongingness. This effect seems to be larger as the number of ostracizers in a group increases.

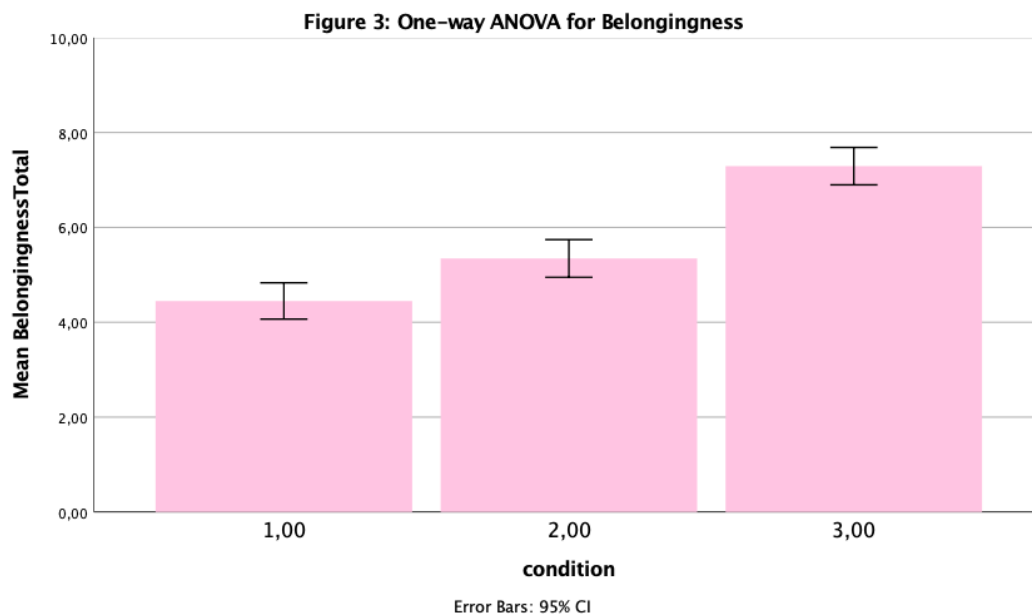


Figure 3. One-way ANOVA for belongingness

Threatened Control

A one-way between subjects ANOVA was conducted to compare the effect of smartphone induced ostracism on control in the control, partial smartphone use, and full smartphone use conditions. No significant effect of smartphone induced ostracism on control was found the three conditions [$F(2, 171) = 0.17, p = .848, f = 0.04$]. These results are displayed in figure 4. Smartphone induced ostracism does not seem to have an effect on the extent to which participants feel like they are in control of the situation.

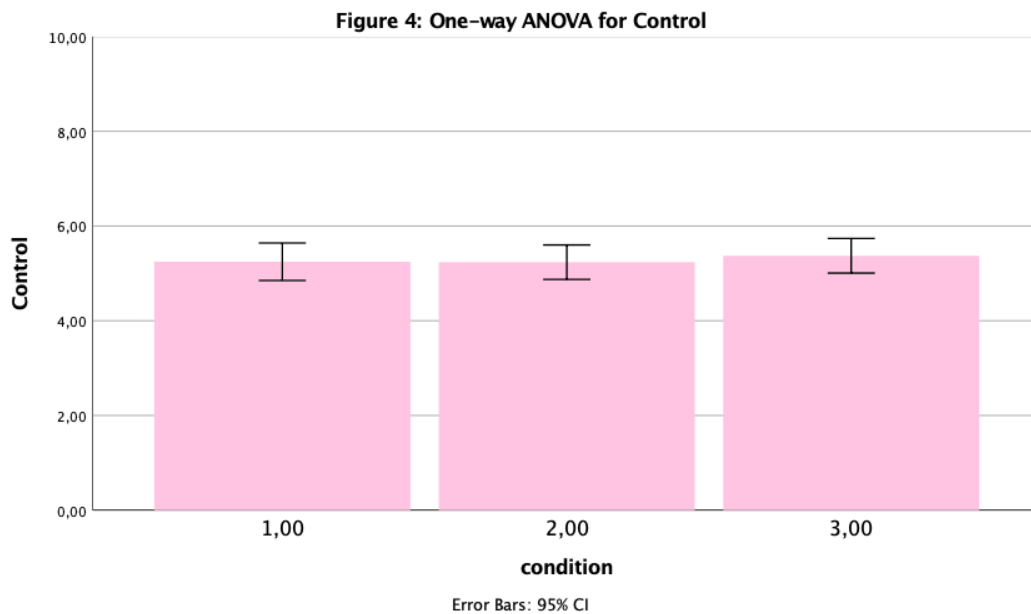


Figure 4. One-way ANOVA for control

Threatened Self-esteem

A one-way between subjects ANOVA showed that there was a significant effect of smartphone induced ostracism on self-esteem [$F(2, 172) = 10.94, p < .001, f = 0.36$]. Post hoc comparisons were conducted using the Tukey HSD test. These comparisons showed that the mean score for the control condition ($M = 4.22, SD = 1.20$) was not significantly different from the mean of the partial smartphone use ($M = 4.60, SD = 1.12, p = .315$) condition. The mean of the full smartphone use condition ($M = 5.37, SD = 1.69$) was significantly higher than the mean

of the control condition ($p < .001$) and the mean of the partial smartphone use condition ($p = .001$). These results are displayed in figure 5. Taken together, these results suggest that there is an effect of smartphone induced ostracism on participants' self-esteem, when ostracized, participants report higher levels of threatened self-esteem. However, this effect only seems to exist if the whole group is participating in the ostracism.

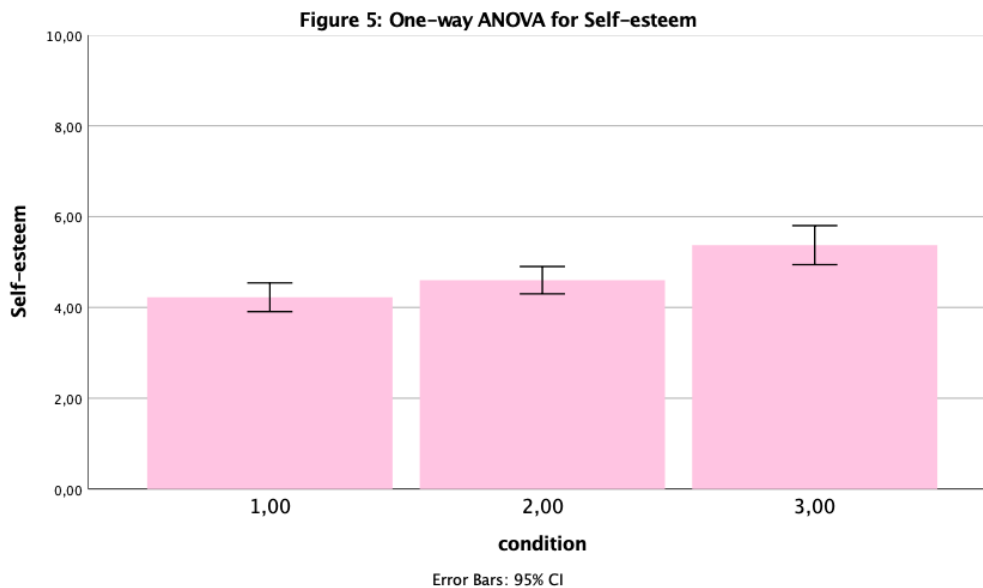


Figure 5. One-way ANOVA for self-esteem.

Threatened Meaningful Existence

A one-way between subjects ANOVA found no differences between the control, partial smartphone use, and full smartphone use conditions when it came to meaningful existence [$F(2, 172) = 0.92, p = .399, f = 0.10$]. These results are displayed in figure 6. These results suggest that there does not seem to be an effect of smartphone induced ostracism on how meaningful participants feel their lives are.

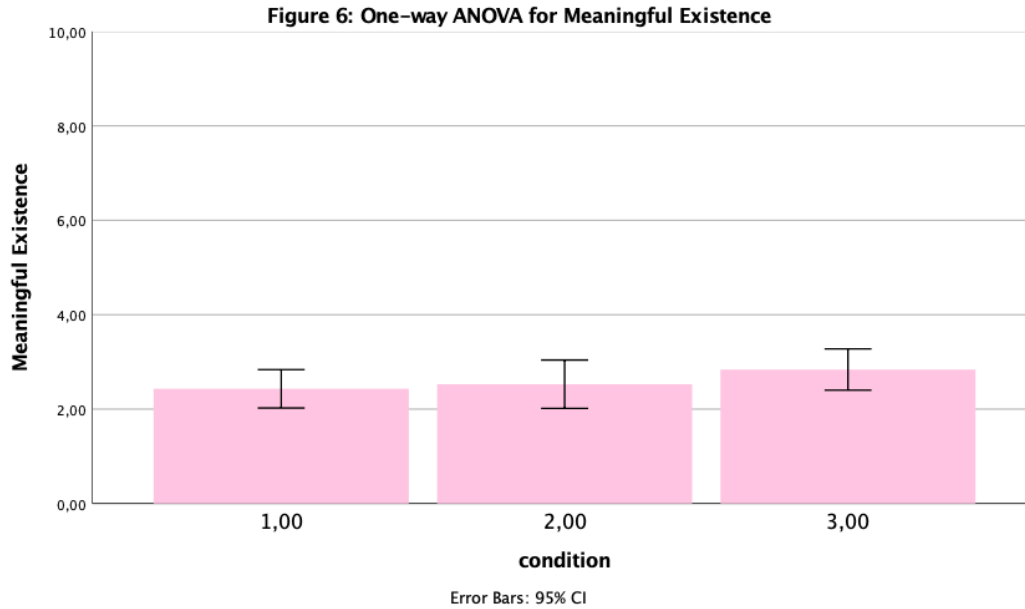


Figure 6. One-way ANOVA for meaningful existence.

Correlations

Pearson product-moment correlations were calculated to assess the relationships between the six dependent variables. First of all, intensity of ostracism was positively correlated with perceived group cohesiveness ($r = 0.766$, $n = 175$, $p < .001$), belongingness ($r = 0.523$, $n = 175$, $p < .001$), control ($r = 0.172$, $n = 175$, $p < .05$), self-esteem ($r = 0.551$, $n = 175$, $p < .001$) and meaningful existence ($r = 0.272$, $n = 175$, $p < .001$). Perceived group cohesiveness was positively correlated with belongingness ($r = 0.547$, $n = 175$, $p < .001$), control ($r = 0.215$, $n = 175$, $p < .001$), self-esteem ($r = 0.587$, $n = 175$, $p < .001$) and meaningful existence ($r = 0.265$, $n = 175$, $p < .001$). Belongingness was also positively correlated with control ($r = 0.161$, $n = 175$, $p < .05$), self-esteem ($r = 0.422$, $n = 175$, $p < .001$) and meaningful existence ($r = 0.199$, $n = 175$, $p < .001$). Moreover, control was also positively correlated with self-esteem ($r = 0.320$, $n = 175$, $p < .001$) and meaningful existence ($r = 0.368$, $n = 175$, $p < .001$). Lastly, self-esteem and meaningful existence were also positively related to each other ($r = 0.273$, $n = 175$, $p < .001$).

These data are also available in table 1.

Table 1.

Correlations for study variables

Variable	1	2	3	4	5	6	<i>M</i>	<i>SD</i>
1.Intensity of ostracism	-						4.44	1.59
2.Perceived group cohesiveness	.766**	-					4.85	1.39
3.Belongingness	.523**	.547**	-				5.73	1.91
4.Control	.172*	.215**	.161*	-			5.29	1.42
5.Selfesteem	.551**	.587**	.422**	.320**	-		4.75	1.45
6.Meaningful existence	.272**	.265**	.199**	.368**	.273**	-	2.61	1.72

*Note: *p < .05, **p < .001, two-tailed.*

Discussion

Smartphones are present in a lot of social encounters and can have a variety of effects on the person using the smartphone. However, less attention has been paid to the interpersonal effects of smartphone use. Some initial research has suggested that smartphone use by others can elicit feelings of exclusion (Hales, Dvir, Wesselmann, Kruger, & Finkenauer, 2018), and therefore has negative interpersonal effects. So far, the literature on smartphone use by others has only focused on one type of manipulation, which made use of participants' ability to recall events. Moreover, other research (Tobin et al., 2018; Sandstrom et al., 2017) indicates that the negative effects of ostracism increase as the number of people who are responsible for the ostracizing increase in a group. The present study aimed to explore what the interpersonal effects of smartphone use are, while making use of a different manipulation than one based on memory recall. In order to do this, smartphone induced ostracism was manipulated across three different conditions: one in which participants had to imagine that no smartphones were used, one in which participants had to imagine that two of their five friends had used a smartphone, and one

in which participants had to imagine that all five of their friends had used a smartphone. Based on the need threat theory of ostracism by Williams (1997), it was hypothesized that the interpersonal effects of smartphone use would be negative because smartphone use by others is similar to ostracism and would therefore threaten the four fundamental needs. Moreover, it was also hypothesized that these negative interpersonal would increase as the number of ostracizers in a group increases.

The results partially support these hypotheses. First of all, perceived intensity of ostracism functioned as a manipulation check. This manipulation check indicated that manipulation was only partially successful. Participants in the control condition did report lower intensity of ostracism than participants in the partial smartphone use condition and the full smartphone use conditions, but no difference was found between the latter two. It seems logical that participants reported that they felt that the intensity of ostracism was higher if any ostracism took place compared to when there was no ostracism. Previous research has suggested that the effects of ostracism are comparable, regardless of the relationship between the person who is being ostracized and the person who is responsible for the ostracizing (Arriaga, Capazza, Reed, Wesselmann, & Williams, 2014) and that the negative effects of ostracism increases with the number of ostracizers (Tobin et al, 2018; Sandstrom et al., 2017). It is unclear why the results do not show this pattern. Further research could look at whether the manipulation of ostracism was strong enough and further research might also investigate more closely whether the characteristics of the friendships might have influenced these results.

Secondly, the results for both perceived group cohesiveness and threatened belongingness supported the hypotheses. Participants who had to imagine that their friends used a cellphone instead of including them reported that they perceived the group to be less cohesive and that they

felt less like they belonged to the group. Moreover, these negative effects significantly increased with the number of friends that engaged in the ostracism by using their cellphones. The results for these two variables seem to indicate that smartphone use does have some negative interpersonal effects and that these effects are larger when the number of ostracizers in a group increase.

Thirdly, the results for threatened self-esteem show that there was only an effect when comparing the control condition and the full smartphone use condition. Self-esteem was not threatened when comparing the partial smartphone use condition to the control condition. A possible explanation for these results is that participants in the control and partial smartphone use conditions can still get social support from at least a part of the group. It seems logical that having someone with whom you can connect might protect you from the negative effects of exclusion. Research by Barcaccia et al. (2018) has shown that friendship is an important moderator for the relation between bullying and its psychological effect, the presence of friendship specifically reduces the negative psychological effects of bullying. As excluding someone can be seen as a form of bullying, this might be a possible explanation for the observed findings. However, further research is needed to establish that this indeed explains the current findings.

Lastly, the results for both threatened control and threatened meaningful existence did not support the hypotheses. For both variables, no significant effects were found when comparing the three conditions, meaning that participants did not feel like their life had less meaning and that they were less in control of the situation after being exposed to friends who were focused on their cellphones. Why might this be the case? A possible explanation might be that participants were asked to think about five of their best friends. This means that participants were asked to

think about a relatively high number of friends, and they had to think about friendships that are of a relatively high quality. Reminding the participants about these things might have affected the results. For example, the high quality of the friendship might have led the participants to be more understanding when their friend paid less attention than usual. Thus, it might have been possible that reminding the participants that they have a relatively high number of high-quality friendships to begin with, has affected the extent to which they react to being ostracized. Further research is needed to determine if this is indeed the case. Further research should also look at the reason why this pattern of results is found for the fundamental needs of control and meaningful existence, but not for self-esteem and belongingness.

So far, the results per variable have been discussed. The correlations between all variables were also computed to determine whether these could have possibly been an issue. As they all measured the effects of ostracism, it would be problem if they were not correlated, or negatively correlated with each other. However, all variables were positively correlated with each other, which indicates that the measures themselves do not seem to be problematic.

However, there are also some important limitations that have come forward. First of all, because the online survey was spread via the social media platforms of Facebook and WhatsApp, a convenience sample was gathered. Even though this allowed the author of this study to reach a large number of potential participants relatively easy, it has a large downside. Only people who were connected to the author of this study on either or both of these social media platforms were asked to fill in the survey. It is likely that the participants are therefore similar to the author, thus the results of the present study might not be generalizable. It is therefore important that future research looks at different types of samples, samples that culturally diverse, and to compare the results of different kinds of samples with one another.

Second, the sample consisted of 111 female participants and 62 male participants. Thus, there was an almost double number of female participants compared to male participants. This could have affected the observed result as men and women might not necessarily react to their emotions in the same way. For example, a study by Kring and Gordon (1998) found that even men and women do not differ in the way they experience emotions, but they do differ regarding the extent to which they express their own emotions. They found that women are more expressive when it comes to their emotions than men are. For the present study, this means that it might have been possible that the female participants might have been more likely than male participants to report their negative feelings after thinking about friends who were more focused on their cellphones than on other people. Future research should look at whether such gender differences exist when it comes to expressing feelings after being ostracized.

A third limitation is that the sample size itself ($N=175$) might have been insufficient. The participants were randomly assigned to one of three conditions, which averages at 58.3 participants per condition. This relatively small sample per condition might have led to problems with accurately and reliably finding effects. For example, the sensitivity power analyses indicated that lowest possible effect size that could be detected with this sample was a medium effect ($f = 0.24$). Because of this, it is possible that small effect sizes were not detected even if they do exist in reality. This might have been the cause why the results from some analyses did not support the hypotheses. On the other hand, it might have been the case that other effect sizes were overestimated and therefore also not reflect the reality in an accurate and reliable way. Therefore, future research should focus on gathering a larger sample size in order to find more accurate and more reliable estimates of the effects.

Fourth, the manipulations of smartphone induced ostracism might also be improved. The manipulations all mentioned that the participant had to imagine that they were going to hang out with their best friends. However, people can spend time or “hang out” together in various ways. For example, people can spend time together by actually engaging in an activity together, but they could also spend time together by studying or working together. In the latter case, it might seem logical that people are not necessarily communicating with each other. In such a case, smartphone use by others in one’s presence might not be perceived as a way in which one is socially excluded. As no clear definition was given for “best friends”, there might also have been individual differences regarding how participants interpret this. The ambiguity of the described scenario might therefore be a problem for the analyses. For future studies, it might be interesting to see if the participants interpret these scenarios in a different way. Moreover, it might be interesting for future research to look into the participants’ specific thoughts about the smartphone use by others and what they might think the reason is for the other person being focused on his or her smartphone. Both these suggestions could be solved, for example, by including an open-ended question or by having participants discuss their thoughts with each other after the manipulations.

Another limitation is that these scenarios were of a hypothetical nature. First of all, it might be the case that not all participants were even able to imagine what was asked of them. For example, there might be individual differences in the number of friendships a person has. If you then ask a person who, in reality, only has one or two close friends to think of five close friends, this person might not be able to imagine this. For future studies, it would therefore be interesting to also explore the specific friendships the participants have and whether this might have influenced their ability to imagine what was described in the scenarios. Another problem with the

hypothetical nature of the scenarios is that there could also have been individual differences in the extent to which participants are even willing or motivated to do what was asked of them. Such differences, if they played a role, might also have affected the results. Therefore, it could be interesting for future studies to use the design of the present study in a real-life setting. For example, a group of friends could come to the lab and then randomly be assigned to either focus on their phone or to not do so. By doing this, the hypothetical nature of the scenarios could be eliminated, which makes it possible to determine whether this hypothetical nature was a problem for the study design to begin with.

It is also worth noting that this study was conducted during the global coronavirus pandemic of 2020. During this pandemic, people are asked to avoid social contacts as much as possible. It seems logical that peoples' fundamental needs are threatened to some extent by the crisis as they might feel more isolated. Moreover, living in such an uncertain time might influence peoples' mood in general, which could have affected their responses to the survey in general. Some initial research already seems to support the idea that this global health crisis also has negative psychological effects, which could possibly severe (Brooks et al., 2020; Berger & Reupert, 2020; Shigemura, Ursano, Morganstein, Kurosawa, & Benedek, 2020) It would therefore be worth it for future research to look at the potential effects that such uncertain environmental conditions might have on participants' responses on the survey that was used in the present study.

To conclude, the present study has made some steps in understanding the interpersonal effects of smartphone use. Even though the hypotheses were not supported by the data, this study still adds to the literature by at least identifying which variables were not affected, or affected to a lesser extent than expected, by ostracism that was caused by smartphone use by others.

Because of this, future research still has a lot of potential ways to explore the interpersonal effects of smartphone use more and to broaden the current knowledge regarding this subject. For now, it is important to know that even though the negative interpersonal effects were not observed in all analyses, no positive interpersonal effects of smartphone use by others were found. Thus, it seems wise to leave your smartphone in your pocket when in the company of others and to focus on them instead of on your screen.

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