# Fighting FoMO

A study on implications for solving the phenomenon of the Fear of Missing Out


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## Abstract

**Background:** The Fear of Missing Out (FoMO) is a phenomenon that describes the reason for compulsive overuse of technology. It appears when people try to communicate with their social environment via social media. When a person suffers from FoMO, he has the feeling to be missing something. This can lead to physical and psychological issues. Research shows that a one's need to belong is a main factor which influences the Fear of Missing Out. As the personal need to belong is higher, the more susceptible one is to this phenomenon. Different motivation strategies were studied to achieve a decrease of compulsive social media use.

**Objective:** This research aimed at developing interventions to stimulate behavioural change and thereby reduce the aftereffects of FoMO.

**Method:** Out of eight interventions, four were chosen from a pre-study in which respondents (N = 15) were interviewed about their opinion of the interventions. These interventions were then tested in the main study against a control group in an online simulation experiment, based on a 2x5 in between subjects design. The respondents (N = 207) were confronted with a fictive WhatsApp scenario and an online survey. Their level of FoMO, need to belong, attitude and motivation were measured. ANOVA analyses were conducted to examine the influence of the interventions and the need to belong on FoMO, attitude and motivation.

**Results:** The results showed that the created interventions influenced the Fear of Missing Out partly. Furthermore, they were able to motivate the respondents to show behavioural change and make less use of WhatsApp. It was found that persuasive and motivating strategies scored high on attitude, whereas the coercive strategy was evaluated negative. The results confirmed the important role of the need to belong for FoMO. It was proven that a high need to belong also leads to a high susceptibility to the Fear of Missing Out. Finally, the need to belong influenced neither attitude, nor motivation of the participants.

**Conclusion:** Due to this research, it was possible to further elaborate on the technological phenomenon of FoMO. It was possible to prove that frustration, anxiety and mental exhaustion are FoMO-related emotions. This research further elaborated on the role of need to belong as a cause for FoMO. Additionally, it was found that persuasive and motivating strategies lead to a more successful design for behavioural change in this context. This change then forms a first step towards reducing FoMO.



**Keywords:** Need to belong; Fear of Missing Out; technological paradox; Anxiety; Social media addiction; Social media; Motivation strategies; Behavioural change

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# 1. Introduction

*Imagine*

*You have formed a WhatsApp group with your closest friends Max, Lena, Thomas and Julia. They decide to meet in the evening, but do not know yet where to go and what to do. Because of this, your friends decide to just meet in the city and go somewhere then. Unfortunately, you have been working and could not follow the conversation. After they have met, you ask where they are so you can meet them as well. You do not get any reply, even though you can see that everyone has read your messages. You experience a lot of stress and you fear that they may experience something fun while you are not part of the group.*

These days, modern society has to deal with a relatively new technological paradox. This paradox is related to social media, which were developed in order to easily stay in contact with family and friends. The internet hereby offers an instant communication channel, which can be accessed for instance via the smartphone. However, this continuous connection to a social environment holds a negative side. The fact that sharing information is so easily accessible, creates a fear that one may miss something when the connection is interrupted. This fear is called Fear of Missing Out (FoMO). The scenario above represents a perfect illustration of FoMO.

FoMO originates from the humans' need to belong to a social group and is as old as society (Beckers, 2014), because we always have been anxious about planning and spending our time in such a way that we miss something else. Social media enable a constant flow of information which satisfies this need. The permanent connection to other people via technologies, such as smartphones, gets addictive. At the point in time, when the information flow gets disturbed, the connection to the social environment gets interrupted. The need to belong cannot be satisfied anymore and humans start to feel anxiety because they do not know the reason for this interruption. This is called "Fear of Missing Out" (Hermann, 2011; Przybylski, Murayama, De Haan & Gladwell, 2013).

Users who experience FoMO try to reduce his anxiety by increasing the information income. This is achieved by compulsively staying connected to social media, as they provide the user with new information. This leads to inattentiveness with regard to the users' real environment. Not watching what is happening around you can become very dangerous. Mindlessly crossing the street may cause accidents, as well as just shortly checking the smartphone for any texts while driving. Furthermore, FoMO can affect the individual on the

psychological level. The individual starts to feel frustrated, mentally exhausted and socially excluded when one is not up-to-date about what friends are doing and one cannot participate. Sharing and being in social networks therefore becomes daily routine, which may also affect ones work behaviour and can even result in stalking friends. Finally, on a societal level, FoMO has resulted in a Heads-Down-Generation; a society in which people only pay attention to their phones (Buchenau & Fürtbauer, 2015).

Earlier research has focussed on what this phenomenon is (see Grohol, 2011; Hermann, 2011; Przybylski et al., 2013; Vaughn, 2012). However, until now, it has not been researched how the effects of this phenomenon can be reduced in order to prevent an addiction to social media. This research investigated the Fear of Missing Out within the environment of the instant messaging service WhatsApp. The study investigated different strategies to stimulate behavioural change. It was aimed to develop an intervention which would reduce FoMO, while it was accepted by the user, and could motivate them to reduce their compulsive behaviour. In order to achieve this, the following research questions were composed:

*In which way does the need to belong influence the Fear of Missing Out?*

*Which motivational strategies can help reduce the symptoms of the Fear of Missing Out?*

*Which motivational strategies can motivate users to reduce their usage of instant messaging technologies?*

# 2. Literature Review

## 2.1. Technology and communication in society

According to the latest counting of the Centraal Bureau voor de Statistiek (CBS), more than 80% of the Dutch population aged between 12 and 25 were in possession of a smartphone in 2013 (CBS, 2014). Within the age group of 25+, this was an ever increasing 60%. Furthermore, smartphones were used for social media and instant messaging such as WhatsApp by nearly 90% by the population aged between 12 and 25 (CBS, 2014). It is evident that maintaining social connections online has become an immense part of societal life. By means of technology, this connection can be preserved continuously.

## 2.2. Need to belong

Humans have an intrinsic need to belong to other social groups (Baumeister & Leary, 1995). This suggests that humans want to be part of other social constructs. This can be for instance family or a group of friends. Social isolation forms the contrary to this and people try to avoid this. Nowadays, this goes even further: Facebook and Twitter make it possible to share one's opinion with thousands and millions of people, which has as result that one can reach more people than one was able 20 years ago. This simplifies the possibilities to satisfy the personal need to belong.

Furthermore, social media in general provide easy access to rewards and social proof (Przybylski, Murayama, De Haan & Gladwell, 2013), when contacts give each other likes, comments or share each other's content. Already a simple reaction on the user's input can trigger the feeling to be involved in the social network.

It appears that one of the most popular instant messaging services is WhatsApp. The mission of WhatsApp is "to let people communicate anywhere in the world without barriers" (WhatsApp, n.d.). This indicates that WhatsApp is a tool to instantly communicate worldwide with other people. The application was meant to work as an alternative for the Short Messaging Service (SMS) (WhatsApp, n.d.; Dürscheid & Frick, 2014). With WhatsApp, the user is able to send messages, photos, and files and make (video-) calls via the internet in real time (WhatsApp, n.d.). With all these features, WhatsApp can be used as a tool to easily and immediately satisfy the need to belong. Altogether, this implies that technology has taken a serious and important part in our lives.

Especially amongst teenagers and young adolescents instant messaging services have become an essential part of the daily routine (Dakin, 2014; Church & De Oliviera, 2013). Amongst youngsters the need to belong is quite high (Goodenow, 1993). This is because the social environment of teenagers and young adolescents is not as well developed as it is for adolescents. Dossey (2014) has found that students show an increased willingness to make use of social media channels, even at moments, when they are not supposed to do so – for instance during classes. Humans, who have a strong need to belong to social groups, and regularly engage in social media, are most likely to try and satisfy their need to belong via social media.

## 2.3. The cell phone and WhatsApp

With the rise of the cell phone, the era of mobile internet communication became a huge part of modern society. The cell phone and later the smartphone have made it very easy to communicate with people all over the world. Carbonell, Oberst and Beranuy (2013) have found out that already the cell phone, which had no connection to the internet, but facilitated mobile communication, resulted in technology abuse amongst their users in order to fulfil their need to belong.

In modern society, the smartphone offers multiple channels to instantly connect to other humans via the internet. One of the most popular instant messaging services is WhatsApp (CBS, 2014). It lets one connect to their network in real time and offers instant feedback with a notification about when the communication partner was last online. Furthermore, the user can see whether the chat partner has received, or even read the sent message (FAQ, n.d.). People who make use of this service get highly involved in their network, and can satisfy their need to belong excessively (see section 2.2.).

When the communication partner does not reply immediately, the information flow gets interrupted. The user does not have the "possibility of a social connection" (Grohol, 2011) and therefore is unable to satisfy his need to belong. This results in a high susceptibility to the Fear of Missing Out (Alt, 2015). The more a person makes use of instant messaging services, the more susceptible he becomes to this technological phenomenon. The user focusses too much on satisfying his need to belong by means of instant communication technology (Correa, Hinsley & De Zuniga, 2010) instead of relying on offline connections (e.g., meeting family or friends). The combination of technology as an external appeal and need to belong as an internal appeal can eventually trigger the so called Fear of Missing Out (Hodkinson, 2016).

## 2.4. The Fear of Missing Out and its consequences

The phenomenon of the Fear of Missing Out (FoMO) is relatively new as a field of study. In this scientific field the influence of FoMO on a person's use of technology is investigated. However, it can be traced back to times when we did not have social communication technologies at all. The first article that has discussed the phenomenon of FoMO dates back to 2000 and was written by Dan Herman. He stated that consumers are no longer only led by their intrinsic motivations as they were known up to that point in time, but also by "a new,

basic motivation: [the] ambition to exhaust all possibilities and the fear of missing out" (Herman, 2000). However, he did not evaluate further on his concept of FoMO.

Grohol (2011) defines the Fear of Missing Out as the anxiety that occurs "because the possibility of a social connection is more important" than anything else. He states that FoMO "is a very real feeling that's stating to permeate through our social relationships" (Grohol, 2011). When the connection to the social environment is interrupted, the user experiences anxiety, because he does not know the reason for the interruption. The need to belong in that case is strong and cannot be satisfied. This results in the fear to be missing something. On the other hand, the need to belong also affects the user when he receives a notification about an incoming message. The user then has the desire to participate (Przybylski, Murayama, De Haan & Gladwell, 2013). If the user is unable to participate and answer this message, again the need to belong cannot be satisfied. This results in the fear to be missing something.

These findings suggest that the Fear of Missing Out is a two-sided phenomenon, which can either occur due to the lack of, or one's inability to check on an incoming message. However, FoMO can be treated differently within the two sides. Someone who actually receives an incoming message has the choice to actively check on that message in some way. Either he can just grab his phone, or he arranges access to the message. This could be leaving a room, where mobile phones are not allowed, or setting the car aside in order to legally take the phone into his hands. On the other side, people who experience the Fear of Missing Out while they do *not* receive any incoming information, do not have the possibility to reduce their anxiety because the necessary information (message) is absent. The latter group will be investigated in this research, because the situation which causes FoMO cannot be actively influenced. The Fear of Missing Out will be defined as follows:

*"The Fear of Missing Out describes the feeling to miss something while trying to communicate with others through social media. This can occur because one feels the constant need for updates, or due to a lack of incoming information, which would be 'messages' in communication terms. In both cases the aim is to satisfy one's need to belong."*

FoMO lets people constantly check on their smartphones and social media accounts in order to be highly involved in their network. This is a form of compulsive behaviour which these people show to satisfy their need to belong. Compulsive behaviour is related to addictions as an "addiction is a persistent, compulsive dependence on a behaviour or substance" (The Free Dictionary, n.d.). The definition furthermore states that there are two types of addiction, "substance addiction" and "process addiction". Substance addiction describes an addiction to substances such as Cocaine, LSD or alcohol. Process addictions on

the other hand consist of compulsive behaviours that do not depend on a consumable substance. Examples of this would be Gambling or Sex (The Free Dictionary, n.d.). In this case, it is the actual process of doing something, which makes the individual addicted. According to this, FoMO can be called a process addiction which results in the unhealthy abuse of technology (Shaffer, 1996; Michaels, 1988; Renau, Gil, Oberst & Carbonell, 2015).

Finally, abusing communication technology to fulfil one's need to belong can result in the same psychological and physical consequences: isolation, anxiety, physical discomfort and sickness (Turel, Serenko & Bontis, 2011). Ellis (2003) brings discomfort and anxiety into a similar spot, stating that humans experience an "emotional tension that results when people feel (…) that they should or must get what they want (and should not or must not get what they don't want)". In other words: When people get into situations that contradict their expectations, they feel anxious. According to Cohen and Williamson (1979), this results in what is known as 'stress'. The fear of social exclusion and a certain state of frustration towards the chat partner represent the emotions of FoMO (Przybylski, Murayama, De Haan and Gladwell, 2013). Herman (2000) adds mental exhaustion to this. These three components can either appear apart from each other (in a mild form of FoMO) or appear together, when the addiction has become distinct.

## 2.5. Changing behaviour

The aim for this study is to develop an intervention which can cause users to reduce their compulsive behaviour. Tromp, Hekkert and Verbeek (2011) have researched the circumstances in which users of technology are willing to change their behaviour with regard to their personal usage of the technology in question. According to them, there are two important factors which influence one's behaviour: the social environment and the technology itself (Tromp, Hekkert & Verbeek, 2011). Amongst other things, social cues form the reason for influencing the user's behaviour. This implies that the user will adapt his behaviour following the paradigm of the social environment he is settled in. Furthermore, the technology itself provides the way to influence the user's behaviour (Tromp, Hekkert & Verbeek, 2011).
The design of the technology can therefore either be "discouraging the problematic behaviour or (…) encouraging the other desired behaviour" (Tromp, Hekkert & Verbeek, 2011). They state that there are four main design choices on how to influence user behaviour. These are decisive, coercive, seductive and persuasive. On the one hand, decisive and coercive design choices appear to be strong influencing choices. They aim at a design which forces the user to show certain, more desired behaviour. On the other hand, seductive and persuasive design

choices are weaker in their ability to influence behaviour. They rely more on the user's insight in his behaviour and the user's intrinsic motivation, to eventually trigger behavioural change.

Dorrestijn (2012) generally agrees with these statements. He argues that there are three main strategies which can be used to stimulate behavioural change. According to him, a strategy to change behaviour must be persuasive, motivational or coercive. Firstly, a persuasive strategy would be subtle, and based on the cognition of the user. This strategy responds to the ability to manipulate the user through cognitive stimuli. Secondly, a motivating strategy would respond to the moral values of the human. Dorrestijn (2012) states, that the human being learns and internalizes moral values from his social environment. These values can be addressed in order to motivate the user to behavioural change. Lastly, a coercive strategy forces the user to show different behaviour. This can be achieved for instance by restricting access to technology.

# 3. Intervention-types

Subsequently, the different strategies of Dorrestijn (2012) were brought together with the environment of WhatsApp, in order to create interventions which will serve as visual stimulus for both the pre-study and the main-study. All interventions were based on further literature, which will explain the core of the respective intervention.

## 3.1. Standard situation WhatsApp

For the main study it will be necessary to have a control group. Therefore a FoMO-related scenario will be created into the environment of WhatsApp. This should represent the standard situation and give the respondents the possibility to feel themselves into the situation. The interventions will all follow up on this standard situation.

As Figure 1 shows, the situation consists of a WhatsApp group chat with 5 friends. Four of these friends discuss with each other. In the scenario, the 'I' reacts late on the foregoing chat. There are no reactions by the others. The check marks indicate that the messages have been transmitted, then received and finally been read. The standard situation stops at this point in time.

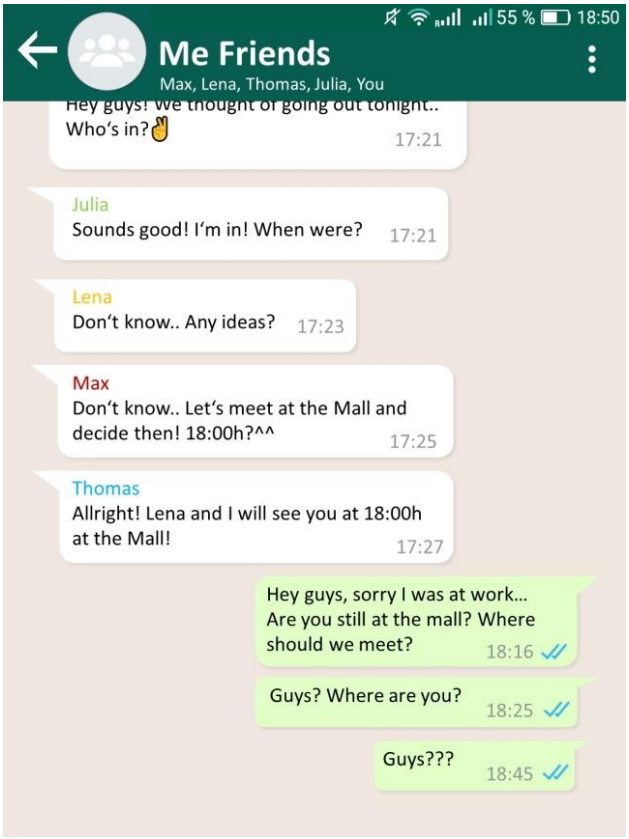


**Figure 1:** *Example of the standard situation*

## 3.2. Information Reduction and conditioning

Shaffer (1996) states that technology addictions are comparable to for instance an alcohol addiction, regarding the symptoms. Therefore technology addictions – and hence also FoMO – can be treated the same way as other addictions. Montag and Reuter (2015) suggest decreasing the dose of the drug. Firstly, this could be the information about the status of the message. By removing this, the need to belong could not be satisfied by recognizing that a message has been delivered or read. The only satisfaction would come from either sending or receiving a message. Following Dorrestijn (2012), this would be a persuasive strategy.

Secondly, the access to the drug could be restrained. Limiting the possibility to use the technology would again lead to less information about the sent message. This would cause the user to be unable to satisfy his need to belong by means of the technology at all. Knowing this, the user will avoid situations in which this possibility is limited. He then will be conditioned to show other behaviour. This would be a coercive strategy (Dorrestijn, 2012).

### 3.2.1. Information Reduction as an intervention – No checkmarks

The first intervention will simply consist of the removal of the check marks and – for private chats – the last-seen status of the chat partner (see Figure 2). One will not have any more information about the status of the message or the chat partner. This means that the person who has sent the message will neither know whether the message has been read, nor whether the chat partner actually is online.

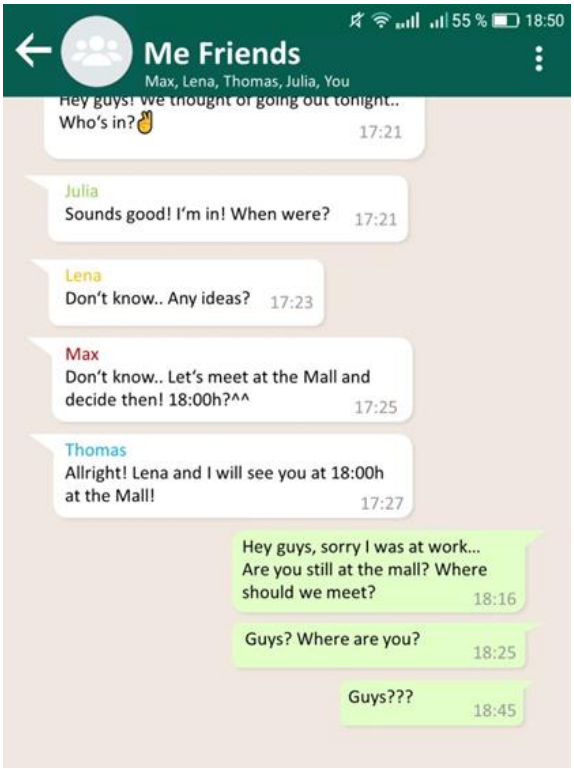


**Figure 2:** *No checkmarks and no last-seen status*

### 3.2.2. Information Reduction as an intervention – Blockade

Another possibility to reduce the usage of the smartphone would be to block the app entirely when a user shows compulsive behaviour. Hereby the smartphone will indicate that the app is about to be blocked. If the user does not react, the app will be blocked for 5 minutes. The smartphone user is forced to close the app. The blockade is indicated by a black padlock across the whole screen (see Figure 3). If the behaviour appears too often, the duration of the blockade will increase stepwise up to 10 minutes. The user must learn to control his behaviour in order to prevent a blockade of the app. The amount of blocks will be tracked, so the user has insights in his behaviour and becomes aware of his compulsive usage of the app.

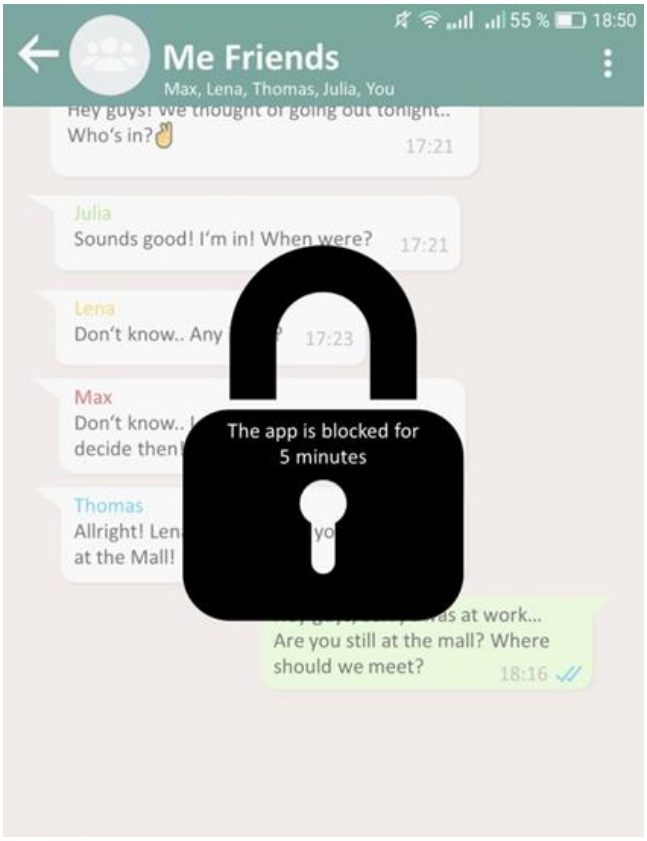


**Figure 3:** *Blockade*

### 3.2.3. Information Reduction as an intervention – Self-closing chat

The next intervention would consider only the chat which causes the Fear of Missing Out. The app will recognize compulsive behaviour and block the chat for usage. In such a case, the user will automatically return to the home screen of the app. Also the chat cannot be opened again, because of the blockade. This will be indicated by a small padlock on the right hand side of the chat (see Figure 4). The blockade will last at a maximum of 5 minutes, or until the

chat partner responds. However, when the user repeatedly shows compulsive behaviour, the blockade will intensify and eventually last the full 5 minutes, regardless of any possible response. This is to make the user aware of his behaviour and to force him to stop showing the undesired behaviour.

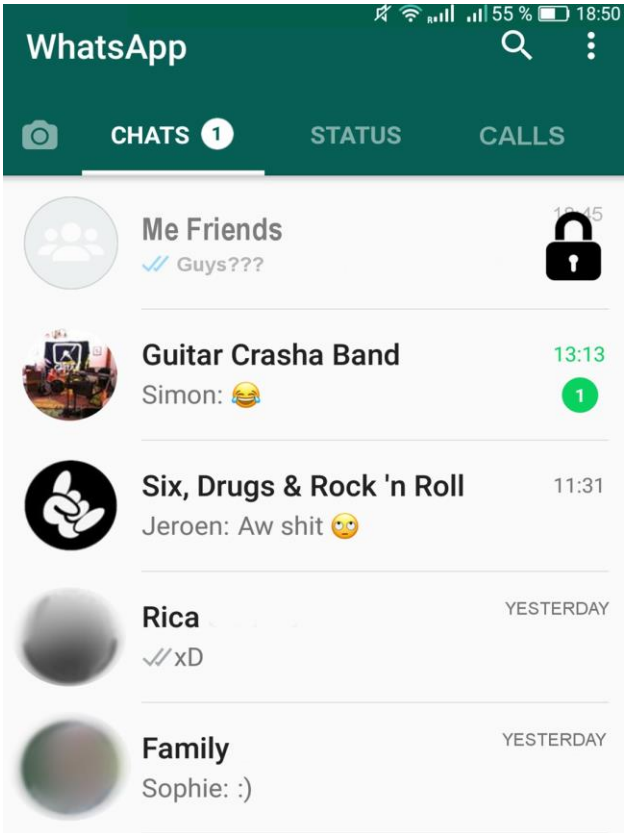


**Figure 4:** *Self-closing chat*

## 3.3. Pointing out undesirable behaviour

Another possible solution is to respond to the user's social appearance. One's social appearance is of high importance when interacting with one's environment. According to the Social Identity Model of Deindividuation Effects (SIMDE) by Tajfel, Flament, Billig and Bundy (1971), humans tend to adjust their behaviour to what the bigger group does in order to blend in. Compulsive behaviour is abnormal, relative to the bigger group. According to Wagner (2008), pointing out the undesired behaviour should be already enough to attend the user on his behaviour, which occurs in an undesirable context. The user therefore again should be able to compare his behaviour to his social context. The reasons are embarrassment and the wish to conform to the standards of the bigger, social environment, one is part of.

Therefore the user should be motivated to change his behaviour (Tajfel, Flament, Billing and Bundy, 1971). In terms of Dorrestijn (2012), this would be a motivating strategy.

### 3.3.1. Pointing out undesirable behaviour as an intervention – Alert message

This intervention consists of a pop-up message that reminds the smartphone user of the fact that he again only checks on his phone while there is no interaction ongoing. The alert takes in the whole screen so the user can recognize it immediately (see Figure 5). He has actively to take action to remove the message. Meanwhile, he apprehends that he leaves himself to his addiction. Also, to enhance this effect, the system will again count the amount of times that the FoMO-alert is shown. The user can see this number as well and therefore has better insights in his compulsive behaviour.

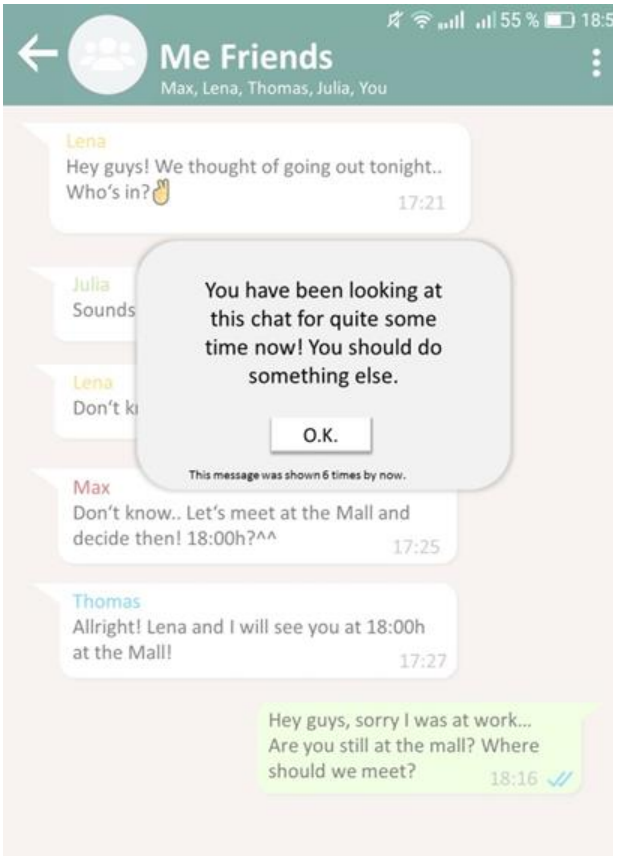


**Figure 5:** *Alert messaae*

## 3.4. Media Richness

Research has shown that media messages are processed better, when the used medium scores high in media richness (Daft & Lengel, 1986). According to Daft and Lengel (1986), messages that are broadcasted through a medium which only provides visual cues, score

relatively high on the richness scale. When media provide messages with auditory cues, they score even higher on that scale. The richer a medium is the more social cues are shared between the sender and the recipient. This gives the message a higher efficiency, because humans react better to social cues, compared to textual, clean cues (Daft & Lengel, 1986). Kahai and Cooper (2003) found, that the media richness theory not only works for traditional media channels, but can also be effective for new media. Technology is able to combine both visual and auditory cues. This should evoke the desire to conform to the common social environment even more. In terms of Dorrestijn (2012), this would be a persuasive strategy.

### 3.4.1. Media Richness as an intervention

This intervention connects quite closely to the 'Alert message'-intervention (see section 3.3.1.). In this intervention a voice additionally indicates the user's behaviour. This indication is both visual and auditory (see Figure 6). Following theory, a written alert has a different impact compared to a spoken alert. The theoretical background of the media richness theory allows the conclusion that adding a channel which emphasises a social cue, makes the message more effective.

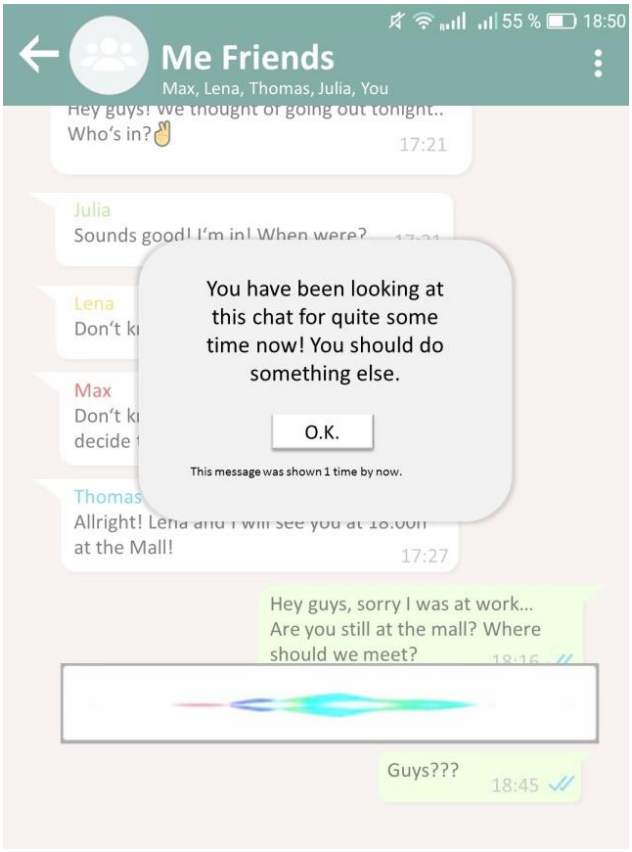


**Figure 6:** *Voice alert message*

## 3.5. Inverted Negative Reinforcement

While it is necessary to make people aware of their behaviour, creating motivation for behavioural change is an important factor as well. The negative reinforcement theory by Stinus, Caillé and Cador (2010) states that one gets motivated, when an "unpleasant stimulus […] is removed after a behavioural response". In the case of a smoker for instance, this means that it is good when someone shows the behaviour of 'stopping with smoking' because this leads to the removal of the 'addiction, and negative consequences of smoking'. In other terms: Users of a smoking cessation application get confronted with the positive effects of stopping with smoking, which motivates them to further show that behaviour.

Since giving positive feedback, when actually not using the app is impossible in the given environment, a theoretical implication about inverted negative reinforcement is formulated: Motivation to quit certain behaviour can be achieved by giving negative statements when showing the undesired behaviour. In this case, the user would be attended to simple time-related facts when he or she uses the app too long. The user is attended to more social and useful activities that he could have executed while just checking their phone. Zichermann and Cunningham (2011) point out that such an intervention could also be designed as a motivational game. Offering tasks while waiting can motivate the user to do these tasks instead. Hereby the compulsive behaviour which is caused by the Fear of Missing Out can be reduced. Following Dorrestijn (2012), this would be a motivating strategy.

### 3.5.1. Inverted Negative Reinforcement as an intervention – Task intervention

This intervention is will confront the user with a popup-message. It will provide examples of different activities which he could have done during the time that he only waited for a response from his chat partner (see Figure 7). For instance, the user will be attended to the fact that he already is busy for 10 minutes and in this time could have emptied the trash, eaten something nice, drunk something and the phone's battery could have saved a certain percentage of its battery. Additionally, tasks like 'Run the stairs up and down 3 times' or 'Do 30 sit-ups' can be offered to the user. Again, this intervention will show statistics on the user's behaviour, which should enhance the effect of motivational insights into the user's compulsive behaviour.

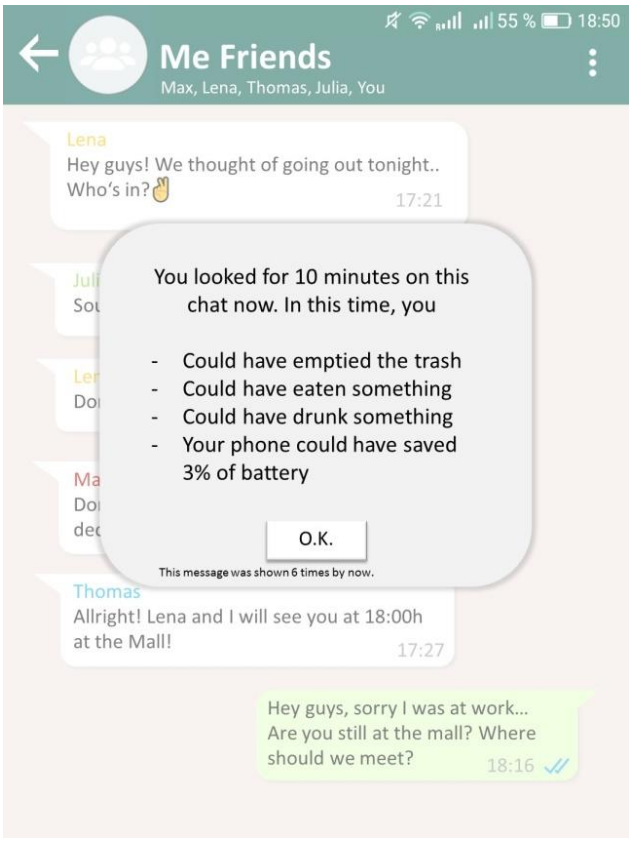


**Figure 7:** *Task intervention*

## 3.6. Self-talking

When a human being experiences anxiety, it is likely that they will talk to themselves in order to calm themselves down. Hatzigeorgiadis, Zourbanos, Mpoumpaki and Theodorakis (2009) have found that this self-talk-performance actually has a positive, calming influence on one's level of felt anxiety. Jackson and Maslach (1982) have found, that disposing off one's bad feelings by talking about it, and just proclaiming one's feelings, can help to reduce one's stress level. Therefore, a user who experiences the Fear of Missing Out and who is given the possibility to express his anger, worries and anxiety, should be able to lower his level of stress and therefore can counter the aftereffects of the Fear of Missing Out. Following Dorrestijn (2012), this would be considered as a persuasive strategy.

### 3.6.1. Self-talking as an intervention

The following intervention will give the user the possibility to express his feelings and actively provide information about what FoMO is and what its aftereffects are. When the system detects compulsive behaviour, a small speech bubble will appear in the lower right corner. It will blink slightly, in order to catch the user's attention. When clicking on it, the user will be asked why he shows the detected behaviour ('What's wrong?'). The user will furthermore see a blank field. There he will have the possibility to enter text, so he can answer

the asked question (see Figure 8.1.). The idea behind this is that the user can just load off his emotions, worries, anger, questions and other negative feelings. The person can send this 'into the blue' – nobody will ever see this message, because it is not sent to anyone. After that, the user will receive brief information about what FoMO is (see Figure 8.2.). In this way, he has disposed of the negative feelings, is aware of the phenomenon and therefore has the opportunity to choose for altering his behaviour. The formulation of the given information was positively pre-tested with four respondents.

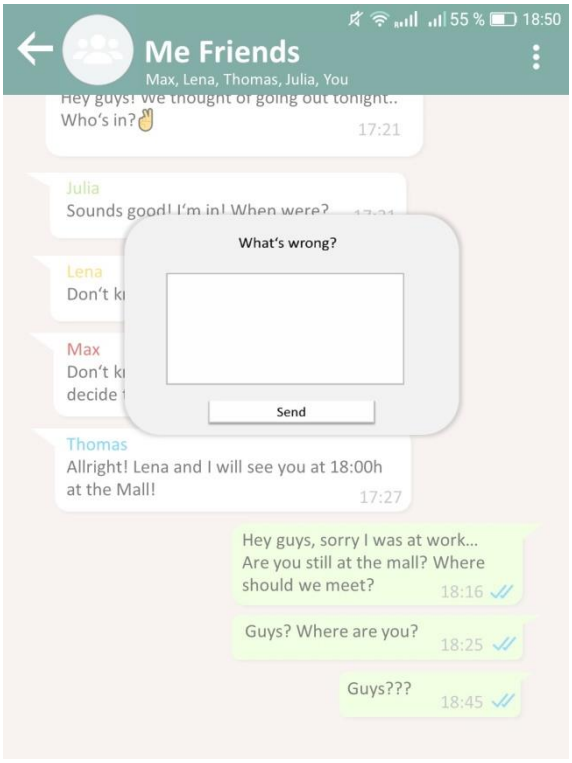


**Figure 8.1.:** *The first stage of the Self-talking intervention*

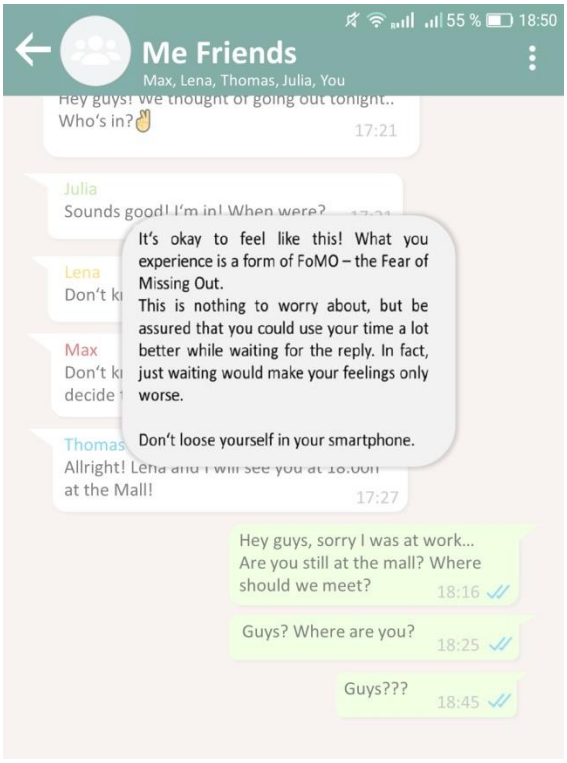


**Figure 8.2.:** *The second stage of the Self-talking intervention*

## 3.7. Colour indication

Another persuasive factor will be taken into the pre-study: colours. According to Itten (1970), humans tend to associate colours with certain emotions, and even behaviours. Even though colours can have different associations in different cultures, it is evident that two colours remain evoking the same feelings. On the one hand, green is generally associated with positive feelings, and one tends to feel okay with what one does. Green indicates that 'everything is okay'. On the other hand, red generally evokes the opposite feelings and even causes humans to show certain (trained) behaviour. When seeing the colour red on a stoplight, a pedestrian will stop automatically because he has learned what the colour means in that particular context. Generally, the colour red indicates that 'something is wrong'. Following Dorrestijn (2012), an intervention with colour coding would be a persuasive strategy.

### 3.7.1. Colour indication as an intervention

This intervention contains an indication for one's behaviour, based on colour coding. The participant will be able to chat normally, but the edges of the screen will have a green colour (see Figure 9.1.). When the user starts to show compulsive behaviour, the edges will slowly turn orange (see Figure 9.2). When the user continues to show undesired behaviour, the colour will eventually change to red (see Figure 9.3.). The user hereby gets attended on his behaviour. Because of the general association with the colours, the user is likely to show behavioural change when he gets to see the red indication too often. He learns that his compulsive behaviour is undesirable.


**Figure 9.1.:** *The first stage of Colour indication*

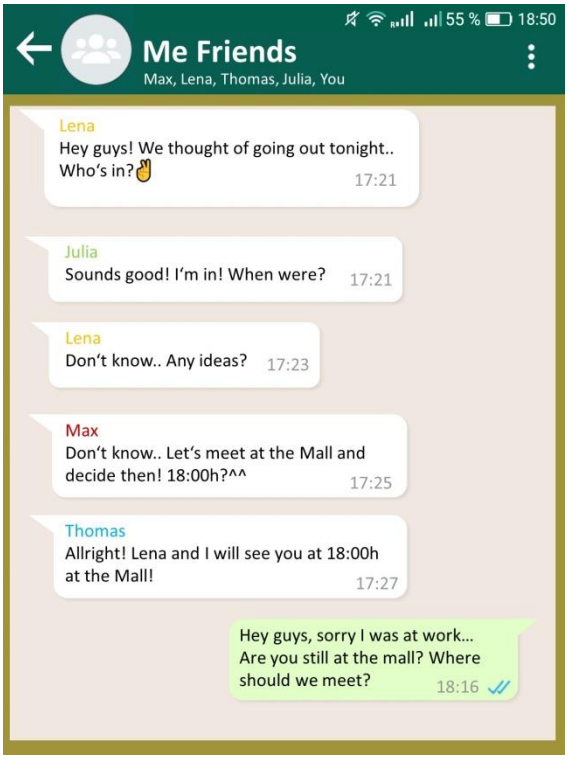


**Figure 9.2.:** *The second stage of Colour indication*

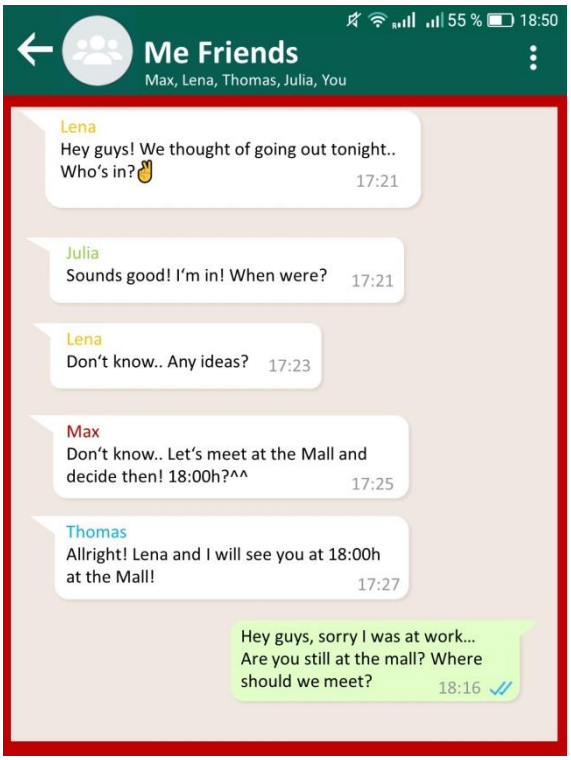


**Figure 9.3.:** *The third stage of Colour indication*

# 4. Pre-study

An intervention that is aimed to help the user with an unpleasant experience of course must be accepted by him as well. Based on the literature, quite different approaches can be taken in order to extenuate the aftereffects of the Fear of Missing Out. Hence, a pre-study was conducted in order to determine which interventions hold most promise for dealing with FoMO. The four best scoring interventions from this pre-study will be tested against the standard situation in the later main study. The different interventions were presented and explained to 15 participants who were asked to put themselves into a fictive scenario. In that scenario the respondents had to imagine a situation in which they show compulsive behaviour and most probably experience the Fear of Missing Out. They were asked to imagine this scenario by themselves, in order to determine whether this procedure would work in the main study as well. If not, a general scenario would have to be sketched in order to lead the participants in the main study.

With this scenario in mind, the participants were asked to rate the interventions, considering their adoptability into real life and what they think in general about them. They were asked to make use of the think aloud protocol method (Jääskeläinen, 2010). Subsequently, they would have to choose a top three of the interventions which they would like most when they would encounter the intervention in real life. The four interventions which were chosen most by the participants will be taken into the main study. There they will be tested against a control group which represents the current situation.

## 4.1. Results of the pre-study

First of all, it became clear that the respondents had no difficulties imagining a situation in which they would experience the Fear of Missing Out. On the other hand, it must be stated that all respondents were students between the age of 18 and 25 and therefore are most likely to be more experienced with the requested situation. Hence, for the main study it should be taken into consideration to present a pre-sketched scenario to the respondents. In this way, it will be ensured that also those who are less experienced in the field of social media will imagine a scenario of similar type and feel themselves into the correct emotional state.

When testing the interventions, it became obvious, that certain features would not work in a real life setting. This became very obvious for the interventions ‘Voice alert message’ and ‘Blockade’. The participants indicated that they would find it annoying to get an

automatic voice alert when they were for instance in a public space and had their phone on purpose in silent mode. Furthermore, they indicated that blocking the whole app would be too much of an aggressive intervention, because it takes one's freedom to communicate with other people. Consequently, these interventions were not chosen for the top 3 at all.

The next least chosen interventions were the 'No checkmarks' and 'Self-talking'. Both of them were chosen five times into the top 3 of the respondents. The respondents indicated that the first option (leaving checkmarks and online status out) could be too subtle and may not be recognized enough by the user. They claimed that the intervention should be immediately recognizable. As a matter of fact, the respondents were divided when it came to the question whether the intervention should be eye catching or subtle. Their opinions became a little clearer when it came to the 'Self-talking' intervention. The respondents thought that it would be a nice feature to have, but could lose its value when the intervention, and especially the information text, appears too often. Additionally, some respondents claimed that they wouldn't take it very serious when their mobile phone suddenly was worried about their well-being. Others claimed that it could help to express their feelings and thoughts, but mentioned that it could become annoying when they had to do this more often. As a result, the user may only type one word and send it away in order to get the intervention to turn off again.

The next favourite interventions of the respondents were the normal 'Alert message' and the 'Self-closing chat'. Both of the interventions were chosen seven times into the top 3 of the respondents. They liked the 'Alert message' because it presents a clear indication that the user's behaviour is unwanted. They indicated that it could also initiate the user to just call the chat partner because it reminds the user that there has not been any interaction for some time. As a disadvantage, the interviewed persons claimed that from time to time, they could possibly only click away the pop up without further notice. Also the respondents claimed that – even though it is a slightly more aggressive intervention – taking the possibility to access the chat could work as well. The user then would be forced to do something else. It would be a punishment for unwanted behaviour. Furthermore, they thought it could work as prevention for the user to further develop the Fear of Missing Out. As a disadvantage, the respondents mentioned that they were unable to change the information from their side, for instance to give another time at which one could meet. Finally, it seemed that this constraint would appear less serious to the user.

The last interventions which were chosen most by the respondents of the pre-test would be the 'Task'-intervention and 'Colour indication'. The respondents indicated that they found it very motivating to receive little tasks and facts for the time in which they would use their smart phone due to FoMO. Some of them even stated that they enjoyed this intervention. Another reason why it was chosen this often was that this intervention shows a certain level of sensibility. Compared to other pop ups, this intervention is less demanding and appears less forcing in the eyes of the user. Anyway, it still must be taken into consideration that also this pop up can just be ignored and annoy the user when appearing too often. The 'Task'-intervention was chosen 10 times into the top 3 of the respondents.

With 11 votes into the top 3, only the 'Colour indication'-intervention was more successful in the eyes of the respondents. They indicated that it was a very subtle manner of indicating unwanted behaviour. Also it does not take one's freedom to continue their behaviour if they wish to. However, the respondents claimed that the context of this feature must be clear to the user because it does not give clear feedback on behaviour, but only indicates something. To the user it is not necessarily clear that the colour aims at the user's behaviour. Without any explanation, it could mean many different things to him. This will be taken into account when creating the questionnaires for the main study.

As a result of the pre-study, it became clear that the following interventions should be taken into the main study in order to be tested against the current situation:

- Colour indication
- Task
- Alert message
- Self-closing chat

**Table 1**
Results of the pre-study

| Intervention | Advantages | Disadvantages | Top 3 | Strategy [a] |
|---|---|---|---|---|
| Voice alert message | - | Phone would switch to sound automatically, even in situations in which this is unwanted | 0 | Motivating |
| Blockade | Would reduce the use of the app | Too aggressive | 0 | Coercive |
| No checkmarks | Subtle | Not recognized immediately | 5 | Persuading |
| Self-talking | Nice feature, could work for emotionally affective participants | Not serious enough, too annoying in usability | 5 | Persuading |
| Alert message* | Clear indication of behaviour, initiate other behaviour (call chat partner) | Can just be clicked away | 7 | Motivating |
| Self-closing chat* | Does not block the whole app, but prevents compulsive behaviour, works preventing | Unable to change information for chat partner | 7 | Coercive |
| Task* | Encouraging / Motivating, enjoyable and sensible | Could become monotonous, and can be ignored | 10 | Motivating |
| Colour indication* | Subtle, does not interfere in user's behaviour | Context of intervention could be unclear, could appear too subtle | 11 | Persuading |

* Will be taken into the main study

[a] Following Dorrestijn (2012)

# 5. Main Study

The results from the pre-study led to the method of the main study. They showed that coercive, motivating and persuasive strategies would be acceptable in a real life setting. The main study tested these strategies against the (current) standard situation, using a 2x5 between subjects design. The research was a simulation experiment, immediately followed by a survey. The study was conducted online.

## 5.1. Procedure

In the experiment, the respondents were confronted with a scenario (see Appendix A) and subsequently were placed randomly into one intervention-type group. This was either one of the selected interventions or the standard situation as a control group. Consequently, the respondents' level of FoMO, and their general need to belong were tested. After that, their motivation for behavioural change was measured, as well as their attitude towards the intervention. When the respondents were placed in the control group, there was no need to measure their attitude. Finally, the participants filled in their demographic data. The whole questionnaire can be found in Appendix B. The respondents were randomly gathered via different channels. Firstly, the internal SONA-system of the University of Twente was used in order to gather students. Secondly, random participants were approached via social media channels, such as Facebook and Twitter.

## 5.2. Participants

For this study, people from the age of 13 and older were eligible to participate in the study. The study aimed on participants between 13 and 34 years because in this age human beings are most susceptible to FoMO (Goodenow, 1993). However, older participants also took part in the study, since they are less susceptible to FoMO due to their lower need to belong. The results from this study should confirm this, and this is why also older participants were eligible to take part in the study. There were no further restrictions for the participants, who were chosen at random. All in all 207 participants took part in the study. The mean age was 27.87 (SD = 11.19) years. Table 2 presents an overview of the participants' gender and age.

**Table 2**
Overview of participants' gender and age

| | Gender | | Age | | | | |
|---|---|---|---|---|---|---|---|
| | Male | Female | 15-24 | 25-34 | 35-44 | 45-54 | 55+ |
| N | 74 | 133 | 120 | 47 | 17 | 14 | 9 |

## 5.3. Measurements

### 5.3.1. Need to Belong

The Need to Belong Scale by Leary, Kelly, Cottrell, and Schreindorfer (2005) was used in order to determine to which extent need to belong had effect on the Fear of Missing Out. All items were scored on a 7-point Likert-scale (scale anchors: "*I strongly disagree*" versus "*I strongly agree*") (see Appendix B). The higher one scores on those items, the more urgent one wants to belong to social groups. It was tested with a Cronbach's alpha of .81 (Leary, Kelly, Cottrell, & Schreindorfer, 2013). This value was confirmed with the data from this study, which was also .81. Finally, the items of this scale were combined into one variable by conducting a median split. By doing so, it was possible to place the respondents into two categories (1 = 'low need to belong' and 2 = 'high need to belong'). The median was 4.70.

### 5.3.2. Fear of Missing Out

The Fear of Missing Out consists of three different constructs – frustration, the fear of social exclusion, and mental exhaustion. Based on these three constructs, a scale for FoMO was created. It contained different items which were measured on a 7-point Likert-scale (scale anchors: "*I strongly disagree*" versus "*I strongly agree*") (see Appendix B). The scale was inspired by the Perceived Stress Questionnaire by Levenstein et al. (1993). All items were set in the past tense in order to frame them on the encountered situation. The respondents were furthermore instructed to answer these items, based on the simulated situation (see Appendix B). For all constructs the mean was computed in order to create one variable for them ('Frustration', 'Fear' and 'Mental exhaustion'). The higher respondents scored on these variables (scale 1-7), the more they experienced the respective emotions.

For the construct of frustration, the items "I felt angry", "I felt frustrated", "I felt irritated", "I felt lonely" and "I felt like I am missing something" were used. Cronbach's alpha for this construct was .84.

For the construct of fear, the items "I felt anxious", "I felt nervous", "I felt tense", and "I felt calm" were used. Cronbach's alpha for this construct was .67, which is acceptable.

For the construct of mental exhaustion, the items "I felt tired" and "I felt mentally exhausted" were used. Based on a factor analysis the item "I felt stressed" was deleted. After that, Cronbach's alpha was .65, which is acceptable.

### 5.3.3. Motivation

The interventions did not only focus on reducing stress, but also on motivating the user to show more desirable behaviour. Hence, the participants' motivation for behavioural change was measured. No scale was found for general motivation measurement. Because of this, a scale was developed, based on the theory of planned behaviour by Ajzen (1991). Based on a factor analysis, the items "Because of the intervention, I want to use WhatsApp / the new app less" and "I think I would feel better when I use WhatsApp / the new app less" were created (see Appendix B). Cronbach's alpha was .65, which is acceptable. The items were scored on a 7-point Likert-scale (scale anchors: "*I strongly disagree*" versus "*I strongly agree*"). Finally, the mean of all items for motivation was computed. This resulted in the variable 'motivation'. The higher respondents scored on this variable (scale 1-7), the more they were motivated to show behavioural change after the encountered situation.

### 5.3.4. Attitude

The respondents' attitude towards the intervention was measured in order to determine whether the user would actually accept such an intervention. For this, the items "This intervention would be effective for me", "This intervention would make me mad", "This intervention would work for me" and "This intervention appeals to me" were presented (see Appendix B). The items were scored on a 7-point Likert-scale (scale anchors: "*I strongly disagree*" versus "*I strongly agree*"). The questions were based on Burton and Lichtenstein (1988), who tested the scale with a Cronbach's alpha of .92. The scale was retested by conducting a factor analysis. It appeared that the item "This intervention would make me mad" correlated too much with another factor. Hence, this item was deleted from the scale. This resulted in a Cronbach's alpha of .81. Finally, the mean of all items for attitude were computed. This resulted in the variable 'attitude'. The higher respondents scored on this variable (scale 1-7), the better they evaluated the intervention for its implementation in a real life setting.

### 5.3.5. Covariates

The constructs of age, usage of social media platforms, usage of social messaging and whether the respondents indicated to have grown up with social media or not, were covariates in the conducted analyses.

Five categories for age were created: 15 to 24, 25 to 34, 35 to 44, 45 to 54 and 55 to 80. This was done because the research did not aim for results on mirco level with regard to age, but on a meso level, combining several ages in one category. Furthermore, the first category started at 15, because there were no respondents under the age of 15. The smaller

intervals in the younger categories were created because of their need to belong and its influence on FoMO. The older the respondents were, the less they feel the pressure to belong to a social group. On the other hand, a person from the first category may experience a different need to belong, compared to a respondent from the second or third age category.

Furthermore, the variable 'usage of social messaging' was measured by asking the respondents how long they would make use of such services per day. They could then answer *0-1 hrs*, *1-3 hrs*, *3-6 hrs*, or *6+ hrs*. The same was conducted for the construct of 'usage of social media platforms'.

Finally, the participants were directly asked whether they thought that they have grown up with social media. They could simply answer *yes* or *no* to this. By means of this, the last construct 'grown up with social media' was measured.

### 5.3.6. Data analysis

The data was imported into the statistics software SPSS, where it was found that the data was normally distributed. Due to this, it was possible to use ANOVA analyses. These were conducted with the independent variables intervention-type and need to belong against the different dependent variables (frustration, fear and mental exhaustion, attitude and motivation). By means of the ANOVA analysis, the main effects for both intervention-type and need to belong were observed. Additionally, the interaction effect between the independent variables was investigated. All results were adjusted to the used covariates. Furthermore, LSD post hoc tests were conducted to compare the interventions pairwise.

# 6. Results

After all answers were collected, the data was imported to SPSS. In total 207 answers were collected, and it was found that there was an equal distribution of the respondents over the five groups (see Table 3). The intervention groups will also be referred to as 'intervention-types' in this chapter.

**Table 3**
*Distribution of the different variables over groups*

| Group | | Standard | Colour indication | Task | Alert message | Self-closing chat | Total |
|---|---|---|---|---|---|---|---|
| Valid N | | 43 | 44 | 39 | 40 | 41 | 207 |
| Need to belong | Low | 24 | 18 | 19 | 23 | 19 | 103 |
| | High | 19 | 26 | 20 | 17 | 22 | 104 |
| Gender | Female | 30 | 30 | 26 | 26 | 21 | 133 |
| | Male | 13 | 14 | 13 | 14 | 20 | 74 |
| Mean age | M | 29 | 27 | 29 | 28 | 25 | 27.87 |
| | SD | 12 | 12 | 13 | 10 | 9 | 11.19 |
| Usage of social platforms | 0-3 hrs | 35 | 37 | 33 | 34 | 35 | 174 |
| | 3+ hrs | 8 | 7 | 6 | 6 | 6 | 33 |
| Usage of social messaging | 0-3 hrs | 30 | 35 | 34 | 29 | 35 | 163 |
| | 3+ hrs | 13 | 9 | 5 | 11 | 6 | 44 |
| Grown up with social media | Yes | 21 | 22 | 16 | 21 | 28 | 108 |
| | No | 22 | 22 | 23 | 19 | 13 | 99 |

The results from the conducted ANOVA analyses are presented in Table 4.

**Table 4**

*Results of the ANOVA analyses for all dependent variables*

| | | df | F | Sig. |
|---|---|---|---|---|
| Frustration | Intervention-types | 4 | .747 | .561 |
| | Need to belong | **1** | **19.011** | **.000** |
| | Intervention-types*Need to belong | 4 | 1.152 | .334 |
| | Age category[a] | **1** | **40.443** | **.001** |
| Fear | Intervention-types | 4 | .843 | .499 |
| | Need to belong | **1** | **6.806** | **.01** |
| | Intervention-types*Need to belong | 4 | .307 | .873 |
| | Age category[a] | **1** | **3.051** | **.082** |
| Mental exhaustion | Intervention-types | **4** | **2.512** | **.043** |
| | Need to belong | **1** | **6.602** | **.011** |
| | Intervention-types*Need to belong | 4 | 1.683 | .155 |
| Attitude | Intervention-types | **3** | **2.166** | **.094** |
| | Need to belong | 1 | .411 | .522 |
| | Intervention-types*Need to belong | 3 | .454 | .715 |
| Motivation | Intervention-types | **4** | **9.083** | **.000** |
| | Need to belong | 1 | 2.12 | .147 |
| | Intervention-types*Need to belong | 4 | .334 | .854 |
| | Social platform usage[a] | **1** | **3.758** | **.054** |

[a]This variable was a significant covariate

LSD Post hoc tests were conducted for all dependent variables in order to compare the intervention-types pairwise with regard to the respective variable. These results are summarized in Table D1 (see Appendix D).

## 6.1. Fear of Missing Out – Frustration

The results did not bring up a main effect for the intervention-types ($F(4, 193) < 1$, $p = .56$). However, pairwise comparisons of the intervention-types (see Appendix D, Table D1) showed that the standard situation scored significantly lower than the 'Self-closing chat'-intervention ($p = .07$). Furthermore, these comparisons showed that also the 'Task'-intervention scored significantly lower, compared to the 'Self-closing chat'-intervention ($p = .08$; see Figure 10).

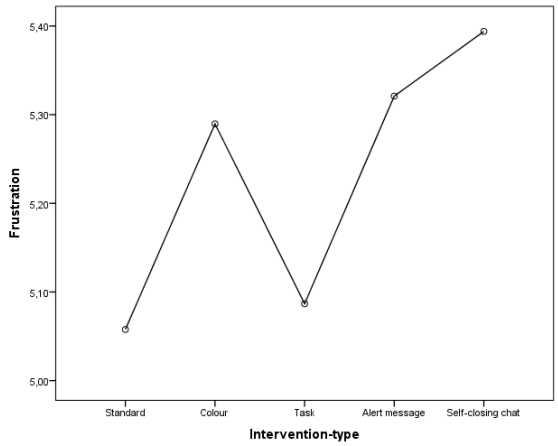


**Figure 10:** *Scores of intervention-types for the concept of Frustration*

The results showed a strong effect for the need to belong with regard to frustration ($F(1, 193) = 19.01$, $p < .001$; see Table 4). Respondents with low need to belong ($M = 4.9$, $SD = .1$) scored lower on frustration compared to those with a high need to belong ($M = 5.54$, $SD = .1$; see Table 5). This showed that users with a weak need to belong also would feel significantly less frustrated a situation, similar to the one that the participants had encountered.

**Table 5**

*Need to belong in Frustration*

| Need to belong | Mean | SD |
|---|---|---|
| Low | 4.9 | .1 |
| High | 5.54 | .1 |

Furthermore, no significant effect was found for the interaction between the intervention groups and the need to belong ($F(4, 193) = 1.15$, $p = .33$; see Table 4).

The covariate age did have significant effect on these results (F (1, 193) = 10.44, p < .01; see Table 4), showing that younger respondents would feel more frustrated than older participants (see Figure 11).

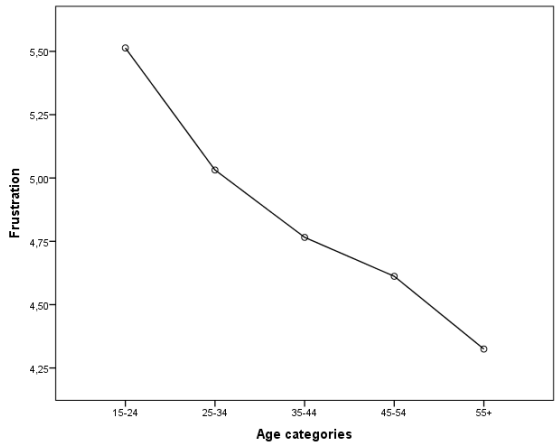


**Figure 11:** *Scores for age categories in the concept of Frustration*

## 6.2. Fear of Missing Out – Fear

No main effect was found for the intervention-types (F (4, 193) < 1, p = .5; see Table 4). However, pairwise comparisons showed that the 'Task'-intervention caused significantly less fear compared to the 'Self-closing chat'-intervention (p = .04; see Figure 12; Appendix D Table D1).

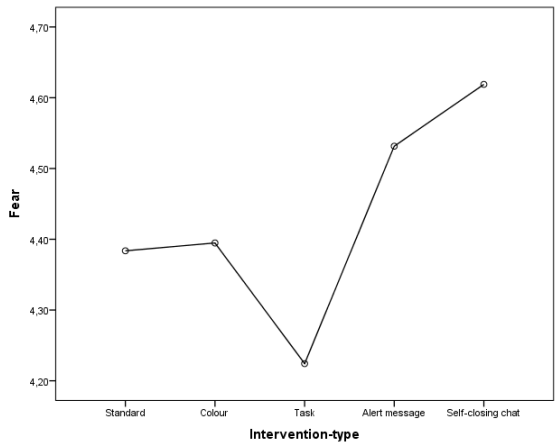


**Figure 12:** *Scores of the intervention-types in the concept of Fear*

For need to belong, significant results were found (F (1, 193) = 6.81, p = .01; see Tables 4 and 6). They showed that the mean for respondents with a low need to belong was lower (M = 4.22, SD = .11) compared to respondents with a high need to belong (M= 4.62, SD = .11),

indicating that users with low need to belong would feel less frightened to be socially excluded than other users.

**Table 6**

*Need to belong in Fear*

| Need to belong | Mean | SD |
|---|---|---|
| Low | 4.22 | .11 |
| High | 4.62 | .11 |

No significant results were found for the interaction between the five intervention groups and the need to belong ($F (4, 193) < 1$, $p = .87$; see Table 4).

The age of the respondents had marginal effect on the results ($F (1, 193) = 3.05$, $p = .08$; see Table 4), showing that younger respondents felt more fear, compared to older participants (see Figure 13).

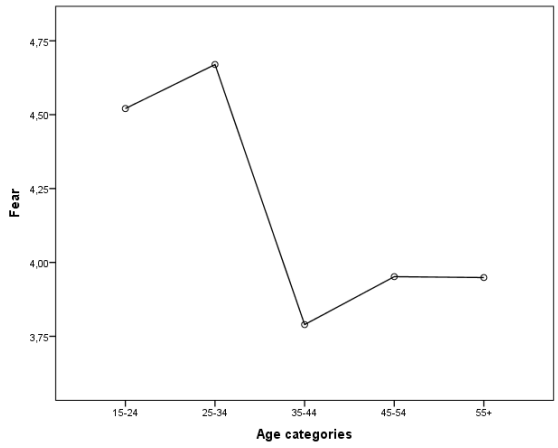


**Figure 13:** *Scores for age categories in the concept of Fear*

## 6.3. Fear of Missing Out – Mental exhaustion

Significant effects were measured for the intervention-types ($F (4, 193) = 2.51$, $p = .04$; see Table 4). It was observed that both the 'Standard'-group ($M = 2.95$, $SD = .19$) and the 'Colour'-group ($M = 2.89$, $SD = .19$) scored significantly lower on mental exhaustion compared to the 'Task'-group ($M = 3.52$, $SD = .2$), the 'Alert message'-group ($M = 3.32$, $SD = 1.96$) and the 'Self-closing chat'-group ($M = 3.52$, $SD = .2$; see Table 7, see Figure 14).

**Table 7**

*Intervention-types in Mental exhaustion*

| | Mean | SD |
|---|---|---|
| Standard | 2.95 | .19 |
| Colour | 2.885 | .188 |
| Task | 3.515 | .198 |
| Alert message | 3.32 | .196 |
| Self-closing chat | 3.523 | .195 |

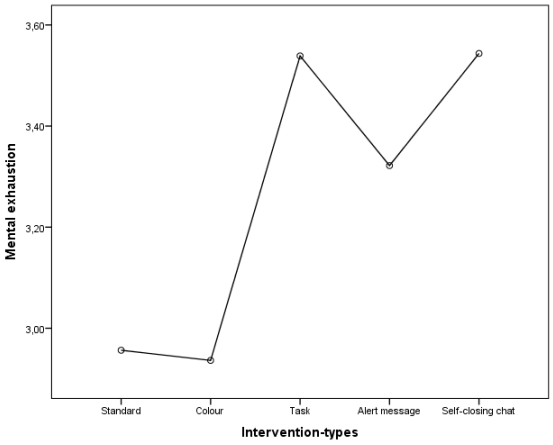


**Figure 14:** *Scores of the intervention-types in the concept of Mental exhaustion*

Pairwise comparisons showed that the 'Standard'-group and the 'Colour'-group both scored significantly lower on Mental exhaustion than the 'Task'-group and the 'Self-closing chat'-group (see Appendix D, Table D1; Figure 14) indicating that both 'Standard'- and 'Colour'-group would result in less exhaustion, compared to the other interventions (p's < .05).

Furthermore an effect was found for need to belong (F (1, 193) = 6.60, p = .01; see Table 4). For the low belongingness group the mean was lower (M = 3.01, SD = .13), compared to the high belongingness group (M = 3.47, SD = .13; see Table 8), showing that users with low need to belong also would feel less exhausted in the given situation.

**Table 8**

*Need to belong in Mental exhaustion*

| Need to belong | Mean | SD |
|---|---|---|
| Low | 3.006 | .125 |
| High | 3.471 | .125 |

No interaction effect was found between the tested intervention-types and the need to belong (F (4, 193) = 1.68, p = .16; see Table 4).

## 6.4. Attitude

A marginally significant effect was found for the intervention-types (F (3, 152) = 2.12, p = .094; see Table 4). It appeared that the interventions in the 'Colour'-group (M = 3.9, SD = .22) and the 'Task'-group (M = 4.01, SD = .23) were evaluated significantly better, compared to the interventions in both the 'Alert'-group (M = 3.46, SD = .23) and the 'Self-closing chat'-

group (M = 3.32, SD = .23; see Table 9, Figure 15). This indicated that users would rather accept the ‘Colour’-intervention and the ‘Task’-intervention, than the ‘Alert’- or the ‘Self-closing chat’-intervention.

**Table 9**

*Intervention-types in Attitude*

| | Mean | SD |
|---|---|---|
| Colour | 3.895 | .217 |
| Task | 4.014 | .229 |
| Alert message | 3.455 | .228 |
| Self-closing chat | 3.324 | .225 |

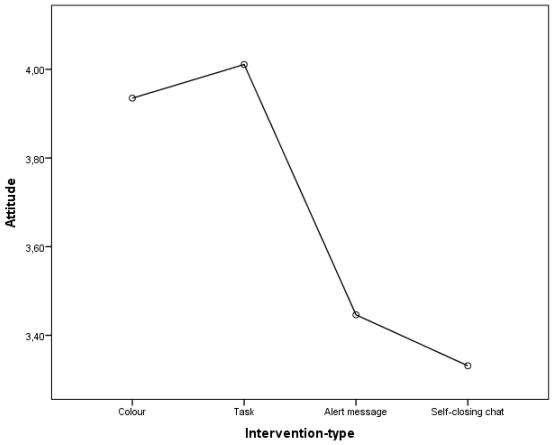


**Figure 15:** *Scores of the intervention-types in the concept of Attitude*

Pairwise comparisons showed that both the ‘Colour‘-group (p = .052) and the ‘Task‘-group (p = .04) scored significantly more positive than the ‘Self-closing chat‘-group (see Appendix D, Table D1; Figure 15), suggesting that respondents would prefer the ‘Colour’-intervention and the ‘Task’-intervention above the ‘Self-closing chat’-intervention.

No effect was found for need to belong (F (1, 152) < 1, p = .52; see Table 4) and neither was found for the interaction of intervention-types and need to belong (F (3, 152) < 1, p = .72; see Table 4).

## 6.5. Motivation

It was found that there was a main effect for the different intervention-types (F (4, 193) = 9.08, p < .01; see Table 4). The ‘Standard’-group scored a mean of 3.30 (SD = .2), the ‘Colour‘-group scored a mean of 4.61 (SD = .19) and the intervention of the ‘Task‘-group scored a mean of 4.36 (SD = .2). Finally, the ‘Alert message‘-intervention scored a mean of 4.63 (SD = .2) and the ‘Self-closing chat‘-intervention scored a mean of 4.76 (SD = .2; see Table 10, Figure 16).

**Table 10**

*Intervention-types in Motivation*

| Intervention-type | Mean | SD |
|---|---|---|
| Standard | 3.304 | .195 |
| Colour | 4.61 | .193 |
| Task | 4.359 | .203 |
| Alert message | 4.627 | .202 |
| Self-closing chat | 4.763 | .201 |

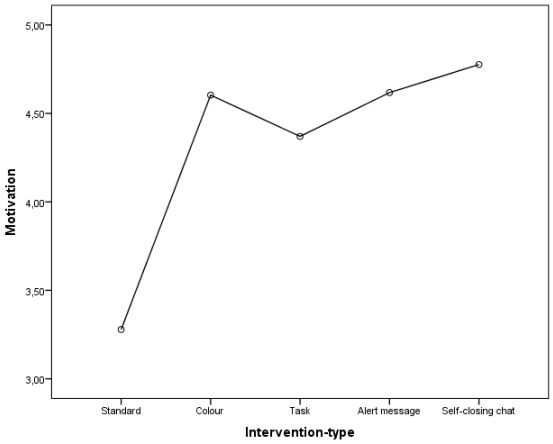


**Figure 16:** *Scores of the intervention-types in the concept of Motivation*

Pairwise comparisons indicated that all interventions scored significantly higher on motivation compared to the 'Standard'-group (all p's < .001; see Appendix D, Table D1). This shows that any type of intervention was able to motivate the respondents to change their compulsive behaviour.

No significant results were found for need to belong ($F(1, 193) = 2.12$, $p = .15$; see Table 4) and no effect was found for the interaction between the intervention-types and need to belong either ($F(4, 193) < 1$, $p = .85$; see Table 4).

Finally, it was found that the amount of social platform usage influenced the results significantly ($F(1, 193) = 3.76$, $p = .05$; see Table 4), indicating that respondents with a low use of social media were significantly more motivated, compared to heavy users of social media platforms (see Figure 17).

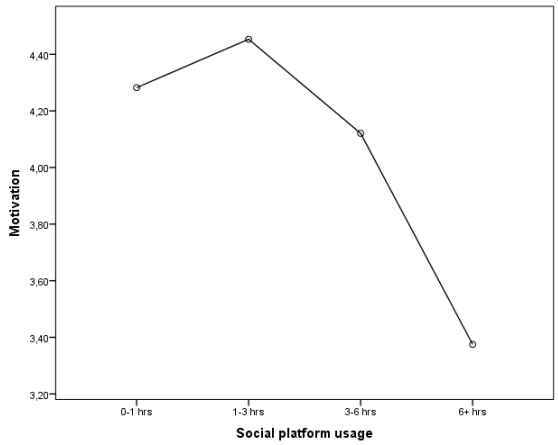


**Figure 17:** *Scores of motivation compared to the amount of social platform usage*

# 7. Discussion

## 7.1. Main findings

The main findings are summarized in Table 11 and will be further elaborated on in the following chapter.

**Table 11**

*Summary of the main findings*

| | | Intervention-types | Need to belong |
|---|---|---|---|
| Fear of Missing Out | Frustration | No effect | Strong effect |
| | Fear | No effect | Strong effect |
| | Mental exhaustion | Strong effect | Strong effect |
| Attitude | | Marginal effect | No effect |
| Motivation | | Strong effect | No effect |

### 7.1.1. Intervention-types

The findings show that the type of intervention does not have too much influence on the symptoms of the Fear of Missing Out. Contrary to the preliminary assumptions, the interventions did not have any significant influence on neither the frustration-component nor on the fear-component. It must be stated that this research was conducted with a simulation experiment. Hence, it is questionable how good these feelings could be simulated for the respondents. The results show that only the respondents' state of mental exhaustion was negatively influenced by most of the interventions. The results do not offer a clear explanation for this, but most certainly this happened because the visual stimuli were unknown to the respondents. Hence, they had to put higher cognitive effort into interpreting them. However, it appears that the 'Colour'-intervention did not have a significantly different effect on the level of mental exhaustion for respondents, compared to the control group. The respondents have already internalized the colours' meanings and therefore do not have to put mental effort into interpreting them in the given context.

Furthermore, the results show that the used stimuli differ from each other with regard to the respondents' attitude towards the interventions. It appears that the 'Colour'- and 'Task'-interventions were evaluated better than the interventions 'Alert message' and 'Self-closing chat'. Based on this, it can be stated that a forcing strategy should not be applied, when it is aimed that the user also should accept the intervention. In order to maintain a positive attitude

towards the intervention, it is necessary that the stimulus is either persuasive ('Colour'), or offers an alternative activity, which may motivate the user ('Task').

Lastly, it was found that the intervention-types strongly influence the users' motivation for behavioural change. It appears that all interventions were able to create more motivation for behavioural change, compared to the standard situation. This implies that the interventions raise the awareness for the phenomenon of FoMO and stimulate their motivation for behavioural change towards less usage of social media messaging. It can be proven that persuasion, motivation and forcing different behaviour eventually do lead to a higher willingness to show behavioural change.

### 7.1.2. Need to belong

The results show that the need to belong plays a crucial role with regard to the Fear of Missing Out. It has become clear that people who have a high need to belong also are more susceptible to the Fear of Missing Out. Contrary to users with a low need to belong, it appears that users, who strongly want to belong to a social group, also score higher on all three constructs – frustration, fear and mental exhaustion. For users with a high need to belong, the presence of a social connection is so important that it influences their emotional and psychological state when being absent.

Furthermore, the results show that one's need to belong affects neither one's attitude towards the intervention nor one's motivation for behavioural change directly. This is interesting, because it could have been that the respondents would evaluate the interventions worse because possibility for information income gets interrupted in some way. Above that, the user's need to belong might have been so strong that he is willing to experience FoMO, just to maintain the feeling of connectedness.

These findings indicate that FoMO can be prevented by satisfying the users' need to belong beforehand. After FoMO has developed, it is not possible to raise motivation for behavioural change by directly responding to one's need to belong. In that case, other input (such as the proposed interventions) must be provided, to achieve a more desirable behaviour.

### 7.1.3. Covariates

The results of this research show that both age and social platform usage have influenced the respondents in the experienced situation. For age it can be stated that younger respondents are more susceptible to feeling frustration and anxiety. The social environment is not as well developed for younger people, as it is for adults. Their need to belong (see section 7.1.2.) is a lot stronger which results in higher susceptibility to FoMO.

It can be stated that the user's motivation for behavioural change is dependent on the amount of time one spends on social media platforms. The results show that the less one makes use of social media platforms, the more one is motivated to also make less use of social messaging systems. It is assumed that this relates to the severity of the addiction to social media. When the user already is heavily involved in his social network – and therefore makes use of these platforms for multiple hours per day – they are most possibly more addicted to social media, compared to persons who make less use of social media platforms. However, this assumption could not be verified by the findings in this study.

## 7.2. Theoretical implications

First of all, the results of this study support the findings by Grohol (2011) since it can be confirmed that frustration and anxiety to be socially excluded indeed are emotions which are triggered by the Fear of Missing Out. In addition to these findings, it can be stressed that also the state of mental exhaustion is influenced by this technological paradox, which goes in line with the first definition of FoMO by Herman (2000). Also, it can be stated that the Fear of Missing Out indeed is a two-sided phenomenon, since this research could prove that FoMO also develops when the social connection is interrupted by the chat partner.

Furthermore, the current findings support the findings by Dakin (2014), and Church and De Oliviera (2013), as it can be stated that need to belong is a main factor from which the Fear of Missing Out can originate. At the same time, it can be stated that younger users of instant messaging services are more susceptible to the Fear of Missing Out. Their social environment is less developed, which is why they have a strong desire to satisfy their need to belong. Hereby, also the findings by Goodenow (1993) and Przbylski, Murayama, De Haan and Gladwell (2013) can be confirmed.

Additionally, it can be stated that both persuasive and motivating strategies should be preferred to forcing strategies, when aiming for behavioural change. These are evaluated more positively than forcing strategies. However, it can be confirmed that all of the applied strategies can evoke behavioural change (Dorrestijn, 2012).

Furthermore, it appears that the amount of time a user spends on social media platforms does influence his motivation negatively. This implies a relationship between one's willingness to behavioural change and one's actual behavioural pattern. This confirms the findings by Renau, Gil, Oberst and Carbonell (2015), who examined the addictive character of communication technology.

Finally, the current findings indicate that persuasion by colour indication is an effective way to stimulate certain behaviour. It has proven that colours are internalized in the human mind to such an extent, that behavioural change can be stimulated easily. These findings support the work by Itten (1970), who claimed that colours work well in this context because the user does not have to put too much mental effort into interpreting the message.

## 7.3. Limitations and further research

The first limitation which should be mentioned concerns the distribution amongst women and men which was not equal. A lot more women took part in the study. Even though the selection process secures an entirely random population, it holds the disadvantage that it is nearly impossible to maintain an even distribution over the demographics of the respondents.

Another point of limitation would concern the setting of the research. Even though it appeared that the stimuli could bring up significant results, it became clear that the Fear of Missing Out really needs time to evoke feelings within the user. In the simulation which was used in this study, it is impossible to let the participant actually wait for hours, which made it difficult to decently bring over the feeling of FoMO. The chosen method was advantageous with regard to the circumstances of the research. Nevertheless, it may be desirable to conduct long-term studies with regard to FoMO.

Furthermore, it can be stated that the visual stimuli which were used for the groups with an intervention may not have been ideally designed. The resemblance with the well-known instant messaging application WhatsApp was very high, which may have influenced the results for both the control group as for the intervention groups. It is advised to conduct long-term studies with interventions that are actually implemented into WhatsApp. The pre-study indicated four interventions which would be most probably accepted by users in a real life setting: ‘Colour’, ‘Task’, ‘Alert message’ and ‘Self-closing chat’.

The results of this research were unable to show whether making less use of instant messaging services would eventually lead to a reduction of FoMO-related emotions. Future research could evaluate whether these interventions would actually be a success and if they could effectively lead to either a reduction of FoMO for the user or behavioural change.

It must be mentioned that some of the used scales were just acceptable with regard to their Cronbach’s Alpha which appeared to range between .60 and .70. Even though all scales were reliable measurement instruments, it must be said that the results should be contemplated with this matter of fact in mind.

## 7.4. Conclusion

The aim of this study was to contribute to research on the technological paradox of the Fear of Missing Out and especially on how to reduce it. The study investigated the possibilities to stimulate behavioural change by means of motivation strategies (persuasive vs. motivating vs. coercive) and interventions based on them. In a pre-study it was possible to reduce the amount of interventions from eight to four, based on their likeability by the participants. The results of this study showed that the tested interventions only influenced the mental exhaustion of the user. It hereby was found that the 'Colour'-intervention – which represented a persuasive strategy – was the least exhausting.

Furthermore, it was found that persuasive and motivating strategies appear more acceptable to the user, while all strategies are able to stimulate behavioural change. Above that, it can be assumed that the amount of time spent on social media platforms negatively influences the user's willingness to show behavioural change.

Additionally, it was aimed to contribute and broaden the existing research on the need to belong and its relation to the Fear of Missing Out. The study explored to which extent the need to belong is involved in the Fear of Missing Out. It turned out that the need to belong influences all components of FoMO, relating a high need to belong to higher levels of the respective emotions. Finally, the relationship between age and the need to belong could be further supported.

As this research was an explorative study on reducing the Fear of Missing Out, important suggestions for further research could be made. The findings from this research can serve as input for future research for explorative research on FoMO in general, and on research for reducing the Fear of Missing Out.

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# Appendix

## Appendix A

### The scenario

Please imagine the following situation

You and your friends have created a group chat in WhatsApp.
They make the plan to meet each other later, but you cannot react immediately because you are at work. Later, you read all the messages, and see that they already should have met.
You also want to join and because of that you ask them where they are. You can see that all group members have read your message, but you do not receive any reply. You keep staring at your screen, hoping that any second any of your friends will reply.
Because you don't receive a reply, you

- get stressed because you do not know what is going on

- get angry because your friends do not reply

- feel excluded by your friends because they are having fun without you

## Appendix B

### Questionnaire
### FoMO measurement

"Please indicate your feelings after you experienced the whole situation."

| | |
|---|---|
| I felt irritated | 1 2 3 4 5 6 7 |
| I felt lonely | 1 2 3 4 5 6 7 |
| I felt nervous | 1 2 3 4 5 6 7 |
| I felt tired | 1 2 3 4 5 6 7 |
| I felt calm | 1 2 3 4 5 6 7 |
| I felt like I am missing something | 1 2 3 4 5 6 7 |
| I felt frustrated | 1 2 3 4 5 6 7 |
| I felt anxious | 1 2 3 4 5 6 7 |
| I felt tense | 1 2 3 4 5 6 7 |
| I felt isolated | 1 2 3 4 5 6 7 |
| I had many worries | 1 2 3 4 5 6 7 |
| I felt discouraged | 1 2 3 4 5 6 7 |
| I felt mentally exhausted | 1 2 3 4 5 6 7 |
| I felt angry | 1 2 3 4 5 6 7 |

***Personal character***

| | |
|---|---|
| If other people don't seem to accept me, I don't let it bother me. | 1 2 3 4 5 6 7 |
| I try hard not to do things that will make other people avoid or reject me. | 1 2 3 4 5 6 7 |
| I seldom worry about whether other people care about me. | 1 2 3 4 5 6 7 |
| I need to feel that there are people I can turn to in times of need. | 1 2 3 4 5 6 7 |
| I want other people to accept me. | 1 2 3 4 5 6 7 |
| I do not like being alone. | 1 2 3 4 5 6 7 |
| Being apart from my friends for long periods of time does not bother me. | 1 2 3 4 5 6 7 |
| I have a strong need to belong. | 1 2 3 4 5 6 7 |
| It bothers me a great deal when I am not included in other people's plans. | 1 2 3 4 5 6 7 |
| My feelings are easily hurt when I feel that others do not accept me. | 1 2 3 4 5 6 7 |

***Motivation towards the intervention***

| | |
|---|---|
| Because of the intervention, I want to use WhatsApp / the new app less | 1 2 3 4 5 6 7 |
| I think the intervention is effective | 1 2 3 4 5 6 7 |
| I think, using WhatsApp / the new app too much, could result in mental stress and discomfort | 1 2 3 4 5 6 7 |
| I think I will feel better when I use WhatsApp / the new app less | 1 2 3 4 5 6 7 |
| I think the intervention is harmful | 1 2 3 4 5 6 7 |
| My usage of WhatsApp / the new app has no influence on my personal life | 1 2 3 4 5 6 7 |
| I would be able to reduce my usage of WhatsApp / the new app | 1 2 3 4 5 6 7 |
| I think the intervention is favourable | 1 2 3 4 5 6 7 |
| For me to do well, using WhatsApp / the new app less would be bad | 1 2 3 4 5 6 7 |
| For me to miss sleep is bad | 1 2 3 4 5 6 7 |
| When using WhatsApp / the new app, I am missing out on other activities | 1 2 3 4 5 6 7 |
| I felt unmotivated | 1 2 3 4 5 6 7 |
| I think my chat behaviour in this situation is harmful | 1 2 3 4 5 6 7 |

***Attitude towards the intervention***

| | |
|---|---|
| This intervention would work for me | 1 2 3 4 5 6 7 |
| This intervention would make me mad | 1 2 3 4 5 6 7 |
| This intervention would be effective for me | 1 2 3 4 5 6 7 |
| The intervention appeals to me | 1 2 3 4 5 6 7 |

***Demographics***

1. What is your gender?
a. Male
b. Female

2. How old are you? a. _____

3. What is your nationality?
a. Dutch
b. German
c. Other

4. Which is the highest degree you have obtained?

| | | |
|---|---|---|
| a. Middelbaar onderwijs | Weiterführende Schule | Secondary School |
| b. MBO | Berufsausbildung | Professional education |
| c. Bachelor | Bachelor | Bachelor |
| d. Master | Master | Master |
| e. Andere | Anderen | Other |

5. How often do you use Social Media platforms per day? (Facebook, Twitter, Instagram…)
0-1 hrs 1-3 hrs 3-6 hrs 6+ hrs

6. How often do you use instant messaging services (WhatsApp / Facebook Messenger / Skype...) per day?
0-1 hrs 1-3 hrs 3-6 hrs 6+ hrs

7. Would you consider yourself to have grown up with Social Media?
Yes / No

Appendix C

## Letter of informed consent

Dear respondent,

First of all, I want to thank you for participating in my study.

I want to attend you on the fact that you can do this study either in English, Dutch or German. Please select your preferred language in the upper right corner. The Video, which you will see later on, will however only be available in English.

In order to end up with accurate results, I kindly ask you to read all instructions and questions carefully. In the following, you will be asked to place yourself in a scenario. Then you will see a video and you will be asked so answer some questions about what you will see.

When answering the questions, it is important that you answer them honestly. Please keep in mind that it is all about your very personal opinion. Take your time to think about the answer, since you will not be able to return to the questions later on. Eventually, you will be asked to answer a couple of questions about yourself.

Your response will remain anonymous, which means that no personal data will be published in the study. Except for the researcher himself, no third parties will have access to the recorded data. Also please keep in mind that you can always stop continuing with the study without giving a reason for this. Should you withdraw from the study, your given answers will not be recorded. It will not be possible to ask access to your given responses afterwards because the researcher will not have any possibility to relate your answers to you.

By clicking on the button underneath to proceed to the study, you confirm to have taken notice of these instructions and accepting them. If you are under the age of 18, proceeding to the study indicates that your parents have given permission for you to do so.

Once again, I want to thank you for your participation.

Kind regards,

Lars Wiesner

l.wiesner@student.utwente.nl

Appendix D

## Table D1 – Post hoc tests

**Table D1**

*Results of the LSD Post hoc tests for each independent variable*

| Variable | (I) Intervention-type* | (J) Intervention-type | Mean difference (I-J) | SE | Sig. |
|---|---|---|---|---|---|
| Frustration | Standard | Colour | -.2674 | .241 | .268 |
| | | Task | -.0033 | .248 | .989 |
| | | Alert message | -.2674 | .247 | .279 |
| | | Self-closing chat | **-.4455** | **.245** | **.07** |
| | Task | Standard | .0033 | .248 | .989 |
| | | Colour | -.2641 | .247 | .286 |
| | | Alert message | -.2641 | .253 | .297 |
| | | Self-closing chat | **-.4422** | **.251** | **.08** |
| Fear | Task | Standard | -.1868 | .232 | .436 |
| | | Colour | -.2182 | .238 | .36 |
| | | Alert message | -.3518 | .244 | .15 |
| | | Self-closing chat | **-.4973** | **.242** | **.041** |
| | Self-closing chat | Standard | .3106 | .236 | .19 |
| | | Colour | .2791 | .235 | .24 |
| | | Task | **.4973** | **.242** | **.041** |
| | | Alert message | .1456 | .24 | .546 |
| Mental exhaustion | Standard | Colour | -.0129 | .27 | .961 |
| | | Task | **-.5954** | **.27** | **.029** |
| | | Alert message | -.3698 | .268 | .17 |
| | | Self-closing chat | **-.6673** | **.267** | **.013** |
| | Colour | Standard | .0129 | .262 | .961 |
| | | Task | **-.5825** | **.269** | **.031** |
| | | Alert message | -.3568 | .269 | .183 |
| | | Self-closing chat | **-.6544** | **.265** | **.014** |
| | Task | Standard | **.5954** | **.27** | **.029** |
| | | Colour | **.5825** | **.269** | **.031** |
| | | Alert message | .2256 | .275 | .413 |
| | | Self-closing chat | -.0719 | .273 | .793 |

| | | | | | |
|---|---|---|---|---|---|
| | Self-closing chat | Standard | **.6673** | **.267** | **.013** |
| | | Colour | **.6544** | **.265** | **.014** |
| | | Task | .0719 | .273 | .793 |
| | | Alert message | .2976 | .271 | .274 |
| Attitude | Colour | Task | -.0511 | .309 | .869 |
| | | Alert message | .4568 | .307 | .139 |
| | | Self-closing chat | **.5985** | **.305** | **.052** |
| | Task | Colour | .0511 | .309 | .869 |
| | | Alert message | .5079 | .316 | .11 |
| | | Self-closing chat | **.6496** | **.314** | **.04** |
| | Self-closing chat | Colour | **-.5985** | **.305** | **.052** |
| | | Task | **-.6496** | **.314** | **.04** |
| | | Alert message | -.1417 | .312 | .651 |
| Motivation | Standard | Colour | **-1.3116** | **.27** | **.000** |
| | | Task | **-1.0555** | **.278** | **.000** |
| | | Alert message | **-1.3468** | **.277** | **.000** |
| | | Self-closing chat | **-1.4776** | **.275** | **.000** |
| | Colour | Standard | **-1.3116** | **.27** | **.000** |
| | | Task | .2561 | .277 | .356 |
| | | Alert message | -.0352 | .275 | .898 |
| | | Self-closing chat | -.166 | .273 | .544 |
| | Task | Standard | **-1.0555** | **.278** | **.000** |
| | | Colour | -.2561 | .277 | .356 |
| | | Alert message | -.2913 | .283 | .305 |
| | | Self-closing chat | -.4221 | .282 | .136 |
| | Alert message | Standard | **-1.3468** | **.277** | **.000** |
| | | Colour | .0352 | .275 | .898 |
| | | Task | .2913 | .283 | .305 |
| | | Self-closing chat | -.1308 | .28 | .641 |
| | Self-closing chat | Standard | **-1.4776** | **.275** | **.000** |
| | | Colour | .166 | .273 | .544 |
| | | Task | .4221 | .282 | .136 |
| | | Alert message | .1308 | .28 | .641 |

*Only intervention-types which had at least one significant difference with another intervention are presented in this table.