

# Surveying Phone Anxiety Patterns, Perceptions, and Coping

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Fig. 1. We investigate anxiety around phone use, such as in response to messages and notifications users receive. As illustrated here, uncertainty and anticipating bad news is one of the drivers of such anxiety.

Many people suffer from anxiety, commonly manifesting in avoidance behavior and stress. For example, they might not open letters because they suspect them to contain bad news. With the phone having taken on a central role in communication and service access, anxiety and avoidance also stem from and impact its use, such as when emails remain unread. However, while phone addition had been studied in depth, avoidance behavior related to phones has not. This necessitates a broader understanding in which ways anxiety impacts and results from phone use. To develop this understanding, we surveyed user stories on the anxiety they felt around interacting with their phones. From 197 stories, we identify eight different kinds of phone anxiety. We supplement this analysis in two ways: (1) a survey with 81 participants to analyze the external perceptions of phone anxiety, and (2) interviews of 12 individual users on their phone anxiety coping strategies.

CCS Concepts: • **Human-centered computing** → **Mobile devices**; *Ubiquitous and mobile computing design and evaluation methods*; *Ubiquitous and mobile computing theory, concepts and paradigms*; *Mobile computing*.

Additional Key Words and Phrases: mobile interaction, anxiety, mental health, avoidance

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## 1 Introduction

Many people face anxious thoughts and feelings sometimes and anxiety disorders are common across the world [3]. General feelings of anxiety, short of full disorders, still can noticeably impact users' lives and can manifest in different ways, such as worrying, avoidance, and stress. Anxiety can also be distinguished depending on the source, such as social anxiety or separation anxiety. Given anxiety's impact on human behaviors in general, we can expect this to also extend to technology-mediated interactions. For example, it has been shown that technology usage patterns can be a predictor of social anxiety levels [8], as can be problematic social media use [51]. Computing itself can be the source of anxiety and the term "computer anxiety" has been coined correspondingly [9]. It can denote anxiety around using a computer in the first place, but also anxiety around things mediated through computers.

Reasons why people are anxious about using computers have been well explored and include lacking experience [4] and some personality traits [5]. We also know about potential mitigation strategies for anxiety, such as improved education and training [16]. However, less is known about computer anxiety around the computer as a mediating device. Today, this most importantly means the phone, which also plays a central role in computer-mediated communication. Email, text messaging [43], video calling [50], and posting on social media [48] all are potentially anxiety-inducing and, correspondingly, existing anxieties influence these use cases [9]. Furthermore, phones take on many other roles, be it as a camera, an alarm, a way to browse the web, or for playing games. In turn, using a phone in those roles might also be a source of anxiety or modulate known sources. Yet, how anxiety impacts people's mobile usage and vice versa is not well explored, as are their coping strategies to deal with that anxiety. Better understanding how mobile interaction and devices facilitate and are influenced by users' anxieties is a necessary step for tackling this issue.

Hence, we set out to map out the different ways anxiety and mobile phone use intersect, and what kind of strategies users have adopted to cope with this kind of anxiety. This intersection between phone use and anxiety can be because users with existing anxieties struggle with some mobile interactions, or because the mobile interactions induce the anxieties in the first place. In either case, the phone mediates the anxiety and provides concrete examples how this influences everyday life.

To develop this broader understanding of how phone-related anxieties (we shorten this to *phone anxiety* for the remainder of the paper) manifests, we collected users' stories from online discussions around anxiety that center on mobile interactions. Furthermore, we ran a survey of people not suffering from phone anxiety, whom we then show example cases, in order to ascertain how such anxieties are perceived by others. Such an external perspective is relevant as many phone anxieties occur around communication, where those with anxiety and those without interact. Finally, we interviewed 12 users who posted on their phone anxiety in order to ask them how they have subsequently coped. Altogether, we describe sources and impacts of phone anxiety, how it is viewed by others, and how people suffering from it have approached coping with such anxiety.

We find that there are a variety of reasons why people report to feel anxious around their phone use. Individual differences are large, with some being anxious about missing out on things happening, while others are instead overwhelmed by their phones. From survey responses, we find that other people's perceptions of such anxieties are generally understanding, with many also indicating a willingness to be accommodating. Finally, through interviews we find that coping mechanisms are similarly diverse as the forms of anxiety, but that these were often ongoing processes with only few managing to completely overcome their phone anxiety. Based on these results, we develop a set of guidelines on how mobile interaction can be designed to take into account anxious user behavior.

In summary, our contributions are:

- We provide a comprehensive overview of phone anxiety, focusing on how phone use modulates anxiety.
- We survey other people's perceptions of such anxieties and corresponding behaviors
- We detail coping strategies users have developed to deal with their anxiety
- We describe a set of guidelines for mobile interaction design to take into account users' anxiety

## 2 Related Work

We discuss computer anxiety as a kindred issue to phone anxiety as well as previous work that bridges anxiety and phones. For context, we then describe previous work on phone use, particularly on identifying and then nudging users away from problematic forms of use. As our main analysis primarily uses data from Reddit, we also go over related work with similar methodologies.

### 2.1 Computer Anxiety

There is a long history of research on computer anxiety, dating back to at least the early 1980s [58]. Many different factors correlate with computer anxiety, as already noted by Maurer in his literature review [45] from 1994. A subsequent meta-analysis on these relationships by Chua et al. [14] reaffirmed the connections between gender and experience with computer anxiety. More than a decade later, Powell's 2013 review [55] presents a more extensive lists of 14 antecedents and correlates for computer anxiety. As she points out, one trend of computer anxiety research in the 2000s was the increased interest in the influences of self-efficacy and perceived ease of use. A recent example of work on computer anxiety is from Di Giacomo et al. [19], who found self-perceived ability of technology use as the main driver of computer anxiety in older people.

Particularly noteworthy in the context of this paper is Brown et al.'s [9] study of anxiety in computer-mediated communication. They posit that such anxiety is a combination of computer anxiety with communication apprehension, further distinguishing between people disliking written and verbal communication. Results from their survey find evidence for this model, however, where they assumed people apprehensive towards verbal communication would embrace text-based communication, the opposite was the case. Overall, their results support that effects on the use of computer-mediated communication are not just due to general computer anxiety, but also connects to anxieties specific to communication. How computer-mediated communication and anxiety interact varies, and Littler et al. [41], for example, found that the valence of computer-mediated communication can moderate whether anxiety increases or decreases.

### 2.2 Anxiety and Phones

Phone use has been posited to be associated with a range of social and individual effects, among them also general anxiety. One example study is by Lepp et al. [39], who focused on college students and their phone use and found that phone use positively correlates with anxiety. A meta-analysis on phone use, stress, and anxiety by Vahedi and Saiphoo [71] also found a significant association between these variables. Similarly, Ran et al. [57] conducted a meta-analysis on the association between social anxiety and phone addition, finding a significant correlation between the two. However, both meta-analyses remark that causality is an open question: it remains unclear whether anxious people use their phone more or whether phone use caused their anxieties.

Usage patterns around anxiety have also been studied in several prior works. Reid and Reid [59], for example, studied whether social anxiety and loneliness would change user preferences around texting or typing. They found that anxious participants preferred to text, diverging from lonely

participants who instead preferred voice calls. As Boukhechba et al. [7] demonstrated, phone usage patterns can be used to predict social anxiety, as can their texting [65]. How people communicate can depend on their personality, but also their social context. One example along those lines is work by Jin and Peña [32], who looked at attachment styles in romantic relationships and how that influenced communication. While they found that participants scoring higher on avoidance used their phones less, the same was not the case for anxiety. However, there was an interaction effect between avoidance and anxiety, with low anxiety strengthening the effect of avoidance. Similarly, Elhai et al. [20] investigated the relationships between depression, anxiety, the fear of missing out, and different forms of phone use, finding process use (i.e., non-social use) particularly affected. Moreover, Kruger and Djerf [36] found an effect of attachment anxiety on phantom ringing.

There are several areas of anxiety more directly connected to phones. An example is *social media posting anxiety* [62], where the phone is the main device through which such postings are made. As Nan et al. [49] described in a meta-analysis, social media use had a significant positive association with social anxiety, and they speculate that mobile devices play a role in this. Another example, where the phone is centrally positioned, is social anxiety around online dating. As Pitcho-Prelorntzos et al. [54] described, self-efficacy and concerns around being recognized by others have significant effects on anxieties in this area. Furthermore, as Chan noted [11], self-efficacy also is a driver of the use of dating apps in the first place. In the same context, Huang and Gong [30] reported how anxiety leads to rejection sensitivity, which in turn influences how dating apps are used.

Noteworthy here is also *nomophobia*, the fear of being without a phone [61]. As Wang and Suh [73] described it, such a fear has mixed effects in the workplace. Moreover, Mendoza et al. [47] found a negative effect of nomophobia on student performance. The effect of nomophobia on well-being is generally negative. For example, Sharma et al. [63] linked it to depression and anxiety. Bulut and Sengul [10] found that gender is a partial moderator of the how anxiety relates to nomophobia.

### 2.3 Regular and Problematic Phone Use

How people use phones and where this use potentially is problematic has been investigated from many perspectives. For example, Kujala and Miton-Shatz [37] collected data on phone users' over several months to investigate how their emotions relate to user experiences over time. Another aspect of user experience, what kind of gratification users are seeking, was investigated by Hiniker et al. [28]. They found further evidence for the purpose of phone use varying between instrumental (i.e., "to achieve a specific goal") and ritualistic (i.e., "to browse, explore, or pass the time"). While users differ in how they use their phones, Katevas et al. [33] identified five general clusters of phone use. For example, they note that there is a group with *personality-induced problematic phone use* with low well-being, and long and late at night use sessions. Problematic phone use has been in focus and has recurring markers, such as described by Shin and Dey [64], who used these to classify such use. Similarly, Tran et al. [69] conducted interviews to identify triggers of compulsory phone use. Another approach is by Bianchi and Philipps' "mobile phone problem use scale" [6], which they used to investigate the connection of problematic use to personality traits, age, and gender.

A common case of problematic use is users who use their phone too much. Correspondingly, researchers have worked on interventions for these users, such as *MyTime* [27], which provides information on usage times and also enables users to set time limits for themselves. Another approach is *MindPhone* [67], which instead prompts users to get them to reflect on their use intentions. More recently, chatbots and large language models have been used to nudge users towards less phone use. For example, *StayFocused* [40] also aims to increase users' reflection and provided chatbot support to help them do so. Another example is *MindShift* [76], which determines

whether problematic use is occurring and then sends the user a customized message in order to persuade them to stop using their phone.

## 2.4 Reddit Analyses

Reddit hosts a large number of forums (subreddits in their terminology) where users can post and discuss links, images, videos, as well just text directly. With it attracting a large number of users and the amount of content they generate, Reddit data has supported many works of research [46]. For example, Kauer et al. [34] looked at posts in the /r/dataisbeautiful subreddit to study how people react to visualizations. Specifically, they used a grounded theory approach to analyze 475 comments and identified 10 different types of reactions, as well as four “reaction scopes”.

As Reddit allows users to post pseudonymously, they are often willing to share personal and sensitive stories, which are important for the analysis of many phenomena. One way this shows is in the use of “throwaway accounts”, as described by Leavitt [38]. An example of such a sensitive area is work by Geauthier et al. [22], where they conducted a thematic analysis of posts from the /r/stopdrinking and /r/OpiatesRecovery subreddits to better understand how they aid addiction recovery. Similarly, Chancellor et al. [12] investigated recovery from opioid use through an analysis of 63 different subreddits. Another example is work by De Choudhury et al. [18] on suicide ideation. They used data from mental health subreddits as well as the /r/SuicideWatch subreddit to develop a model for predicting shifts towards suicidal thoughts.

## 3 Methodology and Results

We combine three approaches for better understanding phone anxiety and how people perceive and deal with it. First, we collected and analyzed discussions of users’ experiences with phone anxiety to better understand the connections between such anxiety and phone use. Second, we conducted a survey to better understand how phone anxiety and the behaviors associated with it are seen by others. Third, we interviewed some of the users who posted about their phone anxiety to better understand how they have subsequently dealt with that anxiety. Each of these three approaches thus provides a different perspective on phone anxiety: (1) in-group discussion of the phenomenon, (2) out-group perception of the same, and (3) personal reflection.

### 3.1 Surveying Phone Anxiety

To determine in which ways people experience phone anxiety, we turned to online communities where such stories are shared and users discuss them with each other. Drawing on such personal stories provides a broad and varied lens on the different forms of anxiety as well as resulting issues. Furthermore, the subsequent reception and discussions in these communities provide additional signals on the validity and frequency of such experiences.

Collection and analysis of data from Reddit comes with some ethics concerns, such as described by Proferes et al. [56], or Gliniecka [25]. A main concern here is privacy and whether Reddit posts constitute public data. We consider the open discussions we collect public exchanges, but do not zoom in closer on individual users. That means that we do not collect profile data, or cross reference the collected stories with other posts by the involved users. Furthermore, we only collect text excerpts of the posts and no metadata that comes along with them (e.g., usernames or timestamps). However, we note that we do not paraphrase the collected stories and thus searching for the excerpts on Reddit is possible. Yet, where users or moderators have removed their posts, such lookup is no longer possible and thus users retain the control over what is linked to their account. Moreover, Reddit accounts generally are pseudonymous and, unless they wish to disclose, no user is required to identify with their real name. We also double checked that no personal identifiable

Table 1. Online communities surveyed and number of stories used in subsequent analysis.

Site	Stories Collected
Beyond Blue Forum, run by an Australian mental health organization	2
Mental Health Forum of the UK Mental Health Foundation	10
Quora	40
Reddit overall	171
▶ /r/anxiety subreddit	17
▶ /r/AnxiousAttachment subreddit	7
▶ /r/CasualConversation subreddit	14
▶ /r/NoStupidQuestions subreddit	6
▶ /r/nosurf subreddit	9
▶ /r/socialanxiety subreddit	34
▶ /r/socialskills subreddit	13
▶ /r/Telephobia subreddit	11
▶ 43 other subreddits	60
13 other sites	14
Overall	237

information is contained in the reported stories. Overall, we deem the risk associated with our data collection and handling low.

We used an iterative search strategy where we started with broader queries and then supplemented this with more focused ones as we uncovered topics of anxiety. For example, “*mobile anxiety*” and “*phone anxiety*” were some of the initial queries. We observed specific forms of phone anxiety in the corresponding results, and hence also added searches for those (e.g., “*notification anxiety*” and “*alarm anxiety*”). As not all users necessarily use the word “*anxiety*” to describe their experience, we also used similar search terms, such as “*smartphone stress*” and “*cellphone phobia*”. These searches returned whole conversation threads with several users involved. We extracted individual user postings from these results, which we describe as “*stories*”. This could be the initial posts starting a conversation or a response to such a post. In some cases, we used several posts from a conversation, analyzing them as separate stories later on. Overall, we collected 237 stories, spread over several communities (see Table 1). Most of these stories were from Reddit and posted in 2018 or later (see Figure 2).

In a later step we further filtered these stories to remove those that (1) were too brief and missing in detail, and (2) focused on related but not sufficiently relevant phenomena. For example, we collected several stories on anxiety connected to the alarm function of users’ phones. While we retained some, we removed stories that focused on the alarm itself (e.g., being anxious because of fear of missing an early flight), rather than phone-specific aspects. This left us with 197 stories to analyze further.

For analysis of our collected stories we used a qualitative content analysis approach, aiming to identify groups of phone anxiety behaviors and issues. First, we immersed ourselves in the data, reading the stories several times and building an understanding of the topics touched upon in them. The first author initiated the process and developed a first set of codes applying an inductive coding approach. Both authors then discussed these codes as well as individual stories. Together, we then refined the codes and identified categories of phone anxiety across them. The first author

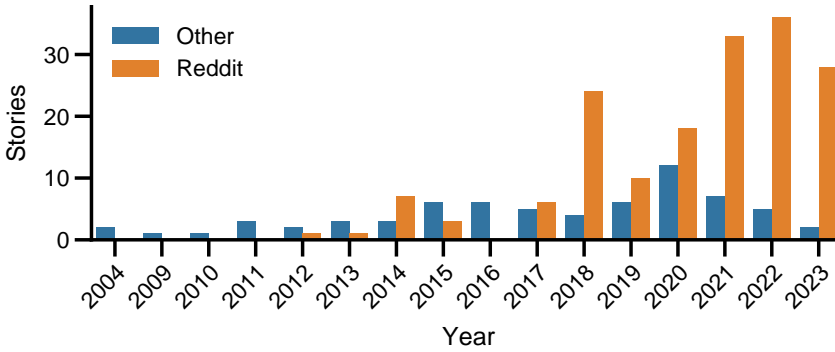


Fig. 2. Overview of collected stories by site and year.

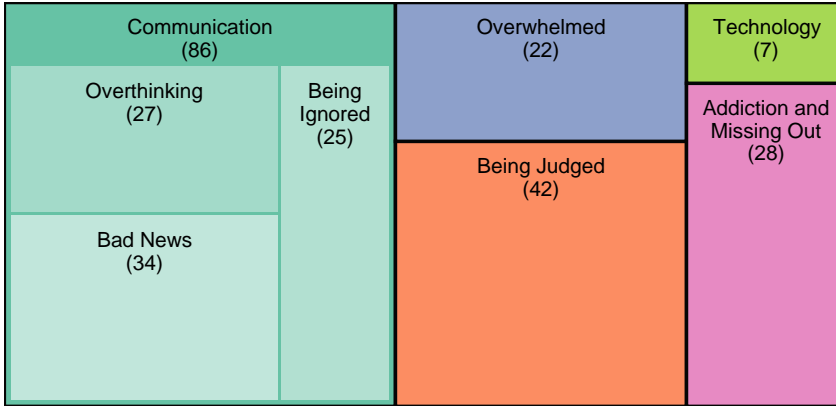


Fig. 3. Via a qualitative content analysis we identified five categories of phone anxiety, one composed of three sub-categories. Note that the size of the categories is only indicative of their prevalence in our sample of user stories and should not be understood as representative.

then revisited all stories to structure them under these categories, with assignment of multiple categories per story allowed.

Ultimately, our collected stories group into five categories (also see Figure 3): being judged, technology, addiction and missing out, overwhelmed, and communication. The latter is further split into three sub-categories: bad news, being ignored, and overthinking. In the following, we describe each of these categories and provide examples from the connected stories.

**3.1.1 Communication.** Most of the stories around phone anxiety concerned some form of communication, be it texting, calling people, emails, or social media. Given that the original purpose of the phone is to enable communication, these anxieties are concerning and suggests some mobile interaction might not be fit for purpose. Dread about making phone calls features particularly prominently in many of the stories. An example of this is how a user describes some of the challenges they face due to phone anxiety:

*My mom always teases me about my extreme reluctance to make calls. Thankfully she would make them for me anyway. I'm 33 and still spend 30 minutes trying to figure out how to order food online rather than have to call them. I havent had a haircut in over a*



*year because I am so good at avoiding making calls, I just never end up doing it. Terrible about calling family I'm not super close with because I just hate feeling that anxiety about making a phone call.*

Similarly, such users rarely answer calls either. As one put it, *"If it is a number I don't know I won't answer it and if it is a family or friend calling I'll only answer sometimes"*. In fact, we saw some users express strong dislike of talking on the phone in general, with one noting *"I hate talking on the phone"*. That user continued, by pointing to social awkwardness as a big reason for this dislike: *"Especially those friends who call you up for no reason and then sit there in silence expecting you to hold up the entire conversation. It drives me crazy!"* In other cases, the dislike stems more from the inconvenience a phone call can be. For example, one user wrote that *"phones are intrusive and an incoming call never comes at a convenient time"*. However, others differentiate by medium, with some calls being more problematic than social media, for example:

*Phone calls and post makes me anxious, not so much notifications from apps. I think for me it's because social media and stuff like that aren't real life so to speak, but any unknown number calling me or letters in the post box stir up my anxiety.*

Having a hard time communicating with people has consequences. For example, one user reported feeling *"sickening dread which promptly turns to guilt"*. But not communication with people does increase the disconnect and harms relationships. It also impacts making new connections and building up new relationships. This is particularly apparent with respect to online dating, which several stories remarked on. For example, one user wrote:

*My SA [(social anxiety)] is so bad that despite getting almost 100 matches and getting messaged first like 8 times (I'm a guy btw) I still just could never get a conversation going, never went on a date and ended up deleting Tinder.*

We identified three further clusters of anxieties around communication that we detail in the following subsections.

**3.1.2 Communication: Fear of Bad News.** When a message or call comes in, there are some users who assume the worst. For example, in one story a user reflects on their dating situation and the fears they have around reply texts, noting they are: *"extrapolating from tiny details and making a ton of assumptions or leaps in logic to imagine the worst case scenario"*. If one assumes a message likely contains something negative, avoidance might seem like a valid strategy—at least for delaying the potential negative impact. As another user explained, there can be a rationale behind such assumptions:

*It's because you are (perhaps unconsciously) expecting bad news. And with some justification. People rarely send emails, or leave voice mails, saying what a great job you did. Typically they contact you to inform you of a problem.*

Life situations can also make it more likely that incoming communication is negative. Being in debt, some users expect bills to arrive, as one user put it: *"because I owed a lot of money for medical bills, and couldn't bring myself to open the bills or call anyone to try to get them sorted out"*. That user also described how they handle this issue now, by *"ask[ing] my husband to make phone calls for me and using chat ("I'm so glad that so many services have chat options now!")"*.

In other cases, stories describe how users feel they might have done wrong and the responses therefore would be negative. For example, some users mentioned they feared being annoying to others, such as one writing *"I'm just afraid of how she'll respond, whether she'll be annoyed or not"*. Another story had someone speculating where this fear around other people's responses might stem from, pointing to low self-esteem as a potential factor:



*Even when I send messages to people I'm close to (like the few friends that I have), I still go into panic mode after finding out that they've responded. For me, I think this particular anxiety comes from thinking that I somehow said the wrong things in whatever I've sent. My low self-esteem just immediately gets to me, and my brain automatically makes me think that others will find me awkward and pathetic through my messages.*

**3.1.3 Communication: Overthinking.** Communication commonly is somewhat ambiguous and, for example, can require people to take a best guess on how another might have intended their message to be received. Yet, ambiguity can also result in people spending substantial effort trying to unpack a message or making sense of an interaction. Where this can be problematic is if it results in overthinking and potentially ending up in negative feedback loops. A similar link between too much deliberation and social anxiety has previously been shown by Hunter et al. [31].

One area where this is more acute is in texting. Text messages lack all the extra cues of in-person interactions, such as tone of voice, facial expressions, and body posture. While emoji, gifs, or stickers can help better convey tone and intent in messages, they generally still fall short in richness compared to voice calls. Hence, there can often be large room for misunderstandings, such as when sarcasm is not identified in a text message. This lack of cues is pointed out in the following story, which also specifically mentions that that users issues are most acute when they have the capacity to overthink the interaction:

*Having a phone conversation causes you to miss out on certain body language cues that help the flow of a conversation. I always feel like I am talking over people. I don't know how they are reacting to what I am saying because I can't see their expressions. Also, there is nothing around to distract you from the conversation. Phone conversations are even MORE personal than most "real" conversations that happen in person, because there is only you and the person you are talking to. Your sense of hearing is the only sense you are using and we are zeroed in on their voice and believe they are zeroed in on ours. It feels more intense because we aren't distracted by their clothes or their body language or other visual cues. I have no problem talking to somebody on the phone if I am doing something else at the same time, like cooking or riding in a car or have something else to stop me from overthinking the call and the conversation. When its just me and the phone call though with no distractions...I hate it.*

One area where users seem prone to overthink is online dating. This is likely because one is interacting with strangers and, not having met yet, there thus can be more room for misunderstandings. Yet, thinking too much about what to reply can be paralyzing, which in turn then limits the prospects of a relationship developing. For example, one user reported how they are doing okay in making matches, but then sabotages themselves in the subsequent interactions: *"Im a fairly decent looking guy and i assume this by getting an average 20 matches a day, but here is the thing. I over think too much what i type and what the other person is gonna type. It sometimes takes me hours or even a day to come up with the perfect answer and by that time the girl has lost interest in me. The usual 'just send it' doesn't work for me cause i just cant simply press send if i think what im writing isnt good enough or im afraid that the girl will back off."*

The dynamics of online dating also make this an area where overthinking is more likely to occur. For example, men on average have fewer matches, while women receive many more and thus also more messages [70]. Similarly, there is a large gender difference in making successful contact [35] and many other dimensions of online dating [1]. Both sides thus have to contend with issues around online dating communication and this again can easily turn to overthinking. Another example on this comes from a user who reports: *"I decided to send her a message and maybe chat a little. The thing is, I always end up feeling a huge amount of anxiety. Sometimes she replies me with short*

*and bold messages, sometimes she replies with interesting thoughts.*” However, things become more complicated for that user, as they have “*reached the dreaded moment of the conversation where she just replies with a smile emoji.*” Finally, this starts of the overthinking process for that user, who now is paralyzed around how to respond, if at all:

*But now I’ve I haven’t answered and don’t intend to since I would be dragging the conversation. But I can’t help but to overthink this. “Maybe she’s busy?” or “Maybe she’s tired of me” “Maybe you are not interesting?” “Maybe she expects me to say something?” “Will she feel sad if I don’t respond?” How should I interpret that “emoji” response? Maybe I shouldn’t think too much about it and say hi to her like normal next time I see her? (which will be until next week?) Should I try to text her tomorrow bringing up another topic to talk about? Help.*

While communication during dating has some people in overthinking spirals, some users report similar patterns while in relationships. One user, for example, wrote about how their “*anxiety about the texting the girl is destroying [them]*”. This manifests as “*panic [...] if i don’t hear from her for a few hours*” and “*reexamin[ing] all our previous texts*”. Hence, familiarity with a person does not necessarily alleviate the overthinking.

Finally, social media is another area where overthinking was mentioned. One way this happens is when users prepare a post, but then, for example, “*start to reasons to a post or comment on here then discard it without posting because of [getting attacked for their opinion]*”. Even for posts from long ago, some users reflect and return to these to clean their history from long ago. For example, one user noted: “*Last year I started overthinking forum posts and book reviews I made a decade ago so I found my old log ins to delete the accounts and comments*”. Furthermore, social media use has many different aspects that can be overthought, such as the type of content to post, how to engage with others, or what public image is desirable. Several of such aspects are mentioned in the following story:

*Hello, welcome to my daily dose of social anxiety. I have a fear of posting on my own social media. I’m afraid of so many things that surround the act of posting. I’m afraid of not picking the right photo, not getting “Enough” likes, and not knowing what to say back to people if they comment! These are all bullshit reasons to be afraid to post but they literally put me into a spiraling mental state. I’ve become a stalker of my own accounts and revisit all my old posts to see if I did something “right” or “wrong”. Nothing is ever directly “right” so I end up deleting 90% of my page. I get jealous when I see my friends and family post about their lives but I never get the courage to actually post. Why has posting become so difficult for me and how do I just get over it??*

**3.1.4 Communication: Being Ignored.** The last sub-category around communication pertains to people that fear being ignored by others. Similar to the previous category, this anxiety also commonly connects to the areas of social media use and dating/relationships. With the former this commonly means fear of exclusion from peer groups, with the latter fear of rejection from (potential) partners. Anxiety around engaging with social media can occur from the start. Recounting why they are afraid of social media, one user, for example, mentioned: “*I’ve never joined. I’ve always been too afraid to. Mostly because I’ve always been an outcast and unpopular*”. Assuming they would feel embarrassed and left out, they preempt that outcome and stay at a distance themselves. On the other hand, some users who did connect to others on social media find what they see still reinforces the feeling of being ignored. For example, this can be triggered by “*looking when old friends who have ghosted my post pictures of what they are doing right now*”. In that case, the user responded by:

*“Delet[ing] many of them because the posts rise my anxiety levels by a factor of 10 [...] Because I feel left behind and forgotten”.*

The act of “ghosting” also comes up in dating, where it has been described as a painful experience with negative effects on well-being [68]. In one of the collected stories, a user vividly described their own reactions to not receiving a timely response from their significant other:

*[...] theres always a stage in my relationship where texting a person and them not responding to my texts fucks me up so bad. like i have physical reaction to it. my heart palpates. i cant fall asleep and even if i do i wake up ever 30-40 minutes to check if they replied or not. i dont know how to control this. this still happens even if i'm not sooo attached to them. im in the waiting mode the whole day. i can't concentrate on my work. i just constantly check their id to see their last seen (if they have it) how do i control this? how do i physically stop the heart palpitations?*

This is echoed by another user, writing:

*I have the same issue, it's to a point where I need to take an anti-anxiety medication before I text someone I like. This is an awful way to live. I cannot stand waiting for a text. If I'm wearing my an apple watch I have to take it off because the watch begins feeling so heavy on my wrist. I don't know if anyone else can relate to that? The only thing that helps me is calling a friend so I don't have to wait in silence for the text to come ...This is just a never ending cycle that is so painful.*

**3.1.5 Fear of Being Judged.** Social media, communication, photos, and videos take up the bulk of the time people spend on their phones<sup>1</sup> Creating and sharing content is a core aspect of such use, yet also brings up issues for some users. Specifically, we encountered several stories where users felt anxious about sharing and connecting with others because they feared being judged as a consequence. In some ways this is related to the communication anxieties we described earlier, but also extends outside that context. One example story where anxiety stems from being judged, relates to social media, with the user also noting that they face a lack of understanding from others with respect to that anxiety:

*i hate how other ppl are like 'you get anxiety from wHaT-' when social media is scary asf. I get scared shitless if i post anything, and i won't be able to concentrate on anything the rest of the day. cuz my mind will constantly be thinking abt what others think of it. and i'm always comparing myself to others so social media is just another way for that. also just being afraid of getting judged or criticized*

Some users are correspondingly holding back on their social media engagement. However, this can feel like a severe self-imposed restriction for them, with one user, for example, stating that *“I really hate this fear. There's so much I want to say, get out and express and I'm too afraid to post a fucking meme. How do you get over this?”* Yet, this is also a fear some users chimed in on to say they had overcome it, such as writing how they *“started by posting funny memes to my story, if no one responds, no harm no foul right?”*

Similar to social media, there are other kinds of apps that also expose users to others, such as dating or marketplace apps. However, where social media can be used privately with just close circle of friends, this is often not possible with such apps. For example, much of the value of dating profiles is in connecting to strangers and a furniture sale only targeting close friends also will be harder. Yet, this then also introduces the possibility that random people might recognize one on the street and one is judged, as one user put it:

<sup>1</sup>See <https://www.statista.com/statistics/435324/share-app-time-category/>.

*I live on a college campus so everyone that would see my profile would be another college student. I don't know how to deal with the anxiety that anyone around me might recognize me from a dating website and judge me for being ugly or something. I'm sort of insecure like that. I don't even intend on using Tinder a lot but just making my profile public gives me that kind of anxiety. Not sure if anyone went through something similar, if/how they got over it? Maybe online dating is just unhealthy for me if I'm really insecure and the thought of being rejected or even judged makes me paralyzed with fear?*

We also saw several examples where the fear of being judged interplays with other forms of anxiety. Here users are afraid of others noticing their anxiety, which in turn strengthens these anxious feelings. One example is a story where a user described their anxiety around making phone calls:

*So I have got pretty bad phobia of calling someone (i.e. making appointments at the doctor). Mainly because I feel the person on the other end judges me or is rude to me and I don't want to sound nervous or have a shaky voice. I never pick up the phone when someone important calls me. And when I open the mailbox to hear what they had to say I feel nervous and have stomach pain. Whenever my phone starts to make the beep noises indicating that the number is being dialed my anxiety peaks. I just hate to appear as if I am too stupid and nervous to make simple calls. I feel like a 5 year old, not an adult.*

A common thread in the above examples is users thinking their appearance, performance, or behavior are not up to some standard. The phone then acts as the channel through which this is disclosed to others, or where these perceived shortcomings become apparent. Furthermore, there also is a loss of control on the users side, which likely also plays into this anxiety. This manifests in one story as loss of control over their data (i.e., their profile could be viewed by anyone). In the last story, the loss of control is in time, where the person calling essentially determines when anxiety peaks. This even plays out when the call is not accepted, as the mailbox message then takes on this trigger function for that user. Even though they can pick when to open such a message, that action brings back the fact that they could not accept the call in the first place.

**3.1.6 Struggling with Technology.** Most similar to computer anxiety, we also found instances where users reported phone anxiety, where the source was in the technology itself and their use of it. This manifested as users feeling poorly equipped for controlling their phones, failing in this use, or not trusting the technology to work as required. An example of this is a story where the user feels a need to check again and again whether the alarm is set correctly:

*I check to make sure my alarm is set at least 10 times before I go to bed. I have 2 alarms set for work. One is my phone and the other is an actual alarm clock. Anyway, the night before I'm afraid the alarm is set wrong or it won't go off so I constantly check it before I go to bed.*

This is echoed in another story, where the user also points out that this issue could be fixed if visibility of system state was better:

*I have terrible "forgot to set my alarm" anxiety. Even with a weekday routine alarm, I need to see for sure that it's been set. So when I saw the "next alarm" widget I was excited. I no longer need to open my phone, go to clock then go to alarms to see if my alarm is set? Wrong. It only displays the next alarm if it's during the same day. If it's 10pm and you have an alarm set for 7am tomorrow, it won't show. But as soon as it hits midnight, bam. The alarm shows on the Lock Screen. Terrible design and completely destroys what I feel should be the main purpose of the widget.*

Similar checking behavior was also reported for when making phone calls and entering numbers. For example, one user noted how: *“I plan what I’m going to say, write it down if it helps. Then I dial and triple check the number (absolutely obsessed with the fear of having the wrong number)”*. In a direct response, another wrote they *“can totally relate to checking multiple times for the number to be right”*. While users are not struggling with the technology per se here, it is the possibility of an input error that triggers their anxiety.

**3.1.7 Addiction and Missing Out.** Feeling unable to detach from their phone resulted in phone anxiety in several of the collected stories. Commonly, this is due to a fear of missing out (FOMO), which has been linked to problematic phone use [15, 66, 77] before. An effect of phone separation and FOMO on anxiety has also been shown by Mannion and Nolan [44] in a lab study. FOMO often relates to the social sphere (e.g., missing a party) but also larger life trajectories (e.g., being unmarried). We also saw this social aspect reflected in the stories we collected, such as with one user describing FOMO in relation to their social media use:

*I wanna quit social media and limit my internet time for good [...]. [...] I have this fear of missing out on building contacts and making new friends [...] seeing other people’s stories and posts, seeing how happy and social they are and feeling insecure about myself. Is my brain trying to trick myself into making internet and gadgets seem like I need them a hell lot more than I ACTUALLY do, or is my fear justified?*

This is mirrored by another user, who wrote:

*Sometimes I get jealous of people who have time for fun things, like traveling, etc. [...] Instagram makes me feel sometime like I’m missing out a lot of things in life, which makes me anxious.*

Some users wrote about switching to a “dumbphone” in order to stop themselves from the continuous engagement they fell into. However, they also reported that sticking with this is hard for them, with the degree of use cessation fluctuating. As one user put it, *“I’ve tried making my smartphone into a dumbphone by deleting social media apps, YouTube, setting up timer lock but nothing sort of this works for me and I just slip into my old habits sooner or later”*. This is echoed in another story:

*For whatever reason I get this idea in my head that something is going to come up where I will need my smartphone and become so anxious about it that I eventually switch back to a smartphone. I’ve never actually had a situation where I required a smartphone but the fear is still there for some reason. The other thing that keeps popping into my head is the fear of missing out. I worry about not being able to capture a moment with a decent camera or missing out on a video or something from one of my friends or being able to look up some information whenever I want. I also worry about not being able to kill time at work and/or on break, and I really shouldn’t be on my phone at work anyway.*

Phone addiction and FOMO are not only about longer interactions with the phone (e.g., scrolling through social media posts). Instead, notification mechanisms also play a role, with users checking over and over whether anything new has come in. One user, for example, described this as follows:

*If I’m being completely honest, my phone definitely contributes to my anxiety issues. I’m constantly checking it for notifications, even when I know there’s nothing there. It’s like a compulsion. I would definitely feel better if I turned off my phone for a day and meditated. I would probably feel more present and focused, and less anxious overall.*

Another feature we saw mentioned were “streaks”, a feature in many apps that strive to keep users engaged. For example, practicing a language on Duolingo every day, increments a “streak number”, which is shown on the user’s profile. Yet, when they miss a day it goes back to zero,

creating an incentive to keep returning daily. In one story, a user reflected on a similar effect in Snapchat and how they realized and overcame the corresponding FOMO:

*I remember when I got snapchat, all I could think about was how so many others had more friends and more conversations and bigger streaks than me. But then I realised that it was pointless. The app was making me think more about the stuff I was missing out on, than what I had. Plus the streaks and stuff are just psychological tricks to get you hooked and addicted.*

Consequently, these users report having a hard time putting down their phones. For example, one user noted “*It’s getting really bad now I have 10–12hr screentime usually and I can’t stop.*” The awareness of the issue, yet inability to curb the behavior, is another source of anxiety for these users. One user, for example, remarked: “*It’s only been a day without social media and minimal phone usage, and I’m going nuts! The anxiety and restlessness is unreal.*”

**3.1.8 Feeling Overwhelmed.** As we have seen, mobile interaction can be addictive and people get anxious about potentially missing out on things. A similar, yet distinct, anxiety occurs where users feel overwhelmed by the amount of information coming in and interaction seemingly asked of them. For mobile notifications this has been pointed out before, such as by Pielot et al. [52]. We also saw stories along the same line, such as a user stating how this gives them “crazy anxiety”:

*It seems like I get an overwhelming amount of notifications on my cell phone. Whether it’s email, Instagram, text messages or a dreaded phone call, notifications are running rampant through my brain and my cell phone. Lately, it’s been seeming like every notification I answer, I get three more notifications about something else. This has been giving me some crazy anxiety, like leave me the fuck alone! I’m trying to take care of this one response before I can get to these other hundred more.*

As other users point out, this anxiety is not just about having to process notifications, but also relates to the actions required subsequently. For example, one user noted that “*every time I see an email notification I get stressed out because it might mean me having to deal with stuff I don’t feel like dealing with atm or at all.*” The same is mentioned by another user with respect to dating: “*I’m a grown ass adult woman in her mid 30’s...I should NOT get stressed over seeing notifications that someone replied to me!*” In particular the pressure to quickly reply plays into this anxiety:

*I also hate instant messages like wechat, whatsapp...etc, i hate notifications from other people, I’m scared of the expectation that i need to reply asap. Sometimes, I ghosted people for weeks-months, i feel bad but I also don’t want to change...It’s just tiring for my mental.*

Feeling overwhelmed is not limited to notifications and people, for example, also report this feeling with respect to messaging. One user framed this as: “*I love my friends dearly and am thankful that I have people who reach out to me. But my god why is replying to texts such a daunting task? Why does it produce so much anxiety?*” Hence, as others in the response to the story also pointed out, there might be a connection to social anxiety. Others relate this to personality traits, noting “*it could just mean you are an Introvert and Dread constant social interactions.*” The stress some feel when overwhelmed by mobile interactions is exacerbated due to going against perceived expectations and norms. One story described this as “fitting into society” and remarked on withdrawal as a response:

*I’m noticing people tend to stress me out a lot even though I want to be a people person. Social media has so much happening and it just always feels fake. Both make me feel anxious Sometimes it feels like I’m the only one that feels like this. It feels like everyone is on social media. Sometimes it feels like I have to have a social media page in order to fit*



*into society. I honestly just deleted my Instagram and kept a small spam page that makes me happy a little but I might delete that too.*

**3.1.9 Summary.** The stories of anxiety show how a broad spectrum of phone use can cause problems. Where some of these have been well-covered in previous work, such as phone addiction and FOMO, other anxieties are more niche. We can also see that some forms of phone anxiety are opposed to each other. While some users feel bad about being glued to their phone, others have issues because they cannot get themselves to use their phone to, for example, make a call.

The stories also show that phones connect to a wide range of use cases. Where calling and texting have been a focus in investigations of problematic phone use, less attention has been given to dating and posting habits. Yet, the latter are activities primarily conducted through and with phones.

### 3.2 How Phone Anxiety is Seen by Others

The stories we collected mainly provided the perspectives of people with phone anxiety. However, we have seen that most phone anxieties are connected to interactions with others, mediated through the phone. Yet, the stories only show one side of that interaction, with the users often ruminating on how others might see or react to them. Furthermore, as Rodebaugh [60] has found, social anxiety is associated with impaired friendship quality. Thus, we assume that the behaviors reported in the collected stories might also result in negative perceptions by others and impact their relationships to such users.

To investigate whether other people indeed have negative reactions to the scenarios described in the user stories, we set out to also collect data on their views. Furthermore, we were interested to see whether reading about the reasons behind the described behaviors would also help others better understand these users. We used a survey approach for this, where we created a questionnaire and elicited participation in volunteer online communities<sup>2</sup>. Participants first provided informed consent and then answered demographic questions, including their own assessment of whether they had phone anxiety.

We received 82 responses to our questionnaire, but removed 16 participants who suffered from phone anxiety themselves and thus could not provide the desired external perspective. Most of the remaining 66 participants answered the optional demographics questions and were balanced in gender (32 male, 31 female, 1 non-binary), varied in age (12× 18–24, 31× 25–34, 19× 35–44, 2× 45–54), and hailed from a wide range of countries (8× United Kingdom, 8× United States, 4×Australia, 3×Canada, 3× China, 3× Germany, and individuals from Georgia, Greece, India, Malaysia, the Netherlands, Poland, Romania, and Spain). The majority of participants (41) also indicated having a friend who has or had phone anxiety.

In the questionnaire we showed five example stories to participants along with some contextual information (see Table 2 for details). The five stories covered three different kinds of scenarios: (1) late replies, (2+3) avoid making and taking phone calls, and (4+5) social media use. We specifically picked kinds of phone anxiety where (1) the described behavior would be visible and impacting another person, and (2) the stories cover several of the categories identified previously. For each story, we then asked participants to answer a question on how they perceive the described situation. Afterwards, we also asked them to reflect on all the stories with different kinds of phone anxiety and to describe to us whether these have changed their outlook or their potential future behavior in any way. Next, we describe the responses for each of the three kinds of stories.

<sup>2</sup>For example, the [/r/SampleSize](#) subreddit as well as the [Dissertation Survey Exchange](#), [Student Survey Exchange](#), and [Survey Sharing](#) Facebook groups.



Table 2. In a survey we showed participants examples of anxiety stories along with corresponding contexts information and questions. Highlighting of important passages also as shown to participants.

**Context:** Many people feel anxious when trying to send the perfect message, often procrastinating and taking hours to respond due to the pressure to respond quickly or face social consequences.

**Question:** How does learning about this change your perception of people who take a long time to respond to your messages?

**Context:** Some individuals refuse to make phone calls and instead prefer messaging, fearing the pressure of immediate response and the possibility of failure in conversational settings.

**Question:** Having learned more on the reasons people avoid phone calls, how do you perceive the concerns of individuals who avoid phone calls in favor of messaging due to fears of immediate response and failure?

**Context:** On top of that, many users experience anxiety when they also receive phone calls. This anxiety can stem from the fear of being judged by the person on the other end or hearing potentially bad news.

**Question:** How do you feel when someone seems anxious while talking to you on the phone?

**Context:** There are users who are hesitant to establish an online presence due to concerns about security and privacy risks or being identified.

**Question:** After learning about this, in what way do you perceive those users who limit their online presence or have no online presence at all (no profile picture, no posts) due to concerns about security or being recognized?

**Context:** Many users report feeling anxious when they see negative comments or feedback on social media platforms. Some user even avoid posting altogether to prevent potential negative interactions.

**Question:** Have you noticed other behaving this way? How to you perceive people who avoid posting on social media to prevent negative interactions?

**User A:** Kind of. I constantly re-read the messages I'm about to send which often takes a long time, especially if I'm speaking with a person that I'm at all anxious around. However, I actually prefer communicating via messages due to being able to re-write your message until it's exactly what you wanted to say, free of any mistakes. I find actual face-to-face speech on the other hand much more difficult. Too much trailing off, mumbling and feeling like a deer in headlights whenever I'm put on the spot.

**User B:** we're like polar opposites...p2p communication is nerve wracking as hell for me, but when i'm in front of people for some reason it's easier for me to force myself to talk... even though i don't even remember what i said most of the time anyways. but with texting it's like, i have soo much time to respond, so i take forever trying to perfect message, as to which point i just get so frustrated i just give up and never text back.

**User A:** Speaking from personal experience, the main reason is fear of the unknown. Who is calling at this time? No number? That can't be good, why would someone need to hide their number? Is it a debt collector from a bill I forgot to pay or maybe I am a bit late due to financial issues...Is it the police with some terrible news? Is it simply yet another annoying telemarketer that you just really don't want to deal with. Just hang up then. Cool, I have no problem hanging up. The problem isn't necessarily in the hanging up, it's in the dealing with the unknown. Somebody you potentially do not know asking you for a favour, money and you just can't say no. Yes, people might say oh well, just answer it then you'll know, but unless you suffer from the anxiety over this, you simply cannot understand. It's honestly really hard to explain to someone who doesn't suffer from it. I personally hate the telephone. I will do everything to avoid talking on it, anyone who knows me knows to text or whatsapp. That way, I can read and digest the message, and not have to think 'on the hop'. I have time to formulate a coherent reply.

**User A:** Hi, So I have got pretty bad phobia of calling someone (i.e. making appointments at the doctor). Mainly because I feel the person on the other end judges me or is rude to me and I don't want to sound nervous or have a shaky voice. I never pick up the phone when someone important calls me. And when I open the mailbox to hear what they had to say I feel nervous and have stomach pain. A month ago I tried to get over it by stopping to overthink and just calling the places I had to call because I kept on postponing the calls. Before I could even call the place I had to breathe slowly and calm down for 10 minutes because my heart was racing, my hands were sweaty and I got a stomach ache. But that still didn't help and I called them with a racing heart and a shaky voice because I was so nervous. Whenever my phone starts to make the beep noises indicating that the number is being dialed my anxiety peaks. I just hate to appear as if I am too stupid and nervous to make simple calls. I feel like a 5 year old, not an adult.. I thought I can maybe overcome my fear by forcing myself to call and get used to them but that didn't work. Even after forcing myself to do 5 calls the symptoms still remain the same.

**User A:** Yep lol. I don't post on my Facebook and rarely comment on anything. I comment on Reddit a lot and post fairly often also because it's anonymous. On Reddit, I have a separate account I use on taboo/inappropriate/embarrassing stuff because I have this anxiety where someone will recognize my main account. No other social media for me.

**User B:** oh i absolutely deleted all ny identifiable social media accounts because of this fear. like, donezo. bye. now i only do social media for fandom stuff. i'm available on text, cat, facetime, or zoom to irl people. or...you know, just go out for lunch or a movie. but a PERSONAL portfolio of my life to update everyone? nah. i'll only go back if the likes and followers option are all disables...aka never lol

**User A:** Hello, welcome to my daily dose of social anxiety. I have a fear of posting on my own social media. I'm afraid of so many things that surround the act of posting. I'm afraid of not picking the right photo, not getting "Enough" likes, and not knowing what to say back to people if they comment! These are all bullshit reasons to be afraid to post but they literally put me into a spiraling mental state. I've become a stalker of my own accounts and revisit all my old posts to see if I did something "right" or "wrong". Nothing is ever directly "right" so I end up deleting 90% of my page. I get jealous when I see my friends and family post about their lives but I never get the courage to actually post. Why has posting become so difficult for me and how do I just get over it??

**3.2.1 When Others Take a Long Time to Respond.** Upon reading the story of someone who is struggling to quickly respond to messages, most participants voiced empathy and understanding. As one participant put it: *"I recognize that they might be dealing with personal challenges that affect their response time"*. Another could now *"recognize that their response time doesn't necessarily reflect their level of interest or care"*. Understanding the issue also led to recognition of the burden: *"I appreciate effort they use in creating their message"*. Such a perspective shift also is mirrored by another participant, who noted they learned *"to value the person and the conversation rather than the timing of their responses"*.

Participants also mentioned they would be open to change their own behavior in order to accommodate others with anxiety. For example, one would now *"consider if my message will contribute to their anxiety"*. This can also manifest as *"patience and not to jump to conclusions about their intentions"* and *"reminds me to prioritize understanding over frustration"*. In other responses, participants stated they had become *"less judgemental"* or *"more mindful of how I interpret delays in responses"* and to *"be calm while conversing"* and *"have more consideration for them"*.

Being aware of the described struggle to respond quickly, perceptions of messaging delay shifted. One participant now saw the delay *"as a sign of their consideration and thoughtfulness rather than just delay"*. Similarly, another thought the slow down *"fosters deeper connection by allowing more thoughtful exchanges"*.

**3.2.2 When Others Avoid Phone Calls.** As with messaging delays, most participants also expressed understanding of phone call avoidance. For example, one participants said they *"see it as a valid response to the pressure of immediate interaction"*. Correspondingly, another acknowledged that they *"understand that some people need time to prepare themselves mentally for phone conversations"*. One participant summarized that *"understanding their apprehension makes me more empathetic towards their preference for messaging"*.

Awareness of this avoidance again resulted in many participants expressing support. Participants wrote they wanted to *"respect their boundaries and preferences"*, *"create a supportive communicative environment"*, and to *"prioritize the person's well-being over the mode of communication"*. Other mentioned approaches were to *"offer to schedule another time to talk if they're feeling too overwhelmed"*, *"encourage them to take deep breaths and try to relax"*, or to *"keep the conversation focused and structured to help reduce their anxiety"*.

However, not all reactions to the call avoidance stories were positive. We had one participant state that they *"perceive them as a bit immature"*. Asked about their own feelings, participants also wrote they would feel *"A little awkward I think, not that much though"* and how *"I usually get angry because I don't understand why they are acting like that"*. In the latter case, that participant did also acknowledge that *"I guess I need to be more empathetic"*.

**3.2.3 When Others Avoid Social Media.** Our participants overall had very positive opinions of others who limit their presence. This was commonly seen as *"great"*, *"good"*, and even *"fantastic"*. On the other hand, such users were also seen as potentially *"shy"*, *"calm"*, *"reserved"*, *"insecure"*, *"too self-conscious"*, and *"protective"*. A few participants also found this behavior *"a little paranoid"*, *"secretive"*, *"bad"*, *"fearful/afraid"*, or *"a bit confused"*.

Avoidance of social media also was something many participants had already observed in their lives. This includes many who abstain or try to abstain themselves, for example, citing privacy and security reasons. As one participant also put it: *"social media is hell"*.

**3.2.4 Summary.** Overall, our survey participants were understanding and empathetic. Furthermore, many indicated they would be open to changing their own behavior and be more accommodating if they became aware someone else had issues with phone anxiety. This is in contrast to many of the

Table 3. We followed a structured interview approach with three stages. The set of questions differed depending on whether a participant still suffered from phone anxiety or not.

Interview Stage	Question	
	Participants still having anxiety	Participants that overcame anxiety
Strategies and Techniques	<ul style="list-style-type: none"> <li>• Are you using any strategies or techniques right now to manage your anxiety?</li> </ul>	<ul style="list-style-type: none"> <li>• What specific strategies or techniques helped you the most?</li> <li>• Were there any particular resources that you found helpful?</li> </ul>
Personal Experience and Impact	<ul style="list-style-type: none"> <li>• What do you find to be the biggest obstacles in managing your anxiety right now?</li> <li>• Are there any specific triggers that make your anxiety worse?</li> <li>• Have you noticed any patterns or situations where your anxiety is particularly intense?</li> <li>• What small steps or changes have you found to be somewhat helpful, even if only a little?</li> </ul>	<ul style="list-style-type: none"> <li>• Can you describe what was the most challenging part of your journey to healing from anxiety?</li> <li>• How long did it take to feel comfortable?</li> <li>• Did you notice any changes in daily life or productivity?</li> </ul>
Support and Advice	<ul style="list-style-type: none"> <li>• Are there any specific actions or behaviors from others that make you feel more supported?</li> <li>• What do you wish people understood better about your experience with anxiety?</li> </ul>	<ul style="list-style-type: none"> <li>• Did your friends and family support you?</li> <li>• What advice would you give to someone currently struggling?</li> </ul>

stories on phone anxiety that circled around worries about the impressions others had of oneself. Going by the comments of the survey respondents, more awareness of and openness around these anxieties might also alleviate some of them.

### 3.3 Interviews on Phone Anxiety

To see how people with phone anxiety themselves are currently coping with or have possibly overcome this issue, we conducted a series of interviews. For recruiting, we messaged the Reddit users posting some of the stories we identified earlier. If they provided consent to the interview, we exchanged further messages on Reddit to ask them for their coping strategies, challenges they faced, and overall reflections on their anxiety. We used a semi-structured approach with some guiding questions developed beforehand, but with the freedom to diverge from and alter them during the interviews. The prepared questions slightly differed depending on whether participants overcame their anxiety or not (see Table 3 for all questions). In the interviews, we also incorporated the stories the participants posted, such as by following up on a coping strategy they mentioned there. Overall, we conducted such interviews with 12 users, with nine of them still suffering from phone anxiety. Hence, while they describe their coping strategies, not all of these are effective. For example, several users still experiencing stresses around their anxiety, even though they are striving to cope.

Commenting on their own anxiety, participants echoed several of the reasons we already found in the stories. For instance, one participant wrote: *“I still feel like I’m addicted to my phone and that causes me anxiety and I want to limit my phone usage but I cannot do it. [...] I tried to limit my phone*

usage but that made it even worse. I would stress all the time that I will miss an important message.” Two remarked on the fear of being badly perceived in a phone call, writing: (1) “Sometimes I felt the other person is judging me and sometimes after the call I just start crying after making a fool of myself.” and (2) “when I don’t know how to respond to a question right away, the more time it takes for me to think the response the higher the chance is for me to go blank and just be dead silent on the call until the person says something to take me out from my misery.” The fear of being judged likely also plays a part for a third participant, who noted that “when I check my phone and in my notification bar I see someone tagging me in a post or someone commenting on my pictures, sometimes it also happens when I get a new friend request and I’m not sure why.” Finally, as another participant stated, communication with strangers can be especially anxiety inducing: “I personally find it very difficult to pick up calls from unknown numbers. I have no problems with calls from friends or close family members, but when I saw a number that I don’t know I feel like I hit a wall.”

Some participants remarked on how other people understand their anxiety. One participant, for example, commented that: “I wish people understood that my anxiety isn’t just about feeling nervous; it impacts my daily life a lot of times. Simple tasks like making phone calls or responding to messages can feel overwhelming. It’s not that I’m being rude or uninterested.” Another stressed how their anxiety manifests: “I wish others knew that anxiety isn’t just in my head and it also causes a lot of real physical symptoms. My heart races, I feel dizzy, and sometimes I even get nauseous. It’s not something I can just ‘snap out of’ or ignore.”

One coping strategy for phone anxiety is to plan and prepare for interactions. For example, one participant remarked: “I will write out scripts still, it’s not always extremely detailed, but I do need any type of personal information that I might be asked (including address, phone numbers, etc.) in front of me. As when I am put on the spot for much of anything I get brain fog.” Scheduling has allowed another participant to overcome their anxiety around random calls: “I started setting specific times during the day to check my phone. Like I would try and avoid as much as I could to use my phone before I wake up or before I go to bed to avoid creating any anxiety bit checking my messages or using social media. I’ve also customized my phone calls so in a way only close friends or family members can call me, if a unknown number tries to call me, my phone would not provide any sound input but when I would check my phone I would see that someone called me. Because of this I don’t get scared when someone that I don’t know calls me.” A related approach is to block incoming communication with built-in means: “One thing that I start doing recently, and so far it seems to help me reduce my levels of anxiety, is to put the phone on ‘do not disturb’ mode during certain hours of day. I especially use this when I’m working or even in my free time when I want to focus on some task. I feel that not hearing the notification makes me more relaxed and even if I’m waiting for a message, I won’t get stressed the same way I would get when I don’t use the ‘do not disturb’ mode because I won’t be able to know if I received a reply.” However, engaging in planning in order to cope with anxiety comes at a cost. As another participant put it, “I want people to understand that managing anxiety takes time and effort.”

Two participants also mentioned sports as a way they try to cope with their phone anxiety, albeit in two rather different ways. For one it was about body insecurity, noting: “I started going to the gym 4 months ago. And I think that this helped me. Now I don’t feel as anxious as before when I open Instagram and see other people there, not sure why. But I guess one reason was that I was insecure with my body?” Another participant remarked that: “for me what actually worked was to exercise regularly. For example, going from a run when I start getting anxious feeling because someone is not responding to my messages really helps me in clearing my mind and reducing the anxiety.” While not quite sports, a third participant also mentioned: “I sometimes try to do breathing exercises prior [to making a phone call] to calm down.”

Some participants found that exposing themselves to their anxiety helped them overcome it. As one put it: “by consistently exposing myself to the anxiety-inducing scenario, I managed to overcome

*my fears. It took me a couple of years but now I can say that I have no issue when I have to call someone to arrange something or ask for information.”* This can also be in the form of talking about these issues, as another participant noted: *“I feel like talking about the things that cause me anxiety with a close friend or a family member actually helped me. Sometimes just vocalizing my worries makes them seem less daunting.”*

Finally, we also got comments on anxiety coping being a highly personal matter, with common strategies not working for all. For example, one participant wrote: *“I feel like my anxiety is different from person to person you know? I tried looking in the past on Youtube to see if I can find something useful but nothing seemed that it will work for me.”* Another remarked: *“I personally tried some techniques I’ve found on Reddit or Quora, but with no luck so far.”* In another participant’s case, they found their anxiety a symptom of something else entirely: *“My case was very specific and rooted in seemingly unrelated trauma [...]. Once I made the connection in therapy to the trauma, my phone anxiety practically vanished overnight.”*

#### 4 Discussion

Through a qualitative content analysis of online posts on phone anxiety, a survey of people without phone anxiety, and interviews of people with phone anxiety we have described the patterns and perceptions of phone anxiety as well as the coping mechanisms people have applied for it. Where our investigation aimed at a broad and comprehensive picture of this issue, many of the individual anxieties have been described previously. Our results, for example, align with those of Brown et al. [9] and Hunter et al. [31]. We find similar connections between anxiety and communication apprehension as well as with increased deliberation. Moreover, we also saw nomophobia patterns [63] emerge as a category in our stories. However, we only observed some of the correlates associated with computer anxiety previously [55] translate to phone anxiety. While perceived lack of ease of use (which increases computer anxiety) did play into some experiences of phone anxiety, the same did not hold for perceived usefulness. However, as Powell also noted, correlates of perceived usefulness mostly showed up in older studies of computer anxiety. Where Ran et al. [57] found social anxiety to be linked to more addiction to mobile phones, we saw a more mixed relationship in our data. While we similarly observed categories of addiction and fear of missing out, we also saw many instances of users with social anxiety shying away from interactions with their phones, which they identified as triggers of said anxiety.

While the line between anxiety disorder and general anxiety is not always clear, most of the stories we collected and responses we received point to the latter. These are users who struggle with specific interactions, for example, because they overthink how a text message would be perceived by the recipient. As we saw in the reported coping strategies, planning and preparation can go a long way for some users and allow them to deal with their phone anxieties more effectively. Such coping techniques have been shown to be helpful in similar situations, such as with people afraid of flying [24] or social situations [72].

How mobile interaction intersects with well-being in general has been a question of growing concern. However, just as we saw how phone anxiety is multifaceted and differs between people, this also holds for larger well-being patterns. For example, Hoffner and Lee [29] found well-being positively correlated with phone use, while David et al. [17] found an overall negative effect. However, the latter also point out that their overall effect masks that individual app categories differ in how they impact subjective well-being. Specifically, while time spent in photo and video apps was associated with more anxiety, the opposite was the case for book apps. Similarly, our results also indicate that social media use, for example, is not uniformly a driver of anxiety, but instead its extensive use gives some people anxiety while other struggle with having a hard time using it in the first place.

## 4.1 Limitations

While we collected a substantial number of stories on phone anxiety, our sample predominantly contains Reddit posts. Whether these stories thus are representative of the phone anxiety issues in the general population is unclear. Reddit users skew more male<sup>3</sup> and younger<sup>4</sup> than average. Furthermore, our methodology does not allow statements on the prevalence of the described phone anxieties.

We also note that the used methodology is useful for describing what kinds of phone anxiety occur, but does not allow us to determine whether phones are primary drivers of such anxiety or mere focal points for existing anxieties. How much the phone is responsible for negative effects showing up in their use is a larger point of contention, not just for phone anxiety. For example, while problematic smartphone use is associated with mental health issues [2], the overall effect of phone use on wellbeing is less clear [23]. Where we map out the space of phone anxiety it hence does require further, more focused, studies to determine to which extent they are responsible for the reported anxieties.

## 4.2 Implications for Mobile Interaction Design

While many of the anxieties we found are rooted in social anxieties and the users' relationship with others, the phone still is the conduit for these anxieties. As such, changing the design of mobile interactions has the potential to lessen the impact of these anxieties. Previous work has shown the efficacy of such designs on anxiety. For example, Chen and Toma [13] found that text editability mediated how social anxiety influences a preference for texting, making it appear less threatening. Another example is *TwIPS* [26], which shows users predicted message reactions, allowing them a way to check whether their message would be received as intended. In the following, we describe three further example cases and potential design approaches.

**4.2.1 Notifications.** While notifications can lead to anxiety, just switching them off is not a suitable solution. As Pielot and Rello [53] described, just disabling them made users feel less able to respond and more anxious. An alternative approach was described by Fitz et al. [21], who found that batching notifications had a positive effect on well-being. Being overwhelmed by notifications is also something reported in the stories we analyzed. However, the associated pressure to reply, ideally quickly, is what seems to heighten the corresponding anxiety. While notification design often makes immediate replying easy (e.g., putting a text box right in the notification), the opposite is not the case. Instead, apps could be designed to not just allow muting of notifications, but to allow users to indicate that they will need some time to reply. As our survey indicated, there is potential understanding for such a user requirement, but currently no direct way to communicate this desire.

**4.2.2 Alleviating Worries About Bad News.** Many users with phone anxiety assume the worst, such as an incoming text being a breakup message, a death notice, or a rejection letter. Such fears are likely exacerbated by the partial information common in message notifications. For example, people might assume that an email from their boss is bad news (for an example, see Figure 1). Subject lines are supposed to help with this, but are also often not sufficiently descriptive. Some applications show the beginning of a message before opening it and thus users can, for example, assume to receive bad news if it starts with "*We're sorry to inform you...*". There is an opportunity here to reduce the uncertainty around incoming messages by optionally analyzing their content and adding

<sup>3</sup>See <https://www.statista.com/statistics/1255182/distribution-of-users-on-reddit-worldwide-gender/>

<sup>4</sup>For US users described at <https://www.statista.com/statistics/261766/share-of-us-internet-users-who-use-reddit-by-age-group/>



warnings or “all clears” labels to them. This could give users a quick indication whether they need to worry about a message or not, allowing them a more informed decision on when to open them.

**4.2.3 Phone Call Interfaces.** While phones have changed dramatically over the last decades, changes to the phone call interfaces have been limited. Caller selection has improved with contact list, which also enable caller ID, so we can know who is calling. However, beyond that, a phone call today is not all that different from a phone call back in the day. One pain point that became clear in the anxiety stories is that the unscheduled and interrupting nature of phone calls is a major cause for many users’ anxiety. Instead, phones could offer interfaces for call scheduling, where one side could ask for a call with accompanying information on potential times, the topic of the call, the urgency, or other pertinent information. Users could then accept such a request, either starting a call as soon as possible or at a scheduled time. Of course, email and messaging already allow users to schedule calls, yet they remain distinct from the calling interface. Instead, redesigning phone calls with an asynchronous initiation phase could change baseline expectations for what a phone call is and demands. There would still be a need to get in touch as fast as possible, but this could be indicated and supported with at least a reason, so users have an easier time accepting such imposition.

**4.2.4 Further Considerations.** The above design examples all lower the burden on the user and shield them from what could trigger their anxieties. However, we note that such designs could also be seen as less appropriate when they enable users to withdraw and avoid change. While such designs could benefit some user in the short term, they might also disadvantage them in the long term. Furthermore, putting in additional checks and escalation levels could induce worry as well, especially if such classification goes wrong. There is a fine line between helping users better deal with their phone anxieties and enabling their avoidance and possibly starting new problematic usage behaviors. Widdicks et al. [75] have described this issue as *backfiring*, where a design with good intentions can have the opposite effect in practice. Such a danger was also noted by Wang et al. [74], who designed software for users with obsessive-compulsive disorder, but noted that the restrictions they put in place to help these users, might also “lead to low user compliance and even backfire.” A similar concern was also noted by Lu et al. [42] when investigating interventions for reducing phone overuse. How best to balance interventions for helping users so they actually help and do not reinforce the behaviors they were designed to reduce thus has to be determined on a system-by-system or even user-by-user basis.

## 5 Conclusion

With many people suffering from some form of anxiety, the role of technology in these processes has been a recurring question. Yet, a broader overview how anxiety plays into mobile interactions has been missing, with much of the previous work focusing on specific forms of anxiety and its correlates. To assemble a more comprehensive account of phone anxiety we combined three different methods to collect (1) stories of, (2) perceptions of, and (3) coping mechanisms for phone anxiety. Furthermore, we outlined several potential ways that research and development of mobile interaction can better cater to such users. Phones play a central role in people’s daily lives and with more and more interaction with systems and others mediated through them. Hence, it is important that future mobile interactions are designed to reduce the ways it triggers anxiety and to better suit users with anxieties in the first place. This paper supports such endeavors.

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