Understanding Account Deletion and Related Dark Patterns On Social Media

BRENNAN SCHAFFNER, University of Chicago
NEHA LINGAREDDY, University of Chicago
MARSHINI CHETTY, University of Chicago

Many social media users may wish to delete their accounts, but it is often unclear if this process is easy to complete and if users understand what happens to their account data after deletion. Moreover, since platforms have incentives to keep users from leaving (to profit from users' data and activity), it is not clear whether platforms employ manipulative user interfaces, or 'dark patterns', during the account deletion process. To investigate these issues, we conducted a two-part study. In Study Part 1, we created and deleted accounts on the 20 most popular social media platforms in the United States and performed an analysis of 490 deletion-related screens across these platforms. From this analysis, we found that account deletion tasks are not straightforward or available on all modalities, that dark patterns are present in account deletion interfaces, and that terminology used by platforms during account deletion is often unclear. In Study Part 2, informed by our interface analysis, we surveyed 200 social media users to understand how users perceive and experience the social media account deletion experience. We found that most participants had tried to delete at least one social media account, and over one-third of them never completed the deletion process. Based on these results, we recommend that account deletion options be present on all modalities that a platform offers, that further work is needed to assess how users are affected by account deletion related dark patterns such as confirmshaming, and finally, that social media platforms need to improve the terminology used in their account deletion processes and make the outcomes of account deletion more clear to users.

CCS Concepts: • **Human-centered computing** → *User studies*; *Walkthrough evaluations.*

Additional Key Words and Phrases: Social Media, Dark Patterns, Account Deletion

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1 INTRODUCTION

Social media users may choose to leave social media platforms by deleting their accounts for a variety of reasons. For instance, users may have concerns about technology addiction [66], data privacy [28], and harassment online [6]. One study found that 42% of United States (U.S.) *Facebook* users have taken a break from the platform for at least several weeks and 26% of users chose to delete the application from their phones [65]. Given the approximately 3.6 billion people that are on social media platforms today [5], it is important to understand how easy it is for a user to delete an account to ensure that users are able to move on from a platform if they wish to do so.

Authors' addresses: Brennan Schaffner, University of Chicago; Neha Lingareddy, University of Chicago; Marshini Chetty, University of Chicago.

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To delete an account, a user has to navigate a social media platform's user interface and confirm that their action was completed. The user also has to understand what will happen to their data when their account is deleted to confirm that it matches their expectations. Platforms may also have to take care to prevent users from accidentally deleting their accounts by adding friction to the process. However, it is unclear if some of this friction in the account deletion process may be intentionally manipulative, i.e., 'dark patterns', so that social media corporations can continue monetizing user information by preventing users from leaving the platform very easily [9, 23, 43, 76]. By dark pattern, we use the description from Mathur et al., to mean *"modifying the user's choice set and manipulating the information flow to the user"* [51]. Dark patterns in social media platform account deletion interfaces may be employed to limit users' agency to freely delete their data, for instance, by making a deletion option hard to find.

Other researchers have studied the difficulties of data deletion online [38, 39] and the user understanding and practices of data deletion on social media [55, 80]. There is also preliminary work examining the different dark patterns that can occur across devices [4]. These studies have not focused on social media account deletion, dark patterns in account deletion interfaces, or the user experience of account deletion and perceptions of account deletion related dark patterns. To examine these issues in depth, we asked the following research questions:

- What does the account deletion process entail on the most popular social media platforms, and what dark patterns (if any) are present in this process?
- What are users' current account deletion experiences and expectations about what will happen to account data post-deletion?
- How do users perceive and understand current account deletion processes and account deletion related dark patterns?

To address these questions we conducted a two-part study: an analysis of the deletion interfaces on the 20 most popular social media platforms in the U.S. (based on the *Tranco* rankings [45]) and a survey with 200 social media users on *Prolific* [1]. In Study Part 1, we created and deleted accounts on each social media platform on three means of access: via the platform's mobile application, via accessing the platform on a mobile browser, and via accessing the platform on a desktop browser. We will refer to the different access means as 'modalities'[4]; we used different modalities to ascertain if certain deletion barriers are medium-based. During data collection, we manually scraped each account deletion screen by taking a screenshot at each interface decision point, that is, whenever a new web page loaded in browser or a new screen loaded in the application for which you would have to perform an action other than scrolling to return. In total, we collected 490 deletion interface screenshots across all the platforms. We then analyzed the deletion screenshots to identify the number of steps in the deletion process, what account termination options exist on different platforms, and to identify any account deletion related dark patterns. In Study Part 2, informed by the results of our deletion tasks analysis, we surveyed 200 social media users to find out about their account deletion experiences.

Based on our study, we had three main findings: 1) The social media account deletion process is not straightforward owing to limited deletion options in some modalities, dark patterns adding friction to the account deletion process, confusing account deletion terminology, and unclear outcomes regarding what happens to user data and account access after account deletion. 2) Users start the account deletion process for a variety of reasons but often do not complete it. 3) What users want from the account deletion process and what actually happens are different, perhaps contributing to the concerns and negative feelings about these platforms.

The specific contributions of this work are:

- We present a manual analysis of account deletion screens on the 20 most popular social media platforms in the U.S. from a manual scraping that resulted in 490 screenshots [1].
- We present a novel taxonomy of account deletion options provided by platforms on different modalities for users wanting to terminate their social media account(s).
- We provide novel evidence of dark patterns in account deletion interfaces contributing to a growing set of studies of dark patterns in various domains [33, 50, 82].
- We present a breakdown of deletion attempt outcomes by platform.

Next, we describe related work, our methods, findings, and discussion before concluding with recommendations to improve account deletion interfaces on social media platforms.

2 BACKGROUND AND RELATED WORK

In this section, we describe what dark patterns are and describe prior works around data deletion and social media.

2.1 What are Dark Patterns?

Academics have extensively studied the area of deceptive practices and behavioral interventions in user decision-making [47, 71, 73]. For instance, in behavioral economics research it is recognized that choice architects can control the environment to influence people's decisions by using the idea that the automatic systems overpower the reflective systems of human decision-making [73]. Some researchers believe that designing a choice architecture for reflection can allow users to make the most beneficial choice in a particular context. For example, Sunstein, among others, discusses the idea of 'nudging' people in a direction as a behavioral intervention, stressing the importance of transparency over manipulation [61, 71]. Otherwise, these forms of behavioral interventions become "adversarial rather than paternalistic", as highlighted by Narayanan et al [56]. Choice architectures are part and parcel of many online services and systems today which have decision making points that require users to decide when to sign up, what to purchase, what data to release and so on. When designers create choices to unfairly push users down a certain path to benefit the service provider, this manipulation is called a 'dark pattern'; a concept for a family of related problems that "modify the user's choice set and manipulating the information flow to the user" [51].

Dark Patterns Taxonomies, Effects, and Measurements: More simply put by Harry Brignull, who coined the term in 2010, dark patterns refer to "tricks used in websites and apps that make you do things that you didn't mean to" [14]. A growing number of taxonomies of dark patterns have since been created [17, 26, 60, 70], such as Gray et al.'s taxonomy of dark patterns from the perspective of user experience designer intent [34] or the taxonomy of dark patterns in game development where game creators worsen player experiences sometimes for monetary gain [24, 27, 82]. These taxonomies motivated researchers to discover and categorize dark patterns across the technology sphere in domains including shopping, privacy, industry defaults, and others [15, 19, 22, 29, 44, 50, 57, 72].

Other dark patterns studies focus on why these online manipulations are effective, with one teasing out dimensions of dark patterns that are manipulative [51]. For instance, in the privacy domain, Bosch et al. created a framework for collecting and analyzing privacy-related dark patterns and provided psychological reasoning for why these dark patterns are effective [15]. Similarly, Waldman et al. [77] outlined how dark patterns abuse human cognitive biases in order to get users to give up more data. Many dark patterns studies focus on specific instances of manipulative user

[1] We will make this data set publicly available on GitHub.

interfaces such as website cookie consent banners which violated the European Union's General Data Protection Regulation (GDPR) [36, 59, 69].

Research in this field is often hindered by the difficulty of measuring dark patterns at scale. Yet, many researchers have found innovative ways to collect data on deceptive and manipulative user interfaces in various domains. For instance, Mathur et al. built a webscraper to automatically detect dark patterns on 11K of the most popular shopping websites globally [50]. Similarly, in their workshop paper, Hausner and Gertz present preliminary results from a machine learning approach at generic dark pattern detection [40]. However, automatic detection of dark patterns is difficult, leaving many researchers to manual data collection methods [81]. For instance, when Di Geronimo et al. manually inspected 240 trending mobile applications, they found that 95% of them had dark patterns (often more than one) [25].

Dark Patterns and Users: A growing set of studies aims to examine the effect of dark patterns on end-users [48, 62, 74]. For example, Luguri and Strahilevitz, arguing for the illegality of many dark patterns, experimentally demonstrated that users exposed to dark patterns were four times more likely to remain subscribed to a service [47]. Similarly, Graßl et al., through user experiments, found that dark patterns in cookie consent forms resulted in users increasingly choosing privacy-unfriendly options [32]. Conversely, users increasingly chose privacy-friendly options when design nudges were implemented in their favor. In another example study, Capurro and Velloso discuss how dark patterns in a medical records program resulted in thousands of additional opioid prescriptions [16]. Some even plead that additional detrimental effects on users lie in the future when dark patterns are added to currently emerging technologies, such as proxemic interactions [37]. A few researchers have performed surveys, interviews, and/or other studies to get user perceptions of dark patterns [11]. For instance, Gray et al. [35] discuss how users perceive the manipulation of dark patterns. The researchers asked users about their emotions regarding manipulation, and whom they held accountable for the manipulation. Another small scale study included interviews with nine users in Sweden to gauge how aware users are of dark patterns in general. In this masters thesis, Maier found that users do not have full awareness of all manipulative design techniques, but when they do identify dark patterns, they place blame on profit-motivated business while recognizing the importance of interacting critically while online [49]. This was echoed in Di Geronimo et al. [25]. Finally, Bongard-Blanchy et al. [13] surveyed users about dark patterns in general, finding that while users may be aware of manipulative designs, they are still manipulated and often do not express concern because the consequences are unknown. They also discuss possible interventions, from elimination to awareness and from educational to regulatory. Somewhat related to our own work, Mildner and Savino [53] discuss the dark patterns they found on *Facebook*'s interface in the logout and the privacy settings, and how these patterns affect users' data privacy and their well-being. Finally, a more closely related study was discussed in an academic panel, hosted by the Federal Trade Commission (FTC), where Gunawan presented preliminary work that showed how the same service can have different user options and dark patterns based on modality [4]. While their analysis included account creation and deletion abilities for some social media platforms, their work was more focused on comparing overall dark pattern exposure from a variety of applications and services (shopping, productivity, business, etc.) across modalities. None of these studies focused on identifying barriers and dark patterns in account deletion on social media. We build on these works by exploring the choices given to users for different account termination options on social media websites, how deletion information is presented to the account owners, and user perceptions of what the deletion process entails.

2.2 Users, Data Deletion, and Social Media

General Data Deletion: Prior work has shed light on persona data deletion more generally. For instance, Vertesi et al. [75] studied user experiences of personal data by interviewing users and creating data narratives, which captured users' relationships and experiences with their data. These researchers used these narratives to create a framework that explains how users make decisions about their personal data, such as deletion. In a more specific case, Chidi et al. investigated why users may even want to delete their posted content on blogs [18]. Other research reflects the perspectives of platforms in data deletion [8]. For example, Garg et al. formalize potential platform responsibilities for deletion given that users may have the right to be forgotten [30], and Xu et al. studied how default data retention policies impact user behaviors, specifically the ephemerality of *Snapchat* messages [79]. Perhaps the most relevant work to ours regarding general data deletion is that of Habib et al., which explores the interaction paths users must navigate (often with difficulty) to find data deletion options, email communication opt-outs, and privacy settings [38, 39]. While their user study involved account creation and deletion of 11 of the same social media sites as in our work, they were more concerned with privacy options and policies on a broader scale of websites. Our study, by contrast, focuses on account deletion barriers in the account deletion task flow on social media websites specifically and assesses user perspectives on account deletion directly.

Deletion on Social Media. Researchers have studied social media in a variety of ways, from predicting human behavior [10, 31] to modeling misinformation and censorship [12, 20]. However, there have been fewer studies on social media deletion. Notably, a user study by Murillo et al. focused on improving understanding of online data deletion practices from a user perspective for email and social media platforms [55]. These researchers found that while most users understand that social media platforms contain both a front-end interface and a back-end server, the complexity of this design was not often understood . Additionally, researchers have studied user understanding and perceptions of retrospective changes (including deletions) to social media posts, a feature to improve user privacy [80]. In both of these works, they did not actually delete any accounts and were focused on content deletion (e.g., posts and tweets), where we focused on full account deletion and investigated the tasks in the account deletion process.

3 STUDY PART 1: ANALYSIS OF DELETION ACCOUNT SCREENS ON SOCIAL MEDIA PLATFORMS

We performed a two-part study to answer our research questions. In Study Part 1, we analyzed deletion screens to see how many steps it takes to confirm an account deletion, for what account termination options are presented, and for any deletion related dark patterns.

3.1 Account Deletion Screens: Data Collection

We chose to examine account deletion on the 20 most popular social media platforms based in the United States using *Tranco* rankings [45] from November 2020, shown in Figure 1. Unlike other popular website rankings (e.g., *Alexa* [7]), *Tranco* is more resilient to manipulation [46]. Because the *Tranco* rankings does not include website categorization, we manually filtered the popular sites for social media platforms. To do so, we used Kietzmann et al.'s definition of social media: *"a platform that is used to create, modify, share, and discuss Internet content"* [41]. We limited our analysis to the U.S. so we could do an English-based text analysis. We focused on high-ranking social media platforms because their business models often include profiting from user data [9, 23, 43], which increases the platform's incentives to keep users from deleting their accounts. Moreover, we anticipated that platforms with more users are more likely to have users that wish to delete their accounts.

	facebook.com	youtube.com	twitter.com	instagram.com	linkedin.com	pinterest.com	vimeo.com	reddit.com	wordpress.com	github.com	tumblr.com	whatsapp.com	flickr.com	soundcloud.com	twitch.tv	spotify.com	etsy.com	slack.com	tiktok.com	quora.com
Creation																				
Mobile App	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Desktop Browser	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓
Mobile Browser	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	X	X	✓	✓	X	✓	✓
Deletion																				
Mobile App	✓	X	✓	X	✓	✓*	X	X	X	X	X	✓	X	X	X	X	X	X	✓	✓
Desktop Browser	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	X	X	X	✓
Mobile Browser	✓	X	✓	✓	✓	✓	X	✓	✓	✓	✓	X	✓	X	X	X	X	X	X	✓

Table 1. Ordered from left to right by platform popularity, the available options for account deletion for each modality and platform (Check is account deletion option is present, Cross is account deletion option is absent, Asterix indicates the option was present but did not work for us). Note, there is a deletion option on *Pinterest*'s mobile application, however it did not work in our study (404 Error). Also, *Etsy* and *Slack* do not offer deletion options, only closure.

For each of the 20 platforms, we systematically recorded screenshots of every screen for both the account creation and deletion processes; however, in-depth discussion of the account creation screens is beyond the scope of this paper. We created a new email address (except for *WhatsApp* which required one of our researcher's phone numbers) for each platform and modality, namely, the platform's mobile application version, the platform's desktop browser version, and the platform's mobile browser version. Once we created the account and were already logged in, we recorded each screen from the platform's home page prior to finding the account deletion option to the point where the account is finally terminated; that is after a user has clicked a confirmation to delete their account. At each screen, we noted additional termination options given to the user (e.g., deactivation or deletion). We took a new screenshot anytime the Uniform Resource Locator (URL) changed from the previous screen in a browser or if we could not scroll back to it on an app, or if an icon to go back to the previous screen appeared on an app, both indicating new screens. We also took a screenshot for any deletion related interfaces required on external platforms, such as going to an email client to receive an email confirmation that the account was deleted. Additionally, we recorded whether a user could complete account deletion for each platform for each modality. All screenshots were collected by a member of the research team residing in India at the time of the study using a Virtual Private Network (VPN) connected to a U.S. server, with the exceptions of *TikTok*, which is banned in India, and *WhatsApp*, which required a phone number. A second research team member used an identical procedure to gather the *TikTok* and *WhatsApp* screenshots in the U.S. We used an iOS device, Safari on iOS, and Google Chrome for the mobile applications, mobile browser, and desktop browser data collection, respectively, except for *WhatsApp*, which was collected on an Android phone. Data collection occurred between September 2020 and January 2021. In total, we created 53 social media accounts and deleted 33 social media accounts, shown in Figure 1, resulting in 490 account deletion interface screenshots. Note, 20 accounts that we created could not be deleted because there was no account deletion option offered on those social media platforms for a particular modality or in the case of *Pinterest* because the deletion option did not work for us.

3.2 Account Deletion Screens: Screenshot Analysis

Two researchers analyzed our data set of 490 screenshots of account deletion screens by coding the data using spreadsheets to record codes for each platform and modality. First, for each platform

Termination Option	Description
Close (Account Closure)	Users cannot delete their accounts; they can only close them, where they remain recoverable.
Delete After Closing	Users can delete their accounts, but deletion occurs only after an unavoidable period of account closure. During this account closure period, the account is recoverable.
Delete Immediately	Users can delete their accounts immediately with no waiting period and the accounts cannot be recovered.

Table 2. Our taxonomy of account termination options presented to the users and their descriptions.

and modality, we counted and recorded the number of screens and clicks required to complete the account deletion process (if it was possible to delete an account at all). We counted button and link presses as clicks; we did not count each required text-box as a click. Second, we categorized the termination options presented by each platform on each modality to their users. During this analysis, we noted that most of the social media platforms used different terminology for account deletion options, so we had to create our own taxonomy of deletion options. In our taxonomy of account deletion options, we defined account deletion as the task a user must complete in order to no longer be able to access their social media account where they create, modify, share, and discuss Internet content [41].

Based on this definition, we noted three main types of account termination categories offered across the 20 platforms we examined which we summarized in Table 2. When users seek to terminate their account, but still have access to it or can recover it, we call this account closure or *'Close'*. We distinguish account closure from account deletion by considering recoverable accounts to be closed and unrecoverable accounts to be deleted. We consider an account to be *'recoverable'* if it is in a state where its social media functionality is not being used but the account owner has the ability to perform an action (e.g., logging in or *'reactivating'*) to begin using its functionality again. Finally, we distinguish when account deletion happens; after a forced waiting period of account closure (which we call *'Delete After Closing'*) or immediately (which we call *'Delete Immediately'*). For example, *LinkedIn* calls their termination options *'Hibernate'* and *'Close'* which we denoted as *'Close'* and *'Delete Immediately'*, respectively since the former results in a recoverable account whereas the latter does not.

Finally, we coded all the screenshots for presence of deletion related dark patterns. To do so, prior to data collection, we created a list of dark patterns that we suspected would be present in account deletion interfaces based on prior work [14, 15, 34, 50], presented in Table 3. We included **confirmshaming**, **bait and switch**, and forced action (**forced registration** and **forced external steps**) because use of these dark patterns could affect the ease of account creation and deletion. In addition, we included **forced continuity** and **immortal accounts** because these dark patterns affect what account deletion options are available and what happens to user's account data after account deletion. Following Mathur et al.'s taxonomy [51], these dark patterns are dark because they modify the choice architecture in the following ways: confirmshaming modifies the decision space asymmetrically; forced continuity, forced registration, and forced external steps modifies the decision space by restricting certain options that should be available to users; bait and switch deceptively manipulates the information flow; and immortal accounts induces false beliefs about what the users' options are. We applied boolean labels to the dataset considering whether each platform exhibited any of these dark patterns when deleting on each modality. We applied labels for confirmshaming, forced registration, forced external steps, and bait and switch for each modality

Dark Pattern	Description
Confirmshaming	"The act of guilting the user into opting into something. The option to decline is worded in such a way as to shame the user into compliance" [14]. For example, when deleting a *Vimeo* account, the user is confronted with an enlarged sad face during the final confirmation step, where the users decides between a bright-red 'Delete Account' button or an enticing 'I changed my mind!' button.
Bait and Switch	Adapted from Brignull's dark patterns taxonomy: "You set out to do one thing, but a different, undesirable thing happens instead" [14]. For example, consider if a user were to press a button indicating that it would lead to an account deletion page, but it instead leads to an unrelated section of the platform interface.
Forced Registration	The requirement of users to register for a separate account in order to complete the desired task, adapted from Gray et al. [34]'s definition of 'Forced Action'. For example, consider if a user was forced to create an account on platform X in order to access functionality on platform Y.
Forced External Steps	The requirement of users to take steps external to the platform in order to complete the desired task, adapted from Gray et al. [34]'s definition of Forced Action. For example, when deleting an account on *Spotify*, users are required to confirm the deletion by navigating to an external email client's inbox.
Forced Continuity	Forcing a user to continue existing on a platform in a social media-like manner, even though they want to delete their account, adapted from Brignull's dark pattern taxonomy [14]. We consider any instance of creating, modifying, sharing, or discussing Internet content to be acting in a social media-like manner [41]. For example, after a user opts to delete their *Facebook* account, *Facebook* indicates that their profile and posts will still be visible to others for some time.
Immortal Accounts	Platforms keeps some degree of data indefinitely, even after users deleted their accounts [15]. If we do not label a platform as exhibiting this dark pattern, it does not mean that they are not keeping your data; it means that they do not indicate that they keep your data. One indication we noted of an immortal account was when platforms said that you would not be able to create another account with the same email address in the future even after your account was deleted.

Table 3. The dark patterns we looked for in the account deletion tasks and the definitions we used to identify them.

on each platform. Then we applied labels for immortal accounts and forced continuity once for each platform because these have to do with platform-wide policies regarding information and account retention.

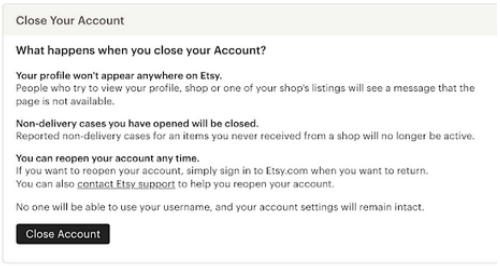
For all of the data analysis coding, two researchers agreed upon the label definitions before examining any screenshots and independently applied labels to the dataset. We calculated inter-rater reliability using Cohen's Kappa [21]. Initially, our rater agreement was represented with $\kappa = 0.79$. After discussing discrepancies, the raters arrived a full label agreement.

3.3 Account Deletion Screens: Findings

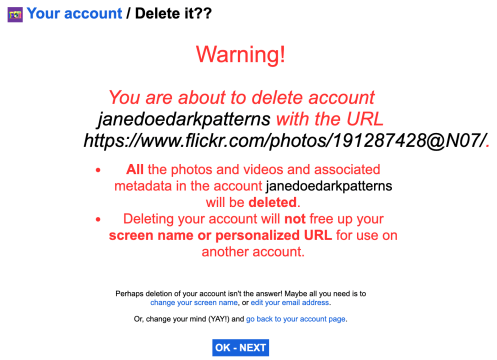
From our analysis of the account deletion task screenshots, we found that social media account deletion is often not straightforward and that the account termination options that social media platforms offer are confusing. These results are discussed below.

3.3.1 Account deletion is often not straightforward. Platforms control which modalities allow account deletion, as shown in Table 1. Account deletion was not always possible on some platforms for various modalities and dark patterns including forced external steps and confirmshaming were present in account deletion tasks. However, although these dark patterns were present, it was not always clear if these were merely preventing accidental deletion or actually attempting to manipulate users into cancelling deletion attempts.

Ability to delete accounts limited on some platforms: 11/20 platforms offered multiple ways to delete an account. By contrast, 8/20 platforms only provide users with one option to delete their account; six of them forced users to use the desktop browser, and two only offered account deletion via their mobile application. Four platforms, *WhatsApp*, *TikTok*, *Slack*, and *Etsy*, did not allow account deletion from the desktop browser. Moreover, two platforms, *Slack* and *Etsy*, do not allow account deletion (by our definition) on any modality because users can always reactivate their accounts. Interestingly, only 4/20 platforms allowed users to delete an account from any modality:



(a) Image from *Etsy* on a desktop internet browser presented to 66 users in the '*Close*' group. Also exemplifies the Immortal Accounts dark pattern.



(b) Image from *Flickr* on a desktop internet browser exemplifying confirmshaming presented to 100 participants.

Fig. 1. Examples of dark patterns in our account deletion analysis.

Facebook, Twitter, LinkedIn, and *Quora*. Further, *TikTok* was the only platform where users could create accounts on the desktop browser but had to install the mobile app to delete their account. Across the platforms, this suggests that being able to create an account on one modality does not necessarily mean you can also delete an account using that modality.

In general, mobile social media users have fewer options to delete accounts than desktop users. It was possible to delete accounts on 16/20 platforms using the desktop version of platforms. However, it was only possible to delete accounts from 7/20 mobile apps. On mobile browsers, it was possible to delete accounts from 11/20 platforms. The remaining 9/20 mobile browser interfaces did not allow for account deletion.

Forced external steps and confirmshaming present in account deletion. 8/16 platforms allowing desktop browser account deletions, 4/11 platforms allowing mobile browser account deletions, and 1/7 mobile applications allowing account deletions exhibited dark patterns. Social media platforms accessed via desktop browsers may have more dark patterns because fewer platforms offer account deletion on mobile apps and browsers. Out of the 34 accounts we deleted (including *Pinterest*), we found seven instances of forced external steps and seven instances of confirmshaming and no other dark patterns. For instance, *Pinterest* deletion involves forced external steps where a user must finalize deletion via a link emailed to them. We note that although we recorded these as dark patterns by definition, it is unclear whether these forced external steps are to merely prevent accidental deletion or make it harder for a user to delete an account. In addition, on 3/20 platforms where we deleted accounts, (*Instagram, Twitch.tv,* and *Spotify*), users were required to navigate to websites or help-centers external to the main platform interface to find the account deletion option; in other words, these account deletion options cannot be located on the main platform interface without a web search on the keywords 'account deletion' using a search engine. Confirmshaming was the other most common dark pattern in account deletion (seven instances present in 34 account deletions). Figure 1b shows a particularly egregious example of confirmshaming during account deletion from *Flickr*. These dark patterns are a lower bound since accounts with more user data accumulated over time and with more connections on a social media platform may exhibit additional dark patterns.

Term. Option	facebook.com	youtube.com	twitter.com	instagram.com	linkedin.com	pinterest.com	vimeo.com	reddit.com	wordpress.com	github.com	tumblr.com	whatsapp.com	flickr.com	soundcloud.com	twitch.tv	spotify.com	etsy.com	slack.com	tiktok.com	quora.com
Close	✓	✓	X	✓	✓	✓	X	X	X	X	X	X	X	✓	X	✓	✓	X	✓	
Delete After Closing	✓	X	✓	X	X	✓	X	X	X	X	X	X	✓	X	✓	X	X	✓	✓	
Delete Immediately	X	✓	X	✓	✓	X	✓	✓	✓	✓	✓	✓	X	✓	X	X	X	X	X	

Table 4. Ordered from left to right by platform popularity, each platform's termination options presented to the users (on whichever modalities allows them). (Check is account deletion option is offered, Cross is account deletion option is absent).

3.3.2 Account termination options are confusing. Our analysis revealed that the language platforms use to describe account deletion is inconsistent and that account termination options vary by platform. Moreover, additional dark patterns exist when users complete the account deletion process that keep user account profiles partially active or account data recoverable.

Deletion language and options change by platform. The breakdown of account termination options that the different platforms offer is provided in Table 4. The most common termination option offered by platforms is *'Delete Immediately'* (11/20 platforms), followed by *'Close'* (9/20 platforms). *'Delete After Closing'* is offered by 7/20 platforms. 7/20 platforms offer multiple termination options, but no platform offers both *'Delete Immediately'* and *'Delete After Closing'*. Of the 10/11 platforms allowing *'Delete Immediately'* (no forced period of reactivation capabilities), users are led to believe their account deletion occurs once the last account deletion confirmation action is completed. (e.g., shown on *Instagram*: *"When you press the button below, your [content] and all other data will be removed permanently and will not be recoverable."* Only 1/11, *YouTube*, makes it unclear if deletion does occur immediately, saying that the deletion *"can take up to a couple of days"*.

The 7/20 platforms offering *'Delete After Closing'* force user accounts to be closed first for a period of time, after which account deletion automatically follows barring user reactivation or recovery. The 'grace period' varies. For *Facebook, Twitter,* and *TikTok*, the forced close-period lasts 30 days; for *Pinterest* and *Quora*, the period lasts two weeks; for *Spotify* the period is one week, and *SoundCloud* does not indicate this window's duration. 2/20 platforms (*Etsy* and *Slack*) only provide the *'Close'* option, offering no way for an account to be made unrecoverable. Given that the deletion options are so varied, users may not be able to gauge when their accounts will be deleted, what will happen to their data, and who has access to their account data after deletion occurs.

Immortal accounts and forced continuity make deletion outcomes unclear. We also found evidence of dark patterns when account deletion is completed. 10/20 platforms had immortal accounts and indicated that they kept some account related information even after accounts were terminated (e.g., Figure 1a). In some cases, platforms used wording like *"data will be removed"* (*Instagram*), *"inaccessible to other Quora users"*, *"will no longer be viewable on Twitter"*. The exact nature of what happens to the data is not explained to the users, and it is unclear whether or not the data is not being fully deleted or what data is being deleted. 7/20 platforms had forced continuity, meaning that if a user seeks to terminate their accounts on these platforms, other users on the platforms will still be able to engage with their content for some time. Some of these platforms overlap with the platforms only offering a *'Delete After Closing'* option. For instance, when deleting an account on *Quora*, a forced 14-day closure period occurs before deletion, and the user's content is not removed from the platform until the end of this period. Two of the seven platforms we labeled with forced continuity were special cases. It was unclear when *YouTube* and *SoundCloud* account data was deleted. *YouTube* informed users seeking deletion that *"usually this takes a few minutes, but can*

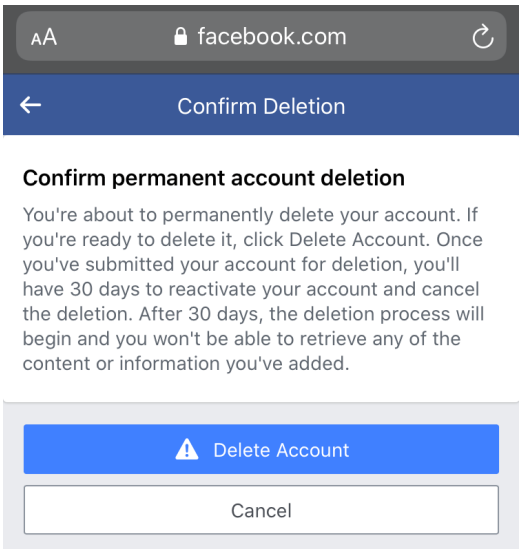


Fig. 2. Image from *Facebook* on a mobile intenet browser presented to 68 users in the '*Delete After Closing*' group.

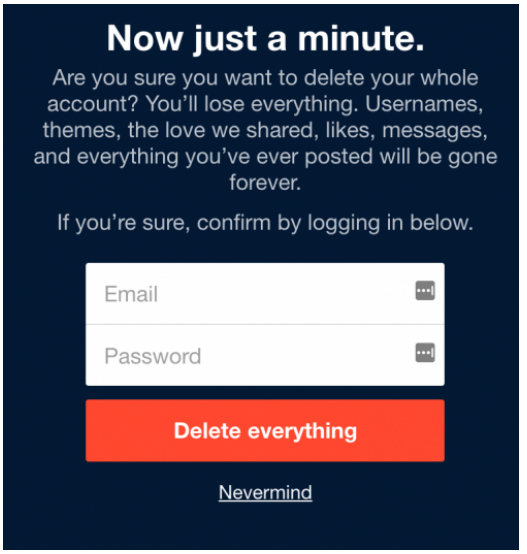


Fig. 3. Image from *Tumblr* on a desktop internet browser presented to 66 users in the '*Delete Immediately*' group.

take up to a couple of days if you have a lot of content". In both cases, other users could still interact with the account after deletion, but it was unclear for how long. Again, we note that these dark patterns may be present to prevent accidental deletion or to prevent users from leaving but the exact designer intent is unknown from our data set of screenshots.

4 STUDY PART 2: USER DELETION EXPERIENCES AND PERCEPTIONS OF DELETION INTERFACES ON SOCIAL MEDIA

In Study Part 1, we found that account deletion is not straightforward, that account termination options are confusing, and that dark patterns are present in the account deletion process. To investigate whether users can understand account deletion language and the outcomes of account deletion as well as how users perceive account deletion related dark patterns, we conducted Study Part 2. In Study Part 2, we asked users about their account deletion experiences, exposed them to different account termination options, and investigated their perceptions of dark patterns we found such as confirmshaming, forced external steps, immortal accounts, and forced continuity.

4.1 Users' Account Deletion Experiences: Survey Design

To gather user perceptions of the phenomena identified in Study Part 1 and informed by our literature review, we designed a survey with the following categories of questions:

- **Social media behavior:** First, we asked about the participant's social media usage such as which social media platforms they use or how many hours a day they spend on social media. We also asked which modalities participants typically use for accessing their social media accounts: application on mobile device, internet browser on mobile device, internet browser on laptop/desktop computer, and application on laptop/desktop computer. Participants could select all modalities they typically use.

- **User perception of canonical account termination options:** Second, we included questions to determine how users interpret the three main account deletion options (from Table 2). From our data set of screenshots in Study Part 1, we identified one screenshot to exemplify *'Close'*, shown in Figure 1a, *'Delete After Closing'* in Figure 2, and *'Delete Immediately'* shown in Figure 3. Every participant was shown only one of the three screenshots but each answered identical questions about what they thought would happen if they completed the account deletion process shown in the image, when they thought their account would be deleted, why they thought that, and who would have access to their data after account deletion.
- **User perception of confirmshaming in account deletion:** Third, we sought to measure how users perceive an account deletion interface exhibiting confirmshaming and one without it. We based our question design on a premise from Mathur et al. who note that "statistical significance in the measure between the [baseline and treatment interfaces] reveals the effect of the treatment" as a way to measure user perceptions of dark patterns [51].
  Every participant was shown two images: a baseline confirmation page (*YouTube*) without confirmshaming and one of two confirmation pages exhibiting confirmshaming from *Flickr* shown in Figure 1b and *Vimeo*. The order in which the baseline and confirmshaming images were displayed was randomized. We asked three Likert-scale questions for both the baseline image and the confirmshaming image; framing the questions as asking the user about what actions they would take upon seeing the image if they encountered it while trying to delete an account. The first Likert-scale question asked how likely is it that you would continue the account deletion process, the second was how likely is it that you would stop the account deletion process, and the third question was how likely is it that you would do something else?
- **Deletion experience and expectations post-deletion:** Fourth, to assess how users perceive forced external steps, immortal accounts, and forced continuity, we asked questions about the participants' experiences deleting social media accounts. We also asked what users desire from an ideal account deletion experience in terms of what data is deleted, who has access to that data, and when account data should be deleted. We also enabled participants to share any additional information about their experience deleting accounts on social media in an open-ended question.
- **Demographic information:** Finally, we asked participants for demographic information such as age, gender, and highest level of education.

Once the survey was designed and implemented using Qualtrics [2], we piloted the instrument with several Human-Computer Interaction (HCI) experts to refine the language use and improve the flow of the questions. Based on the pilots, we also included two attention check questions to ensure participants were fully reading the questions. Once we were satisfied with our instrument, we moved to survey deployment.

4.2 Users' Account Deletion Experiences: Survey Deployment

After receiving approval by our Institutional Review Board (IRB), we recruited participants using Prolific between May and June 2021 [1]. We filtered for participants that have at one time been regular users of social media and for participants that were currently located in the U.S. since Study 1 was also focused on social media platforms popular in this country. After providing consent, each participant filled out the multi-part survey. For completing the survey, we paid participants $3.28 USD (i.e. $11 per hour for an estimated 20 minute response time) in accordance with the STATE minimum wage at the time of the study [ANONYMIZED]. Overall, 200 participants took our survey in total. 68 were in the *Facebook* group ('*Delete After Closing*'); 66 in the *Tumblr* group

Code	Description
Concerns over social media companies	Response included concerns (distrust, dislike, disagremment, etc.) with the company or companies in control of the social media platforms.
Deletion process can be frustrating	Response expressed frustration or diffulty regarding previous experiences deleting social media accounts or described the deletion process as harder than what is needed.
Desire for more options given to user	Response espressed desire for additional termination options being presented to deletion-seeking account owners.
Data is not deleted	Response indicates that account data is kept/used/sold by platform even after the account deletion process.
Desire for more user-friendly platform experience	Response includes desire for a more positive experience for the social media platforms in general.

Table 5. The five most commonly applied codes for the responses to the open-ended survey question: 'Is there anything else you would like to tell us about your experience deleting social media accounts?'. The results for this question are discussed in Section 4.6.2.

('*Delete Immediately*'); and 66 in the *Etsy* group ('*Close*'). For the confirmshaming interfaces, 100 participants saw *Flickr* and 100 saw *Vimeo*.

4.3 Users' Account Deletion Experiences: Survey Data Analysis

After completing data collection, we cleaned the survey data by removing any incomplete or timed-out responses. All respondents passed both attention check questions; however, there were sixteen responses with suspiciously identical responses or where participants gave contradictory responses. For example, a user responded 'yes' to "Would you prefer if your account could be reactivated?" but also said they "did not want the ability to reactivate the account" when asked for how long they wanted the ability to persist. We removed this data and replaced it with data from sixteen new participants. This resulted in 200 total survey responses.

For analyzing open-ended responses in the survey, two researchers independently applied an agreed upon codebook, with one set of codes per question. Text-based responses fit into two categories: fully open-ended questions or multiple choice questions with an option for 'Other (please specify):'. We developed the codebook by first reading through all survey responses and categorizing common ideas in responses. For example, we coded P183's open-ended response: "*I'd love if you could keep your log in and log in and your photos/videos/messages would stay there but everything else to be deleted*" with *desire for more options given to user*. The two researchers then agreed upon the labels to use and applied them to the responses. Many responses fit with more than one code. For example, if a user responded with "*Other (please specify): I cant access my account or anything on it but the site can*," we would include two labels for this response: *data not accessible for user* and *data stored by platform.* A subset of codes used for one open-ended question is provided in Table 5; the full survey codebook includes over 100 codes. We calculated inter-rater reliability, noting that we applied multiple labels to a response. Initially, the two researchers labeled 89.7% of text-based entries with identical codes. After discussing differences in multiple research meetings, the coders came to complete labeling agreement.

4.4 Users' Account Deletion Experiences: Participants

Participant demographics are shown in Table 6. Our participants skewed towards young (66% were under 35), educated (54% had at least a Bachelor's Degree), and identifying as male (57%). The most popular platforms used by our participants and the distributions of time spent on social media, as well as the most commonly used modalities for accessing social media platforms are shown in Table 7. *Facebook, YouTube, Twitter, Reddit,* and *Instagram* were the top five most popular platforms

Age	#	%	Education	#	%	Gender	#	%
18-24	36	18	Less than High School Degree	1	0.5	Female Identifying	83	41.5
25-34	88	44	High School Degree	42	21	Male Identifying	113	56.5
35-44	37	18.5	Associate's/Some College Degree	45	22.5	Non-binary	4	2
45-54	19	9.5	Bachelor's Degree	67	33.5			
55+	20	10	Master's Degree	29	14.5			
			Doctoral Degree	12	6			
			Prefer not to answer	4	2.5			

Table 6. Survey participant demographics: age, education, and gender.

Platform (top 10)	#	%	Modality	#	%	Social Media Use	Hours/Day
Facebook	189	94.5	Application on Mobile	164	82.0	Median	3.0
YouTube	181	90.5	Browser on Laptop/Desktop	161	80.5	Average	3.8
Twitter	166	83.0	Browser on Mobile	97	48.5	Standard Dev.	3.1
Reddit	152	76.0	Application on Laptop/Desktop	34	17.0	Min.	0
Instagram	151	75.5				Max.	17.9
Spotify	120	60.0					
LinkedIn	101	50.5					
Twitch	89	44.5					
Pinterest	81	40.5					
Etsy	77	38.5					

Table 7. The most popular social media platforms among the participants, the modalities in which the participants typically access social media, and the distribution of their daily social media use.

used and there was a median social media usage of three hours per day. Mobile applications and internet browsers on desktops were the most popular modalities being used by 82.0% and 80.5% of participants, respectively. Most users typically used multiple modalities (76.5%) when accessing their social media accounts. 16.5% of participants typically used only their mobile devices (applications or internet browsers), and 12.5% typically used only a laptop/desktop.

4.5 Study Part 1 and Study Part 2: Limitations

Our work has several limitations. In Study Part 1, the manual collection and inspection of the deletion process included newly created accounts that were deleted almost immediately. Thus, our data collection may not reflect the interfaces given to users with more account data and history, extensive contact networks, or engagement with their accounts. Second, our data collection used only a few operating systems and browsers. Although a preliminary analysis comparing different operating systems and browsers resulted in no vast differences, there could be some differences between different systems and browsers that could influence how users perceive dark patterns. Furthermore, as A/B testing is popularly used on social media platforms [42], the screenshots we obtained may be part of an A/B testing experiment, or otherwise tailored in some way to location, or past history. This could mean making generalizations about the data and dark patterns may not be accurate. Next, a manual labeling system is not perfect. Our codebook was based on dark patterns that we found in previous research and may differ from other researchers taxonomies. There may also be dark patterns present that we did not identify or have not yet been identified by the research community.

In Study Part 2, our survey participants were mostly educated users. Since dark patterns have been shown to affect users differently based on education levels [47], our results may be influenced

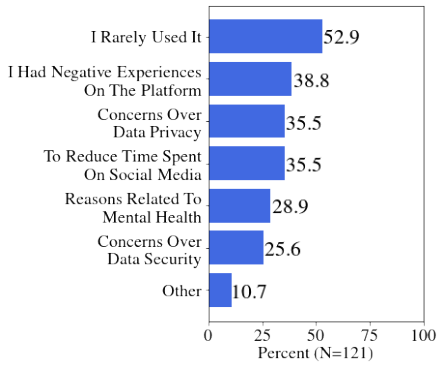


Fig. 4. Reasons for account deletion from the 121/200 users that have tried to delete accounts. (Closed-ended responses)

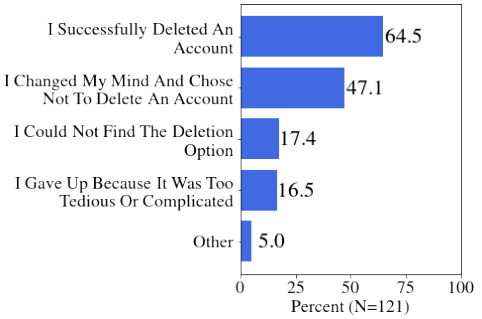


Fig. 5. What happened when users tried to delete an account in the past (121/200) (Closed-ended responses).

by this effect. In addition, while *Prolific* has academically published benefits [63, 64], it may also introduce unseen data bias. For example, all of our participants were willing and able to sign up for an online recruitment platform. In addition, *Mechanical Turk*, a comparable competing online recruitment platform, has been shown to include study participants that skew towards higher tech literacy [54]. Further, in our survey we asked participants about their deletion experiences, expectations, and desires. Their responses may differ from real-life scenarios as their sentiments may not match a situation in which their real account and data is at stake. Furthermore, it is difficult to assess some dark patterns in a survey format. For instance, we could not make users feel as though they were being confirmshamed for ethical reasons and users may not be invested in assessing an interface on a platform they do not regularly use.

4.6 Users' Account Deletion Experiences: Findings

From the survey responses, we gathered that friction in the social media account deletion process undermines participants' desires for deletion and that participants' are not getting what they want from the account deletion process We discuss these findings below. Note, we used Mann-Whittney tests to measure for statistical differences between the Likert scale responses based on whether the participants were shown a confirmshaming or baseline account deletion interface. Since the groups did not vary significantly, we exclude the discussion of these results.

4.6.1 Friction in deletion process undermines users' desire for deletion. Most of our participants had deleted a social media account in the past for a variety of reasons but over a third of these participants did not complete the account deletion process even when they wanted to delete their account.

Most users had deleted a social media account in the past for a variety of reasons. 64.5% (121/220) participants reported that they had deleted one or more social media account in the past. Out of these 121/200 users, the most popular reason for why users deleted a social media account was that users stopped using their accounts regularly (52.9% of those participants who reported deleting an account), as presented in Figure 4. Almost 40% of the 121/220 reported deleting accounts because of negative experiences on the platform, and about 35% of the 121/200 reported wanting to reduce time spent on social media as well as concerns over data privacy as reasons why they had wanted to delete their accounts. Over a quarter of participants also reported reasons related

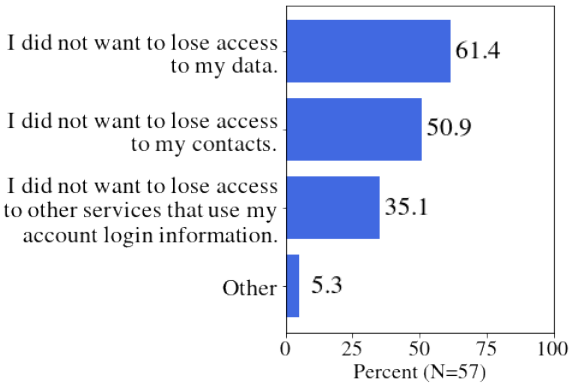


Fig. 6. Reasons why users changed their mind during the deletion process (57/200) (Closed-ended responses).

to mental health and concerns over data security. Finally, 11% of 121/200 participants who had deleted social media accounts selected 'Other' and added their own reasons including: concerns over the company in control of the platform, censorship concerns, political reasons, desire for a fresh account, career-related reasons, a major life event, concerns over platform experience, and avoiding specific people. Thus, a large portion of our participants had previously deleted an account and had significant reasons motivating them to do so.

Many account deletion-seeking users do not complete the account deletion process. We asked users what happened when they had tried to delete their account as shown in Figure 5. While a successfully completed deletion was the most common outcome (64.5% of attempts), many users changed their mind (47.1%), could not find the deletion option (17.4%), and/or gave up because it was too tedious or complicated (16.5%). In other words, at least 35.5% of deletion attempts did not end in a deleted account.

We asked the 47% of users who reported changing their mind about account deletion why they changed their mind (Figure 6). Most of these 51/200 participants reported that they did not want to lose access to their data (61.4%) and did not want to lose access to their contacts (50.9%). Also, 35.1% of users changed their mind during account deletion because they did not want to lose access to other services that use their social media account login information (35.1%).[2] The 'Other' category, which was selected by about 5% of respondents, included sentimental attachment to account posts, a simple change of heart, or admission of addiction to the platform.

We also asked participants which platforms they tried to delete accounts on (which we call an account deletion attempt) and which platforms they successfully deleted accounts on (which we call an account deletion completion). We then broke down the rates of account deletion attempts and account deletion completions by platform (Figure 7). Further, we define the deletion completion rate for each platform as the number of participants that deleted an account on that platform divided by the number of participants that tried to delete an account on that platform. We found that some platforms have higher portions of users attempting to delete their accounts, namely *Facebook*, *Instagram*, and *Twitter*; these were also part of the top 10 most used social media platforms by our participants. Additionally, the deletion completion rates vary greatly by platform, from 0% on *Pinterest* to 100% on *Spotify* and *Twitch*. Moreover, *Spotify* and *Twitch* were the only platforms

[2]While single sign-on (SSO) makes it easier for users to log into different websites across the web and manage many accounts with a single login, the security and transparency of SSO schemes have been criticized [67, 78].

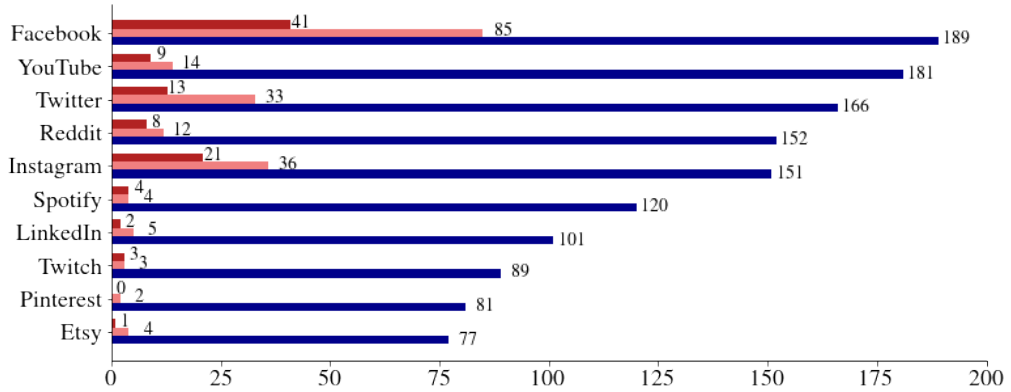


Fig. 7. Total number of account deletion attempts (light red), total number of account deletion completions (red), and total number of platform users (blue) for each of the 10 most popular platforms.

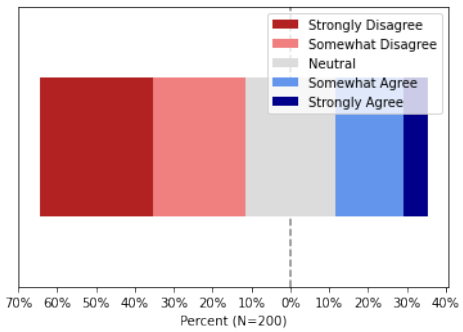


Fig. 8. 5-point Likert scale prompt. 'Please indicate how much you agree with the following: Social media companies have my best interests in mind regarding the account deletion process.'

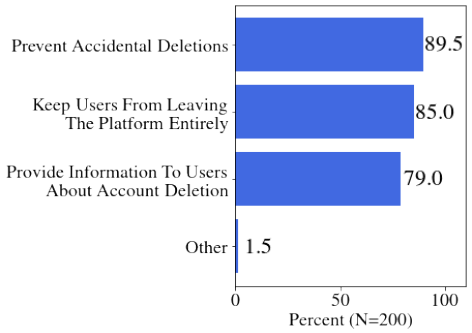


Fig. 9. What participants feel social media companies consider when designing the account deletion process. (Closed-ended responses).

with deletion completion rates higher than 70%. Among the five most used platforms, which were also the platforms with the most deletion attempts, the deletion completion rates were higher on *YouTube* (64%), *Reddit* (67%), and *Instagram* (58%) than for *Facebook* (48%) and *Twitter* (39%). Using Pearson's correlation coefficient, we tested for correlation between the deletion completion rates and each of the following: the number of clicks in the deletion process (median across modalities when available), the number of screens in the deletion process (median across modalities when available), the number of modalities offering deletion (one, two, or three), and the number of dark patterns in the deletion processes (per modality offering deletion). In each case, we found no statistically significant correlation.

4.6.2 Users may not be getting what they desire from the account deletion process. Many of our participants had negative feelings regarding the platforms role in account deletion and mostly agreed on what should happen to account data after account deletion.

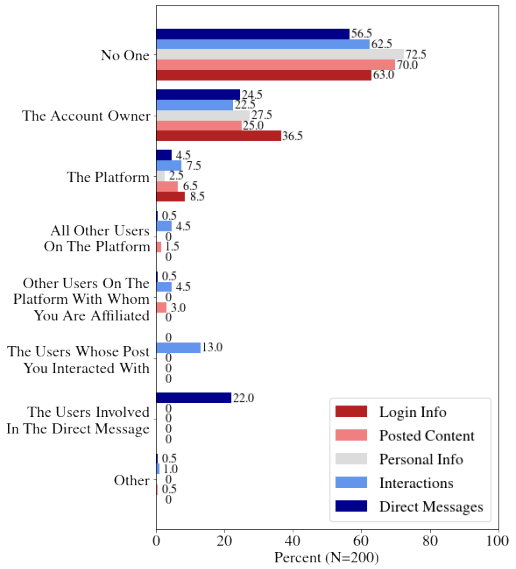


Fig. 10. Responses selected by participants when we asked 'Who should have access to [category of account data] upon account deletion?'. (Closed-ended responses).

Users have negative feelings about the platforms' role in account deletion. Figure 8 show that 53% of respondents either somewhat or strongly disagreed with the idea that social media companies have their best interests in mind regarding the account deletion process, as opposed to the 24% of participants that somewhat or strongly agreed. In addition, while the majority of participants believed that social media platforms are trying to prevent accidental deletions, a large majority also believed that keeping users from leaving the platform entirely (85%) is a factor considered by platform designers when creating the account deletion process (Figure 9).

This sentiment was echoed in the open-ended responses at the end of the survey, where we asked if participants (N=200) had anything else that they would like to share about their social media account deletion experience. Only 31.5% volunteered additional information, for which the five most commonly applied codes were negative towards the social media platforms. 27.9% of these 61/200 responses expressed concerns over social media companies, like "*They delete us so we should delete them. I'm on a facebook timeout right now*" (P118). 24.6% of these 61/200 responses included comments expressing how the deletion process can be frustrating, like "*Sometimes they make it harder to find then it needs to be*" (P36). The next most popular theme in the responses was a desire for more account deletion options to be given to users (18% of responses). For example, P60 said, "*Each [platform] is different so I'd want different options for each.*" Other popular responses for 61/200 participants were expressing awareness that account data is kept/used/sold by platform after account deletion (16.4%) and the desire for a more user-friendly account deletion platform experience (14.8%). 11.5% of 61/200 participants expressed that they had never deleted a social media account before. Finally, 6.6% of 61/200 responses expressed appreciation for termination options for those who just want to take a break from social media (such as deactivate).

Users mostly agree on what should happen to account data upon account deletion. 86.5% of participants (N=200) said "all of my data should be deleted" upon account deletion. While "some of my data should be deleted" was the second most common selected option, there was a significant drop-off representing only 7.5% of participants, followed by "none of my data should be deleted" at 3%. We also asked participants about who should have access to the following account data after account deletion with one question for each data type: login information (e.g., username and password), personal information (e.g., interests, subscriptions, and hometown), posted content (e.g., posts, submissions, and uploads), interactions with other posts (e.g., reactions and comments), and direct messages to other users. Figure 10 shows the options provided and the result distribution. It is worth noting that "the users whose post you interacted with" and "the users involved in the direct message" options were only provided for the questions about their relevant data category, i.e. interactions with other posts and direct messages to other users, respectively.

For every type of account data we asked about, 'No One' was the most popular answer for who should have access to it followed by the account owner. 22% of participants felt that users involved in direct messages should still have access to those messages even if a user deleted their account and 13% of participants felt that other users whose post you interacted with should still have acces to that data. Notably, for every account data type post-account deletion, less than 10% of the users felt the platform should have access to it. Participants seem to place priority on data privacy and account owners before other users and the platform.

On the other hand, participants were split on whether they wanted the ability to reactivate their deleted accounts (48.5% don't and 45.5% do) and, as a result, there was also disagreement regarding when the account data should be deleted. About half of participants say data deletion should occur immediately after account deletion, and the rest reported grace periods from within a few days (15%) to never (3%), the most common being 30 days after the user completes the account deletion process (16%).

5 DISCUSSION

Our findings from Study Part 1 revealed that across the 20 most popular social media platforms in the U.S., account deletion screens and processes are not straightforward, account deletion terminology is confusing, and that there is evidence of dark patterns such as forced external steps, confirmshaming, immortal accounts, and forced continuity in the account deletion process. Study Part 2's findings confirmed that users do have reasons to delete their social media accounts and many do delete accounts successfully. However, over a third of account deletion-seeking users do not always successfully complete the deletion process. Moreover, the deletion interfaces themselves may not be easy to interpret and users expectations of what should happen when an account is deleted may not always match the reality, especially when dark patterns are present. Based on these findings, we discuss how to improve account deletion processes moving forward.

5.1 Allow Account Creation and Deletion on All Modalities

Our findings show that users on desktop browsers usually have the options to create and delete accounts on most social media platforms. However, social media platforms that offer a mobile app, often allow users to create accounts but do not always offer an option to delete an account via these mobile apps. Similarly, when accessing social media platforms via mobile browsers, users are sometimes met with lightweight mobile versions of the desktop interfaces where they cannot create or delete accounts. If a social media platform disallows deletion from mobile applications, users could try mobile browsers before moving to desktop browsers. By limiting account deletion functionality for certain modalities, platforms are limiting the number of people deleting their accounts whether intentionally or not.

It is likely that fewer users will leave a platform if they are unable to do so on their primary modality. Further, some users may not have access to a desktop browser but still may want to delete their account. Recall 16.5% of our participants typically only used mobile devices to access their social media accounts. However, the portion is likely higher in some populations outside the U.S. In some populations, the dominating medium of access is through mobile phones ([3, 52]). In these areas, access to desktop browsers may be limited, thus restricting users from complete account deletion functionality. This unfairly treats people with different levels of resources. We recommend that future designers consider allowing users to create and delete accounts from all modalities. We discovered that some mobile browsers (e.g., Opera[58]) have the capability to show users the desktop version of a website. Future research could assess the feasibility of using this feature for account deletion via a mobile device where it is otherwise not possible.

5.2 Clarify Account Termination Options and Post-Deletion Outcomes

Often, what users want to happen, what users expect to happen, and what actually happens are different. Recall 18% of participants that responded at the end of the survey expressed a desire for more options given to users. Moreover, since there are different categories of data (login information, posted content, personal information, interactions, direct messages, etc.), a more granular approach to deletion options may prove beneficial. However, this could be an overwhelming burden for users [68], potentially even further deterring deletion when desired. A simpler solution would perhaps include standardized deletion options that reflect the desires of the users: data privacy, security, and control. Ideally, social media platforms could design an interface with these standardized options, paired with clear explanations about what data is deleted, when the data is deleted, who keeps access to the data, and the motivations for these policy decisions. Including clear and transparent account deletion polices would mitigate the need for complicated account deletion processes designed to deter accidental or unwanted deletions because the outcomes are clear and disclosed.

5.3 Investigate The Unclear Line Between Necessary Friction and Dark Patterns

Our findings show that it is not uncommon for users to face friction when trying to delete accounts. Platforms have to prevent users from unintentionally losing their content, but it is unclear to determine when this friction is excessive or unnecessary. Our findings showed that account deletion interfaces exhibit dark patterns such as forced continuity, forced external steps, immortal accounts, and confirmshaming. Moreover, users are often confused by these dark patterns because of the inconsistent and obscure account deletion language used by interfaces that do not make it clear when account data is deleted, who has access to it post-deletion, or what is deleted. Although our findings suggest the current interfaces may be problematic for users, we cannot say for certain whether platforms are attempting to keep users from leaving or to prevent accidental deletions or to allow users to take a break without leaving entirely. However, users in our study desired that most of their account data was deleted upon account deletion suggesting that platforms need to be more transparent about immortal accounts and forced continuity. For instance, immediate deletion may be important in cases like users escaping online harassment [6] whose profile and content may be visible for up to 30 days after trying to leave the platform. In these cases, we suggest that platform designers consider allowing users to fully delete all trace of their account if desired. We also note that in the cases of confirmshaming, it is more clear cut what platform motivations may be but we were unable to glean much from our study about how users perceive these interfaces. Future work could more effectively determine the line between necessary friction and dark patterns in account deletion through experiments like those run by Luiguiri and Strahelivitz [47].

6 CONCLUSION

In this work, we studied social media account deletion and related dark patterns. Specifically, we analyzed 490 account deletion interface screenshots from the 20 most popular social platforms for U.S. users for account termination options and dark patterns. We also conducted a survey of 200 users to understand their current account deletion experiences. In our work, we found that the account deletion process is not straight forward or possible on some modalities and contains confusing options. Specifically, account deletion interfaces do not make it clear what happens to account data post-deletion. Additionally, we found evidence of dark patterns such as confirmshaming, immortal accounts, and forced continuity in the account deletion process. Our user study confirmed that participants often want to delete a social media account and many do so successfully. Yet, over a third reported that they their attempts to delete accounts did not result in complete account deletion. Participants also experienced frustration with the deletion process as well as around what happens post-deletion. Based on our findings, we recommend that account deletion should be possible across all modalities, that platforms need to be more transparent and clear about what account termination options mean and what will happen to account data post-deletion. In addition, we suggest that future work continue to explore user perceptions of dark patterns in account deletion.

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