

# Understanding Account Deletion and Relevant Dark Patterns On Social Media

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Social media users may wish to delete their accounts, but it is unclear if this process is easy to complete or if users understand what happens to their account data after deletion. Furthermore, since platforms profit from users' data and activity, they have incentives to maintain active users, possibly affecting what account deletion options are offered. To investigate these issues, we conducted a two-part study. In Study Part 1, we created and deleted accounts on the top 20 social media platforms in the United States and performed an analysis of 490 deletion-related screens across these platforms. In Study Part 2, informed by our interface analysis, we surveyed 200 social media users to understand how users perceive and experience social media account deletion. From these studies, we have four main findings. First, account deletion options vary considerably across platforms and the language used to describe these options is not always clear. Most platforms offer account deletion on desktop browsers but not all allow account deletion from mobile apps or browsers. Second, we found evidence of several dark patterns present in the account deletion interfaces and platform policies. Third, most participants had tried to delete at least one social media account, yet over one-third of deletion attempts were never completed. Fourth, users mostly agreed that they did not want platforms to have access to deleted account data. Based on these results, we recommend that platforms improve the terminology used in account deletion interfaces so the outcomes of account deletion are more clear to users. Additionally, we recommend that platforms allow users to delete their social media accounts from any device they use to access the platform. Finally, future work is needed to assess how users are affected by account deletion related dark patterns.

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

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

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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 [54, 88], mindless scrolling [20], data privacy [39, 56], online harassment [10], and political polarization [13]. Reasons for deleting an account are often related to mental health. For instance, *Facebook's* internal studies found that 17% of teen girls say their eating disorders get worse after using *Instagram*, and 13.5% of teen girls in the United Kingdom reported that *Instagram* worsens suicidal thoughts [92]. Some technologists even encourage people to delete their social media accounts because social

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media platforms are “dismantling your free will” and “poisoning the political process” [61]. In this vein, 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 [87]. Given the approximately 3.6 billion people that are on social media platforms today [7], it is important to understand how easy it is for a user to delete an account to ensure that users can move on from a platform if they wish to do so.

Yet, social media accounts can be difficult to delete. For instance, a user may have difficulty navigating a social media platform’s user interface to find the deletion options, which can be embedded in settings menus that are not intuitive. On the other hand, platforms must 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 easily leaving the platform [15, 34, 59, 102]. By ‘dark patterns’, we mean platform features that “*modif[y] the user’s choice set and manipulat[e] the information flow to the user*” as taken from Mathur et al. [69]. Specifically, dark patterns in social media platform account deletion interfaces may be employed to limit users’ agency to freely delete their data such as by making a deletion option hard to find.

Other researchers have studied the difficulties of data deletion online [51, 52], user’s understanding and practices of data deletion on social media posts [75, 107], and dark patterns related to data protection [48]. There is also work examining the different dark patterns that can occur across devices [50]. 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 relevant dark patterns in account deletion. These issues demand their own attention due to the number of social media users, recent increased criticism of social media platforms, and pervasiveness of concerns over data privacy. To examine these issues in depth, we asked the following research questions:

- (1) What does the account deletion process entail on the most popular social media platforms, and what relevant dark patterns (if any) are present in this process?
- (2) What are users’ current account deletion options on the most popular social media platforms?
- (3) What are users’ perceptions and experiences of account deletion options on the most popular social media platforms?

To address these questions we conducted a two-part study: an analysis of the account deletion interfaces on the 20 most popular social media platforms in the U.S. (based on the *Tranco* rankings [62]) and a survey with 200 social media users on *Prolific* [8]. In Study Part 1, we created and deleted accounts on each social media platform using 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’ [50]; 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 account deletion interface screenshots across all the platforms. We then analyzed the account deletion screenshots to identify the number of steps in the account deletion processes, what account deletion options exist on different platforms, and any relevant dark patterns. The dark patterns we sought to identify were drawn from existing taxonomies of dark patterns [22, 25, 46, 57]. In Study Part 2, informed by the results of our account deletion task analysis, we surveyed 200 social media users to find out about their account deletion experiences.

Based on our study, we had four main findings: 1) The social media account deletion process is considerably variable depending on the social media platform. We found that the account deletion options provided by platforms fall into three main types of account termination which do not always include actual account deletion. Instead, the different social media platforms often use confusing terminology to describe their termination options and do not specify exactly what happens to user data and account access after account deletion. Many of the social media platforms we studied also offered limited account deletion options on some modalities. 2) Some platforms employ dark patterns in both the account deletion user interfaces and in the account deletion policies regarding data retention. 3) Users start the account deletion process for a variety of reasons but often do not complete it sometimes because of platform-created friction such as frustrating account deletion processes. 4) Most users do not want platforms to have access to account data after an account is deleted.

Based on our findings, we have two main recommendations. First, platforms need to be more transparent and clear about what account deletion options entail including what happens to data post-termination, when (if) data is deleted, and who retains access to account data. Second, platforms should allow account deletion on all modalities for which they allow account creation. We also discuss legal considerations of the platforms' retention of account data post deletion and the line between necessary and unnecessary friction in account deletion.

The specific contributions of this work are:

- We present an 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<sup>1</sup>.
- We identify three main account termination options provided by social media platforms on different modalities for users wanting to terminate their social media account(s).
- We provide novel evidence of account deletion related dark patterns contributing to a growing number of studies of dark patterns in various fields [45, 68, 109].
- We present a breakdown of account deletion attempt outcomes by platform.

Next, we describe related work on online data deletion and dark patterns. Then, we describe our methods and findings. Finally, we present the discussion before concluding with recommendations to improve account deletion interfaces on social media platforms.

## 2 BACKGROUND AND RELATED WORK

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

### 2.1 Users, Data Deletion, and Social Media

*General Data Deletion:* Prior work has shed light on personal data deletion more generally. For instance, Vertesi et al. [101] 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 [28]. Other research reflects the perspectives of platforms in data deletion [14]. For example, Garg et al. formalize potential platform responsibilities for deletion given that users may have the right to be forgotten [42], and Xu et al. studied how default data retention policies impact user behaviors, specifically the ephemerality of *Snapchat* messages [106]. Related work has also looked at the difficulties of general data deletion. Habib et al. researched the privacy options offered to users by nine websites, exploring how easy it

<sup>1</sup>This data set is publicly available at <https://github.com/UChicagoAIRLab/SocialMediaTerminationScreenshots>.

was for 24 users to find and use these options [51]. They focused on how easily a user can find how to opt-out of email communications, request the deletion of their personal data, and opt-out of data collection from general websites, whereas we focus on the deletion of full accounts on social media platforms. In a different study, Habib et al. did examine account deletion using an expert review of websites [52]. Specifically, they examined website privacy policies to see what types of data deletion were possible and confirmed whether a data deletion control was provided in a website's account settings. In this study, Habib et al. were more focused on understanding general 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.

*Deletion on Social Media:* Researchers have studied social media in a variety of ways, from predicting human behavior [16, 43] to modeling misinformation and censorship [18, 30]. However, there have been fewer studies on social media account deletion. Mostly, researchers have studied the deletion of social media content (e.g., posts and tweets), a feature designed to improve user privacy. 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 [75]. 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. For example, Yilmaz et al. conducted an interview study to gather user understanding and perceptions of retrospective changes (including deletions) to social media posts [107]. Similarly, Minaei et al. surveyed 191 participants to investigate their experiences, expectations, and impressions of deleting content from their social media platforms and found that 80% of users have deleted at least one post [73]. In all these prior works, the researchers did not actually delete any accounts and were focused on content deletion (e.g., posts and tweets), where we focus on entire account deletion and investigated the tasks in the account deletion process. In another related study, Baumer et al. conducted a study focusing on *Facebook* “non-users”, or users that have left *Facebook* including users who have deleted accounts or just abandoned the platform or deactivated their accounts [19]. Their analysis also describes some participants who found *Facebook* account deletion difficult and gave up on deleting their accounts. Our work differs from this work in that we investigated account deletion on the top 20 social media platforms in the U.S., not just *Facebook*. We also created and deleted accounts and analyzed existing examples of the account deletion process in addition to surveying a broader range of social media users about their account deletion experiences.

## 2.2 Dark Patterns and Online Users

*What are Dark Patterns?:* Academics have studied the area of deceptive practices and behavioral interventions in user decision-making [65, 97, 99]. For instance, behavioral economics research shows 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 [99]. 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 [82, 97]. Otherwise, these forms of behavioral interventions become “adversarial rather than paternalistic”, as highlighted by Narayanan et al [77]. 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” [69].

*Dark Patterns Taxonomies, and Measurements:* Harry Brignull, who coined the term in 2010, says dark patterns refer to “tricks used in websites and apps that make you do things that you didn’t mean to” [22]. A growing number of taxonomies of dark patterns have since been created [27, 37, 81, 96], such as Gray et al.’s taxonomy of dark patterns from the perspective of user experience designer intent [46] or the taxonomy of dark patterns in game development where game creators worsen player experiences sometimes for monetary gain [35, 38, 109]. These taxonomies motivated researchers to discover and categorize dark patterns across the technology sphere in domains including shopping, privacy, industry defaults, and others [25, 29, 33, 41, 60, 68, 78, 98].

Other dark patterns studies focus on why these online manipulations are effective, with one teasing out dimensions of dark patterns that are manipulative [69]. 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 [25]. Similarly, Waldman et al. [103] outlined how dark patterns abuse human cognitive biases to get users to give up more data. Many dark patterns studies focus on specific instances of manipulative user interfaces such as website cookie consent banners which violated the European Union’s General Data Protection Regulation (GDPR) [48, 80, 95].

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 [68]. Similarly, in their workshop paper, Hausner and Gertz present preliminary results from a machine learning approach at generic dark pattern detection [53]. However, automatic detection of dark patterns is difficult, leaving many researchers to manual data collection methods [108]. 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) [36].

*Dark Patterns Effects on Users:* A growing set of studies aims to examine the effect of dark patterns on end-users [66, 83, 100]. Some studies focus on the relationship between employed dark patterns and user subscriptions, as opposed to account deletion. For example, a report from the Consumer Council of Norway concludes that Amazon uses dark patterns to manipulate users into staying subscribed to Amazon Prime [76]. Likewise, 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 [65]. Similarly, Graßl et al. found, through user experiments, that dark patterns in cookie consent forms resulted in users increasingly choosing privacy-unfriendly options [44]. 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 [26]. 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 [49]. A few researchers have performed surveys, interviews, and/or other studies to get user perceptions of dark patterns [17]. For instance, Gray et al. [47] 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 master’s 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

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Desktop Browser	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mobile Browser	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	X	X	✓	✓	X	✓	✓	✓
<b>Termination</b>																				
Mobile App	✓	X	✓	X	✓	✓*	X	X	X	X	✓	X	X	X	X	X	X	✓	✓	✓
Desktop Browser	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓
Mobile Browser	✓	X	✓	✓	✓	✓	X	✓	✓	✓	X	✓	X	X	X	✓	X	X	✓	✓

Table 1. Ordered from left to right by platform popularity, the modalities offering account deletion. (Check is account deletion option is present, and cross is account deletion option is absent. Asterix indicates the option was present but did not work for us). Note, there is an account deletion option on *Pinterest*'s mobile application, however it did not work in our study (404 Error).

business while recognizing the importance of interacting critically while online [67]. This was echoed in Di Geronimo et al. [36]. Finally, Bongard-Blanchy et al. [21] 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 [72] 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 conducted by Gunawan et al. in which they show how the same service can have different user options and dark patterns based on modality [50]. 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 deletion options on social media websites, how deletion information is presented to the account owners, and user perceptions of what the account deletion process entails.

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

In Study Part 1, we investigated our first two research questions. That is, we gathered and analyzed account deletion screens to understand what the account deletion process entails, what relevant dark patterns are present, and what options are presented to users that want to delete their account. In Study Part 2, to answer our third research question, we conducted a survey of social media users to gather their experiences and perceptions of account social media account deletion, which we discuss in Section 4.

#### 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 [62] from November 2020, shown in Table 1. Unlike other popular website rankings (e.g., *Alexa* [12]), *Tranco* is more resilient to manipulation [63]. Moreover, since 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" [57]. We limited our

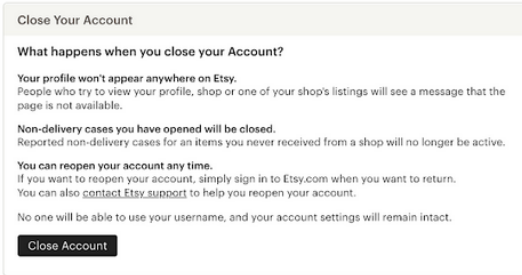


Fig. 1. Image from *Etsy* on a desktop Internet browser exemplifying the ‘Close’ account termination option and the Immortal Accounts dark pattern.

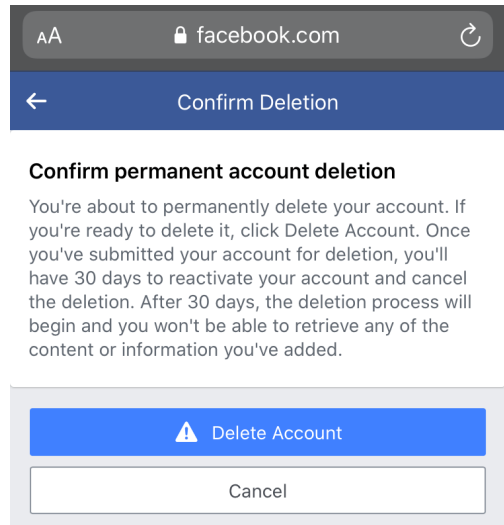


Fig. 2. Image from *Facebook* on a mobile Internet browser exemplifying the ‘Delete After Closing’ account deletion option.

analysis to the U.S. so we could do English-based text analysis. We focused on high-ranking social media platforms because their business models often include profiting from user data [15, 34, 59], 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.

For each of the 20 platforms, we systematically recorded screenshots of every screen for both the account creation and account 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 a phone number instead) 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. After we created the account and when we were logged in, we immediately started the account deletion process without posting any content or entering additional profile information. 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 deleted; that is after a user has clicked a confirmation to delete their account. At each screen, we noted additional deletion 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, 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, all indicating new screens. We also took a screenshot for any account 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 who was remote in India at the time of the study owing to pandemic lockdowns. Data was collected 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

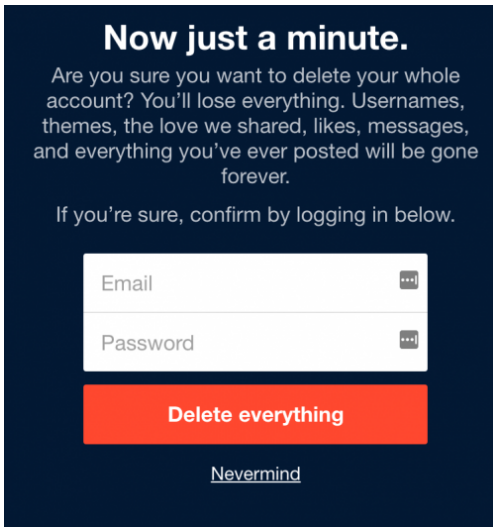


Fig. 3. Image from *Tumblr* on a desktop Internet browser exemplifying the ‘Delete Immediately’ account deletion option.

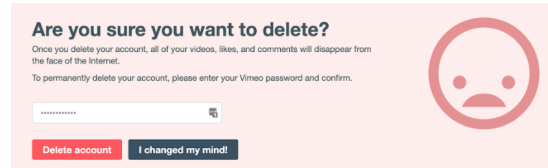


Fig. 4. Image from *Vimeo* on a desktop Internet browser exemplifying confirmshaming presented to 100 participants.

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. Since *WhatsApp* required a real phone number, we could not simply create a new email address like the other platforms. The research team used an Android device with a phone number that was not already linked to an active *WhatsApp* account. Prior to data collection, we conducted a preliminary comparison between Android and iOS devices and found no significant differences.

Data collection occurred between September 2020 and January 2021. In total, we created 53 social media accounts and deleted 36 social media accounts shown in Table 1, resulting in 490 account deletion interface screenshots. Note, 17 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 using qualitative data coding [93]. We used spreadsheets to record information and add codes for each platform and modality. First, for each platform 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), presented in Appendix A.1. We counted button and link presses as clicks; we did not count each required textbox as a click. Second, we added codes to record the account deletion options presented by each platform on each modality to their users. These codes were created inductively and used by both research team members coding the data. Specifically, we defined account deletion as the task a user must complete to no longer be able to access their social media account where they create, modify, share, and discuss Internet content [57]. We then coded for different types of account deletion options offered by each platform, examining whether a user could recover an account following deletion and when accounts were deleted.



Dark Pattern	Description
Confirmshaming	“The act of guiltling the user into opting into something. The option to decline is worded in such a way as to shame the user into compliance” [22]. For example, when deleting a <i>Vimeo</i> 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” [22]. 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 to complete the desired task, adapted from Gray et al. [46]’s definition of ‘Forced Action’. For example, consider if a user was forced to create an account on platform X to access functionality on platform Y.
Forced External Steps	The requirement of users to take steps external to the platform to complete the desired task, adapted from Gray et al. [46]’s definition of Forced Action. For example, when deleting an account on <i>Spotify</i> , 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 deleted their account, adapted from Brignull’s dark pattern taxonomy [22]. We consider any instance of creating, modifying, sharing, or discussing Internet content to be acting in a social media-like manner [57]. For example, after a user opts to delete their <i>Facebook</i> account, <i>Facebook</i> 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 [25]. 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 2. The dark patterns we looked for in the account termination tasks and the definitions we used to identify them as drawn from prior works.

Finally, we coded all the screenshots for presence of account 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 [22, 25, 46, 57], presented in Table 2. 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 account deletion. In addition, we included **forced continuity** and **immortal accounts** because these dark patterns affect what happens to user’s account data after account deletion.

Following Mathur et al.’s taxonomy [69], these dark patterns are problematic because they modify the choice architecture in the following ways: confirmshaming modifies the decision space asymmetrically; forced continuity, forced registration, and forced external steps modify the decision space by restricting certain options that should be available to users; bait and switch deceptively manipulates the information flow; and immortal accounts induce false beliefs about what the users’ options are regarding their accounts. We applied Boolean labels to the data set considering whether each platform exhibited any of these dark patterns when deleting accounts on each modality. We applied labels for confirmshaming, forced registration, forced external steps, and bait and switch for each modality 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 the qualitative data coding, two researchers agreed upon the code definitions as described above before examining any screenshots. Each independently applied code to the data set. We then calculated inter-rater reliability using Cohen’s Kappa [31]. 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

In this section, we reflect on what the account deletion process entails, what account deletion options are currently available, and what dark patterns related to account deletion are present.

Account 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 3. The three account termination options we identified across the 20 social media platforms.

From our analysis of the account deletion screenshots, we found that social media account deletion differs considerably across platforms and that users may encounter dark patterns when seeking account deletion. These results are discussed below.

*3.3.1 Account deletion options vary by platform and by modality.* The various account deletion options offered to users differ by platform. Platforms also control which modalities allow account deletion, as shown in Table 1, leaving some modalities without the ability to delete accounts. Overall, account deletion options are confusing and inconsistent across platforms in terms of when the account is deleted, whether the account can be reactivated, or whether other users on a platform can still interact with a deleted account for a time period.

*Three types of account termination options exist:* In our analysis, we found that account deletion does not always result in a deleted account. Instead, there are three main types of account termination options offered across the 20 platforms we examined; these are summarized in Table 3. The first account termination option we identified is when users seek to delete their account but can still 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 (the ability to create, modify, share, and discuss Internet content) cannot be used, but the account owner can begin using its functionality again by ‘reactivating’ their account. In most cases, we noted that reactivation could be initiated by logging back into one’s account on the platform. In other cases, a user is required to complete a short form requesting that the platform reactivates their account. An example of the ‘Close’ option can be found on *Quora*. *Quora* provides users with the option to ‘Deactivate’ their account. In this case, ‘Deactivate’ results in an inactive yet recoverable account. Thus we label *Quora*’s deactivate option as ‘Close’. An interface screenshot from *Etsy* exemplifying the ‘Close’ account termination option is shown in Figure 1.

The second type of account termination option we identified is ‘Delete After Closing’, which distinguishes when account deletion happens. In ‘Delete After Closing’, there is a forced waiting period of account closure before an account is deleted. The third account termination option we identified is ‘Delete Immediately’ which is when an account is deleted as soon as a user confirms that they want to delete their account. Interface screenshots from *Facebook* and *Tumblr* exemplifying ‘Delete After Closing’ and ‘Delete Immediately’ are shown in Figures 2 and 3, respectively.

*Deletion language and options change by platform.* The breakdown of account termination options that the different platforms offer is provided in Table 4. Platforms do not use consistent wording to describe these options. For instance, *LinkedIn*’s account termination options were called ‘Close’ and ‘Hibernate’ which mapped to what we call ‘Delete Immediately’ and ‘Close’, respectively.

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	tiktok.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	X

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

Other platforms used terms such as “Deactivate” and “Hide” to describe their account termination options. The most common account 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 account 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 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 account termination options are so varied, users may not be able to gauge when (or if) their accounts will be deleted, what will happen to their data, and who has access to their account data after account termination occurs.

*Platforms limit the ability to delete accounts on some modalities:* 12/20 platforms offered account deletion on multiple modalities. By contrast, 8/20 platforms only provided users with one modality to delete their account; six of these platforms forced users to use the desktop browser, and two only offered account deletion via their mobile application. Moreover, two platforms, *Slack* and *Etsy*, did not allow account deletion (by our definition) on any modality because users can always reactivate their accounts. That is, the only account termination option they offer is account closure. Interestingly, only 4/20 platforms allowed users to delete an account from any modality: *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 18/20 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 12/20 platforms. The remaining 8/20 mobile browser interfaces did not allow for account deletion.

3.3.2 *Dark patterns present in account deletion.* Dark patterns including forced external steps and confirmshaming were present in the account deletion tasks. However, although these dark patterns were present, it was not always clear if these were merely preventing accidental account deletion or attempting to manipulate users into cancelling account deletion attempts. Moreover, additional dark patterns exist after users complete the account deletion process (as opposed to during) that keep user account data indefinitely or force profiles to remain partially active for some time.

*Users may have to navigate through forced external steps and confirmshaming to complete account deletion.* 8/18 platforms allowing desktop browser account deletions, 4/12 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 exhibited more dark patterns because fewer platforms offer account deletion on mobile apps and browsers.) Out of the 37 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 account deletion via a link emailed to them. We note that although we recorded these as dark patterns, 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, (*Instagram*, *Twitch.tv*, and *Spotify*), we could not locate the account deletion options on the main platform interfaces at all. Instead, we had to navigate to websites or help-centers external to the main platform interface to find the account deletion option by using a search engine with the keywords ‘account deletion’ to find the account deletion options for these platforms. Confirmshaming was the other most common dark pattern in account deletion (seven instances present in 37 account deletions). Figure 4 shows an example of confirmshaming during account deletion from *Vimeo*. 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.

*Immortal accounts and forced continuity make it unclear if deleted accounts’ data still exist.* 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 deleted (e.g., Figure 1). In some cases, platforms used wording such as “data will be removed” (*Instagram*), “inaccessible to other Quora users”, “will no longer be viewable on Twitter”. However, across all platforms, the exact nature of what happens to the user’s account data is not explained to users during the account deletion process, and it is unclear whether the data is not being fully deleted or what data is being deleted. For instance, if data is not viewable on *Twitter*, is it still stored somewhere?

7/20 platforms had forced continuity, meaning that if a user seeks to delete their accounts on these platforms, other users on the platforms will still be able to engage with their deleted account’s content for some time. For example, when a *Facebook* user opts to delete their account, their profile and posts will still be visible to other users during the forced period of closure. Note that offering a ‘Delete After Closing’ option does not necessitate forced continuity. On *Spotify*, for example, even though a user must go through a forced period of closure before the account is deleted (‘Delete After Closing’), the account content is not public for the duration. On the other hand, when deleting an account on *Quora* via the ‘Delete After Closing’ option, a forced 14-day closure period occurs before deletion, and the user’s content is still publicly available on 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 content was no longer accessible for other users. *YouTube* informed users seeking deletion that “usually this takes a few minutes, but can take up to a couple of days if you have a lot of content”. In both cases, the wording of the screenshots

indicated that content from the deleted account could still be seen by other users for an unspecified duration while the content is in the process of being deleted. Platform support pages confirmed that deleted accounts may still be seen by other users for some time post deletion.

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

In Study Part 1, we found that account deletion varies by platform and modality and that dark patterns are present in the account deletion process. However, it is unclear whether users are affected by the inconsistent account deletion terminology and relevant dark patterns. To investigate user experiences and perceptions of account deletion, we conducted Study Part 2. In a survey, addressing our third research question, we asked users about their account deletion experiences and investigated their perceptions of dark patterns we found in the account deletion processes of the top 20 social media platforms such as confirmshaming, forced external steps, immortal accounts, and forced continuity.

### 4.1 Users' Account Deletion Experiences and Perceptions: Survey Design

To gather user perceptions of the phenomena identified in Study Part 1, we designed a survey with the following categories of questions:

- **Social media behavior:** First, we asked about the participants' social media usage. Questions included which social media platforms users used, how many hours a day they spent on social media, and 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 confirmshaming in account deletion:** Second, 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 [69]. Every participant was shown two images: a baseline confirmation page (*YouTube*) without confirmshaming and one of two confirmation pages exhibiting confirmshaming from *Vimeo* shown in Figure 4 and *Flickr*. We chose the screens from *Vimeo* and *Flickr* because they were both strong instances of confirmshaming in different forms: imaged-based and text-based, respectively. 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? We chose to test only confirmshaming with this method as it typically featured static visual elements that could be captured by a single platform screenshot. The other dark patterns identified in Study Part 1 were embedded in multi-screen user navigation or behind-the-scenes policy decisions.
- **Account deletion experience and expectations post-deletion:** Third, 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

Code	Description
Concerns over social media companies	Response included concerns (distrust, dislike, disagreement, etc.) with the company or companies in control of the social media platforms.
Deletion process can be frustrating	Response expressed frustration or difficulty 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 expressed desire for additional deletion 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 4.5.2.

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. In the survey we exclusively used the term ‘account deletion’ and avoided the use of ‘account termination’ because the former is the more colloquially accessible term. We also did not define account deletion for the participants allowing for personal interpretation.

- **Demographic information:** Finally, we asked participants for demographic information such as age, gender, and highest level of education attained.

Once the survey was designed and implemented using Qualtrics [9], we piloted the instrument with several Human-Computer Interaction (HCI) experts. As a result of these pilots, we refine the wording used in some questions to enhance clarity and improved the flow of the questions. We also added two attention check questions to ensure participants were fully reading the questions. Once we were satisfied with our instrument, we moved to survey deployment. The full survey instrument can be found in Appendix A.2.

## 4.2 Users’ Account Deletion Experiences and Perceptions: Survey Deployment

After receiving approval by our Institutional Review Board (IRB), we recruited participants using Prolific between May and June 2021 [8]. Since Study Part 1 was also focused on popular social media platforms in the U.S, we used Prolific’s demographic filters to restrict respondents to participants that had at one time been regular users of social media and who were currently located in the U.S. We also restricted responses to Prolific participants with a 99% approval rating. Even though we were interested in account deletion, we included participants that had not deleted accounts because we wanted to know the portion of users that had successfully deleted accounts and why users had not deleted their accounts (e.g., whether they could not delete them or chose not to). 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 Illinois state minimum wage at the time of the study [6]. Overall, 200 participants took our survey in total. For the confirmshaming interfaces, 100 participants saw *Flickr* and 100 saw *Vimeo*. All participants were shown the baseline image from *YouTube*.

## 4.3 Users’ Account Deletion Experiences and Perceptions: 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

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.

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. Note, for multiple-choice questions, participants could select all options that apply.

For analyzing open-ended responses in the survey, we performed qualitative data coding [93]. Two researchers independently applied an agreed upon codebook, with one set of codes per survey 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 set of codes to use after discussion and each independently applied these codes to the relevant survey responses. Many responses fit with more than one code. For example, if a user responded with “Other (please specify): I can’t 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 codebook for text-based responses included with ‘Other (please specify):’ options is in Appendix A.3. We calculated inter-rater reliability [71], 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 resolved these disagreements and came to complete labeling agreement.

#### 4.4 Users’ Account Deletion Experiences and Perceptions: Participants

Participant demographics are shown in Table 6. Our participants skewed towards young users (66% were under 35) who were educated (54% had at least a Bachelor’s Degree), and identified as male (57%). The most popular social media 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 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.

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.

#### 4.5 Users' Account Deletion Experiences and Perceptions: Findings

In this section we reflect on users' experiences with and perceptions of account deletion on the most popular social media platforms. As discussed in Section 4.1, we exclusively used 'account deletion' in the survey instead of introducing the terminology we used to describe the three account termination options. Accordingly, we use the term 'account deletion' when reporting the survey results in this section. We remind the reader that the participants' interpretations of 'account deletion' may differ from one another and our own previously stated definition.

From the survey responses, we gathered that account deletion is common but often abandoned before the deletion process is complete and users prioritize privacy over platform interests. We discuss these findings below. To evaluate confirmshaming in account deletion, we showed participants either an account deletion interface with confirmshaming (randomly selected *Flickr* or *Vimeo*) as well as a baseline image without confirmshaming (*YouTube*) in a randomized order. Then, we used Mann-Whitney tests to measure for statistical differences between the Likert scale responses across the baseline image and the confirmshaming images for each question. Since the groups did not vary significantly, we exclude the reporting of these results and return to how evaluating confirmshaming with our survey was difficult in our discussion section.

*4.5.1 Account deletion is common but often abandoned before completion.* 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% (121/200) participants reported that they had deleted one or more social media accounts 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 5. Almost 40% of the 121/200 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 to mental health and concerns over data security. Finally, 11% of the 121/200 participants who had deleted social media accounts selected 'Other' and added their own reasons. For instance, participants mentioned motivations for deleting their accounts including concerns over the company in control of the platform (e.g. "Facebook is an evil, evil corporation" (P180)), political reasons (e.g. 'It is a threat to our democracy' (P44)), life-events such as divorce, and career-related reasons (e.g. 'Searching



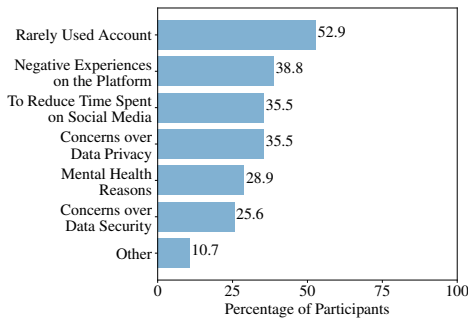


Fig. 5. Reasons for account deletion from the 121/200 users that have tried to delete accounts. (Closed-ended responses)

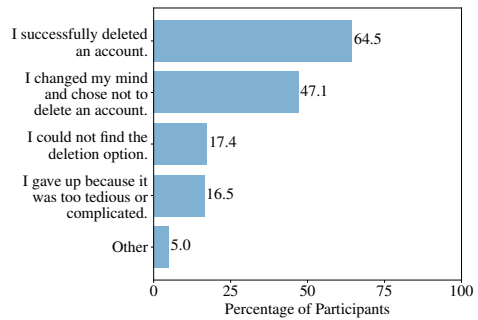


Fig. 6. What happened when users tried to delete an account in the past (121/200). (Closed-ended responses).

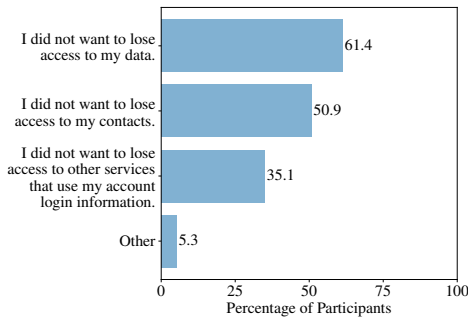


Fig. 7. Reasons why users changed their mind during the deletion process (57/200) (Closed-ended responses).

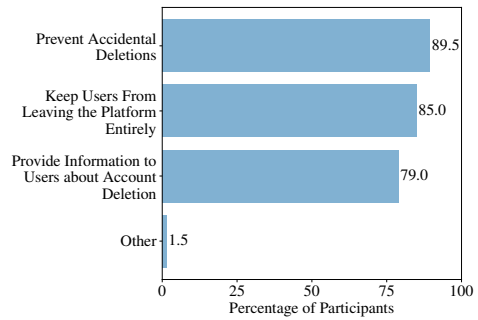


Fig. 8. What participants feel social media companies consider when designing the account deletion process. (Closed-ended responses).

for jobs and did not want social media visible to employers” (P182)). Participants also mentioned concerns over censorship, the desire for a fresh account, and critiques over the general platform experience. In sum, 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 6. 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 account deletion option (17.4%), and/or gave up because it was too tedious or complicated (16.5%). Baumer et al. similarly reported that Facebook “non-users” [19] often could not find the deletion option. In total, at least 35.5% of account deletion attempts did not end in a deleted account. The 5% of participants selecting the ‘Other’ category specified that when they tried to delete their accounts, they ended up coming back to the platform by either recreating new accounts or opting to close their account instead of full deletion. Notably, one participant did not know they only closed their account saying “I thought the account was deleted, but was rather just deactivated as I can still access it” (P95).

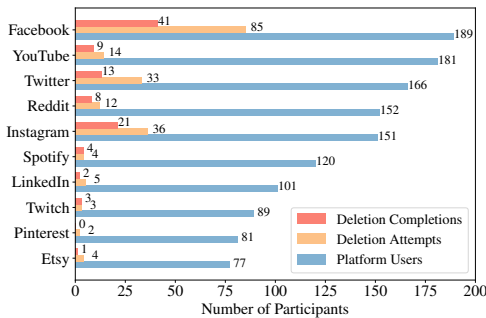


Fig. 9. Total number of account deletion completions (red), total number of account deletion attempts (yellow), and total number of platform users (blue) for each of the 10 most popular platforms.

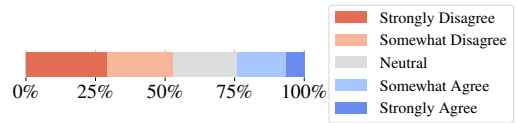


Fig. 10. 5-point Likert scale prompt. ‘Please indicate how much you agree with the following: Social media companies have my best interests in mind regarding the account deletion process.’

We asked the 47% of users who reported changing their mind about account deletion why they changed their mind (Figure 7). Most of these 51/200 participants reported that they did not want to lose access to their data (61.4%) or that they 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.<sup>2</sup> 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 9). 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*. The deletion completion rates also varied by platform, from 0% on *Pinterest* to 100% on *Spotify* and *Twitch*; however, representation of deletion completion rates on these platforms may be skewed since they had low numbers of deletion attempts. Moreover, we had a different number of platform users for each platform. Among the five most used platforms, which were also the platforms with the highest rates of deletion attempts, the deletion completion rates were higher on *YouTube* (64%), *Reddit* (67%), and *Instagram* (58%) than for *Facebook* (48%) and *Twitter* (39%).

**4.5.2 Users prioritize data privacy over platform interests.** 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, including revoking access to deleted account data from the platform and other users.

*Users have mixed feelings about the platforms’ role in account deletion.* Figure 10 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%

<sup>2</sup>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 [91, 104].

Category of Account Data	No One	Account Owner	The Platform	All Other Platform Users	Platform Friends and Contacts	Recipient(s) of the Content Interactions	Recipient(s) of the Direct Messages	Other
Content Interactions	62.5 %	22.5 %	7.5 %	4.5 %	4.5 %	13.0 %	-	1.0 %
Direct Messages	56.5 %	24.5 %	4.5 %	0.5 %	4.5 %	-	22.0 %	0.5 %
Login Info	63.0 %	36.5 %	8.5 %	0.0 %	0.0 %	-	-	0.0 %
Personal Info	72.5 %	27.5 %	2.5 %	0.0 %	0.0 %	-	-	0.5 %
Posted Content	70.5 %	25.0 %	6.5 %	1.5 %	3.0 %	-	-	0.5 %

Table 8. The responses selected by participants when we asked ‘After you delete your account, who do you think should have access to [category of account data]? (Select all that apply)’. (Closed-ended responses).

of participants that somewhat or strongly agreed or 23% that were neutral. 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 8).

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 30.5% (61/200) volunteered additional information, for which the five most applied codes were negative towards the social media platforms. 27.9% of these 61 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 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). Habib et al. identified through expert review that general data deletion options sometimes require confusing multi-step processes, which they suspected could frustrate users [52]. Our study confirms that some users do in fact feel this way when deleting their social media accounts as well. 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.*” 16.4% of the 61 participants expressed suspicion that account data is kept/used/sold by platform after account deletion (16.4%). Thus, the users in our study matched the skepticism that data would actually be deleted expressed by Habib et al.’s smaller scale in-lab study of users trying out various privacy options for deleting their data on various sites [51]. Another common sentiment among the 61 participants was the desire for a more user-friendly account deletion platform experience (14.8%). Additionally, 11.5% of the 61 participants expressed that they had never deleted a social media account before. Finally, 6.6% of the 61 responses expressed appreciation for deletion options for those who just want to take a break from social media (such as deactivate).

*Users prioritize data privacy over the platform’s and other users’ access to deleted account data.* 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. Table 8 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 that data 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 access 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 appeared 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% didn't and 45.5% did) 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 options are confusing and inconsistent terminology is used across platforms. Yet, we were able to identify three main types of account termination: 'Close', 'Delete Immediately', and 'Delete After Closing'. We also showed the platforms do not always offer account deletion options on every modality. Moreover, we found evidence of account deletion related 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 many reasons to delete their social media accounts other than not using an account regularly, and many do delete accounts successfully. However, over a third of account deletion-seeking users did not successfully complete the deletion process. The survey also revealed that more of our study's participants disagreed that platforms have their best interest in mind regarding account deletion than those who felt neutral or agreed. Finally, users in our study mostly agreed that they do not want platforms to have access to deleted account data and that all account data should be deleted upon account deletion. Based on these findings, we discuss how to improve account deletion processes on social media platforms and more generally moving forward.

### 5.1 Clarify Account Deletion Options and Post-Deletion Outcomes

Our first study provided evidence that account deletion options have different outcomes depending on the platform. Platforms delete data on different time frames, they do not always indicate clearly what data is deleted, and who has access to a deleted account's data is also ambiguous. Our first study also showed that platforms are not transparent about immortal accounts, forced continuity, and other data retention policies. Moreover, our second study suggests what users want to happen and what actually happens when a social media account is deleted may be very different. For example, most users in our study desired that all their account data would be removed upon account deletion. Yet, our findings suggest that because account deletion is so inconsistent across social media platforms, users may not be able to glean when their accounts will be deleted, what will happen to their data, and who has access to their account data when the deletion occurs. At the individual level, such policies may result in frustration over not being able to control one's online presence. At a societal scale, these unclear and inconsistent policies may erode public trust in the social media entities and contribute to a "slippery slope" of normalizing poor data practices. Ideally, social media platforms could design an interface with clear account deletion options, paired with coherent 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 transparent account deletion policies would also mitigate the need to add extra friction to the account deletion processes designed to deter accidental or unwanted deletions because the outcomes are clear and disclosed.

Since there are different categories of data (login information, posted content, personal information, interactions, direct messages, etc.), a highly granular approach to deletion options may prove beneficial. However, this could be an overwhelming burden for users [94], potentially even further deterring deletion when desired. We advocate for a simpler solution: requiring standardized deletion options and terminology across social media platforms that reflect the desires of the users such as data privacy, data security, and agency over data deletion. Our identification of three account termination options provides a starting point for future work to standardize account deletion across platforms.

## 5.2 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 account 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. Future work could develop the incentives for platforms to allow account deletion on all modalities. For example, starting in January 2022, if a platform's application allows for account creation, it must also allow for account deletion to be hosted on Apple's App Store [55].

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, 70]. 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[79]) 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.

## 5.3 The Right to Erasure and Other Legal Considerations of Account Data Deletion

Some jurisdictions, such as the Philippines [64] and the European Union (EU) [105], have legally put into effect one's right to be forgotten, giving individuals the right to ask organizations to delete their personal data and requiring the organizations to complete the request with some exceptions. In the EU, this is sometimes referred to as the right to erasure, which more aptly connects to the deletion of account data and the scope of this paper. Some U.S. states are following suit: the California Consumer Privacy Act (CCPA) took effect in 2020 [2], the Virginia Consumer Data Protection Act (VCDPA) takes effect January 2023 [5], and the Colorado Privacy Act (ColoPA) takes effect July 2023 [4]. While the statutes differ in specific requirements, they all affirm a consumer's right to delete their data. No federal U.S. regulation exists for such a mandate, but the right (in similar forms) has been discussed in U.S. legal cases as early as 1931 [1].

Most of the participants in our study seem to support the right to erasure, contrasted with half the platforms indicating (sometimes abstrusely) account immortality. Recall from Section 4.5.2 that most participants agreed no one (including the platform, other users on the platform, and

the original account holder) should have access to an account’s login information, posted content, personal information, interactions, or direct messages upon account deletion. In practice, this is far from reality. For example, the platforms’ terms of services (ToS) often grant the platform an expansive license over account content including the ability to retain copies indefinitely. The ToS on *Youtube*, for instance, states that “[t]he licenses granted by you continue for a commercially reasonable period of time after you remove or delete your Content from the Service. [...] YouTube may retain [...] server copies of your videos that have been removed or deleted” [11]. Yet, users that delete their *YouTube* account may not be aware of this policy as they are only told, “Your content is in the process of being permanently deleted” during the account deletion process. Future work could include systematic analysis of platforms’ ToS contrasted with their more front facing interfaces.

Platforms also have financial incentives to keep user account data (e.g., model training), but they may also have legal responsibilities to do so, such as in response to subpoenas or other court-ordered obligations. In some sense, even deleted data continues to have impact if it was used in the training of machine learning models that continue to operate. The legal matters of data retention become more complex when considering the death of an account holder as other research has explored [23, 24]. Still, it is compelling that our study’s participants did not want even the platform to have access to account data upon deletion despite its prevalence. Thus, according to our study’s participants, for account information to exist after account deletion, it would have to exist distinct from the platform completely, perhaps via a data download prior to the point where all data is deleted and all access revoked. Future work could explore data deletion and retention more deeply for a broader swathe of sites.

#### 5.4 The Line Between Necessary Friction and Dark Patterns In Account Deletion

Our findings from Study Part 1 showed that account termination interfaces exhibit dark patterns including forced continuity and immortal accounts. In Study Part 2, at least half of our participants did also feel that platforms may not have their best interest in mind when it comes to account deletion. The open question is whether friction in the account deletion process is necessary or manipulative. On the one hand platforms have to prevent users from unintentionally losing their content by adding reflective pauses and retaining data in case of reactivation, but on the other hand, platforms may not want users to leave for fear of loss of profit from user data and attention [15, 34, 40, 59]. Further, the subjective experience of friction may leave some users feeling unnecessarily obstructed or manipulated while others may feel grateful for having reflective pauses. The “right amount” of friction may also change across use cases, such as the access modality.

In Study Part 2, we were able to assess how users felt about forced continuity and immortal accounts by asking about their data deletion experiences and expectations. However, assessing the impact of confirmshaming in account deletion interfaces was more difficult. Although we had carefully designed our survey informed by Mathur et al.’s suggestion of using a baseline and dark pattern condition, we could not evaluate the impact of confirmshaming clearly for two reasons: first, we could not make users feel as though they were being confirmshamed for ethical reasons and second, our participants may not have had authentic reactions to the account deletion interfaces we showed because their actual account data on a real platform was not at stake and in some cases, they may not have been a user of the platform whose interface we showed. We point this out because we feel the research community needs more clearer directions on the best ways to evaluate the impact of dark patterns on users in cases where the situation being assessed (someone deleting their account) is difficult to mimic. Clearly, one could run experiments in the vein of Luguri and Strahelivitz [65] to more closely approximate the behaviors of users when their real account data is at stake. These authors used an experimental design to assess the impact of mild to aggressive

dark patterns by creating a fake system and plausible scenario that exposed users to different types of dark patterns and measured their responses. However, even experiments such as these have limitations in their ability to replicate real-world user behavior. They are also resource intensive. Future work could explore how else to assess user reactions to certain dark patterns in account deletion such as confirmshaming or develop better guidelines for the community of what best practices are for evaluating how dark patterns impact users. In account deletion, assessing how confirmshaming, immortal accounts, and forced continuity affects users is particularly important not only because these dark patterns could undermine user agency, but also because users may not be able to leave a platform as desired. For instance, in pressing cases such as instances of online harassment [10], we suggest that platform designers consider allowing users, if they desire, to fully delete all trace of their accounts on demand from any modality without adding unnecessary barriers in this process.

### 5.5 Study Part 1 and Study Part 2: Limitations

Our work has several limitations. In Study Part 1, the manual collection and inspection of the account 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 widely used on social media platforms [58], the screenshots we obtained may be part of an A/B testing experiment, or otherwise tailored in some way to location, or user history. This could mean generalizing about the data and account deletion related dark patterns may not be perfect. Our analysis was also limited to the top 20 social media websites in the U.S. so other websites may have alternative account deletion options. Furthermore, a manual labeling system incorporates researcher biases. 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 in account deletion that we did not identify or have not yet been identified by the research community. Moreover, we considered all cases of dark patterns in isolation. In reality users may encounter multiple instances of dark patterns on the same screen or consecutive screens. Future work could study the interaction effects of experiencing multiple dark patterns together. We also labeled platforms according to our descriptions of the three account termination options, including whether account data is deleted upon account deletion either immediately or after a forced period of closure. However, as a user there is no way to verify that account data is actually deleted from platform servers<sup>3</sup>.

In Study Part 2, our survey participants were mostly educated users and mostly younger adults. Other users who are older for instance may have different experiences. In addition, while *Prolific* has academically published benefits [84, 85], it may also introduce unseen data bias. For example, all our participants were willing and able to sign up for an online recruitment platform. *Mechanical Turk*, a comparable competing online recruitment platform, has been shown to include study participants that skew towards higher tech literacy [74]. Further, in our survey we asked participants about their account deletion experiences, expectations, and desires. Their responses may differ from real-life

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<sup>3</sup>Security researchers have designed and proposed cloud storage systems with "assured deletion", but they remain largely unused [86, 89, 90, 110], leaving users to rely solely upon their trust (or lack thereof) of the platform. Even *Facebook* researchers proposed and recently implemented a system that increases the robustness of their data deletion framework, but its implementation is still solely at the hands of *Facebook's* internal developers [32].

scenarios as their sentiments may not match a situation in which their real account and data is at stake. Future work could expand our study to address these limitations.

## 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 top 20 most popular social platforms in the U.S. for account deletion processes and relevant dark patterns. We also conducted a survey of 200 users to understand their current account deletion experiences and perceptions. This work resulted in four main findings. First, we found that social media account deletion differs considerably across platforms, including variations when account data is deleted, what data is deleted, and whether accounts can be recovered. Overall, we identified three account termination options to capture the main differences to the platforms' account deletion options. We also noted that account deletion options are not always provided for all modalities on which a platform can be accessed. Second, we found evidence of confirmshaming, forced external steps, immortal accounts, and forced continuity. These account deletion related dark patterns may increase friction for users seeking account deletion and obscure data outcomes post-deletion. Third, our user study confirmed that participants often want to delete a social media account, and many do so successfully. Yet, survey results showed that over a third of deletion attempts were abandoned. Lastly, more participants disagreed with platforms having their best interest in mind regarding account deletion than those who felt neutral or agreed. Participants also did not want platforms to have access to deleted account data. Based on our findings, we discussed how the transparency of account deletion related policies should be improved and how further work is needed to understand the unclear line between unobtrusive friction and unnecessary dark patterns in account deletion. We also recommended that platforms need to be more transparent and clear about what account deletion options mean and what will happen to account data post-deletion. Additionally, we suggest that account deletion should be possible across all modalities for any social media platform. In addition, we suggest that future work continue to explore user perceptions of dark patterns in account deletion, including non-social media platforms such as online news or subscription-based accounts.

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