



DEGREE PROJECT IN MEDIA TECHNOLOGY

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Dancing and learning about astrophysics

A case study on user behavior of students in Sweden using
TikTok and the app's impact on their lives

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ABSTRACT

The social media app TikTok, owned by the Chinese Company ByteDance, has become a worldwide success with over one billion monthly active users due to an algorithm that enables users to consume individually tailored content. However, it was also part of political confrontations between countries like the USA and China due to allegedly security risks. Moreover, the app could be classified as a persuasive technology with potential ethical and privacy concerns. A case study on Students in Sweden with quantitative and qualitative research methods was conducted to understand user behavior and the app's impact on users. The former was a survey with 36 participants, and the latter interviews with 6 participants. The case study results indicate, among other things, that the participants consume content beyond entertainment, evaluate the algorithm as accurate, do not unambiguously experience a filter bubble, and assess the app as addictive. Despite ethical and privacy concerns, the app has potential for different use cases, such as marketing or education.

Key Words: social media, TikTok, algorithm, user behavior, persuasive technology, privacy, case study

SAMMANFATTNING

Den social media appen TikTok, som ägs av det kinesiska företaget ByteDance, har blivit en världssuccé med över en miljard aktiva användare varje månad tack vare en algoritm som gör det möjligt för användarna att konsumera individuellt anpassat innehåll. Den har dock också varit en del av politiska konfrontationer mellan länder som USA och Kina på grund av påstådda säkerhetsrisker. Appen kan klassificeras som en övertalningsteknik med dess potentiella etiska och integritetsrelaterade problem. För att förstå användarnas beteende och appens inverkan på användarna genomfördes en fallstudie om studenter i Sverige med både kvantitativa och kvalitativa forskningsmetoder. Den förstnämnda var en enkät med 36 deltagare och den sistnämnda intervjuer med 6 deltagare. Fallstudiens resultat visar bland annat att deltagarna konsumerar innehåll utöver underhållning, bedömer algoritmen som korrekt, upplever inte entydigt ett filter bubble och bedömer appen som beroendeframkallande. Appen har trots etiska och integritetsrelaterade problem, potential för olika användningsområden, t.ex. marknadsföring eller utbildning.

Nyckelord: sociala medier, TikTok, algoritm, användarbeteende, persuasive technology, integritet, fallstudie

1 INTRODUCTION

The social media app TikTok and its equivalent Douyin for the Chinese market [1] is part of the Chinese Company ByteDance, which made the app available worldwide in August 2018 after its fusion with Musical.ly [2] [3]. The app then became quickly popular worldwide, especially during the COVID-19 pandemic, and by the end of September 2021, it had over 1 billion monthly active users and more than three billion downloads [4]. Furthermore, due to an algorithm enabling users to watch individually tailored up to three-minute-long videos, the app has become a great success with Generation Z [3]. Since the marketing industry was estimated to reach up to \$9.7 billion in 2020 alone, TikTok offers a great marketing opportunity for companies and a lucrative income source for influencers or creators [5], [6].

Nevertheless, the app caught the attention of the media and the US government when a Chinese law was introduced in 2017, providing the government with the right to request data from Chinese companies. TikTok's parent company must comply with working with government intelligence operations. As a possible scenario, it could use the data for propaganda reasons, such as influencing the global media environment in their favor. This was allegedly why the Trump administration sought to ban TikTok if it was not sold to an American company [7], [8]. Although TikTok denies allegations of transferring data to its parent company based in China, a company insider confirmed that TikTok is strictly controlled by ByteDance [9].

The step to ban TikTok might have been based on the economic and political threat that China poses to the western world since other big tech companies, especially social media platforms, are also conducting centralized data collection with a handover of the data to the respective government [8], [10]. Due to security reasons, India also banned TikTok in 2021 [11]. It should be acknowledged that the possible connection between the Chinese government and TikTok could increase the government's sharp power and influence sphere [12], leading to an increase in political issues and challenges.

The app will potentially not only become more present in our lives as a form of entertainment but also dominate headlines in global media more frequently. In this context, other questions about the app arise. Since TikTok is a social media platform, it needs to be investigated if it would also fit into the definition of a persuasive technology that can negatively impact the user [13], [14]. Besides, due to the algorithm deciding what kind of content the user gets presented, it needs to be investigated if people, especially politically interested ones or those who use the app as a news source, are stuck in an online filter bubble where they only see filtered information [15]. In addition, user behavior should be studied to understand the quick emergence of TikTok. Thus, the following case study was conducted. It aims to contribute additional valuable insights into why users are drawn to the app and what kind of impact it has on them. The participants in this study were limited to students in Sweden to have a specific target group. This way, it is assured that the collected data is, on the one hand, not generalized but, on the other hand, could allow academic institutions insight into how students have integrated this relatively new app into their lives. This study could also support institutions and organizations interacting with students on TikTok.

The following primary research question was formed: *How and why are students in Sweden using TikTok, and what made them join the app?* To understand the user perception of the algorithm that makes the app so successful, the following secondary question was asked: *Is the Algorithm correctly predicting their preferences, and do they experience the filter bubble effect?* Finally, to understand if TikTok has any impact regarding issues, such as privacy concerns, concentration issues, or a feeling of addiction to the app, the following tertiary question was asked: *Does TikTok have an impact on their lives, and how?* In this context, a literature review, a survey, and interviews were conducted to answer the research questions.

2 BACKGROUND AND RELATED WORK

2.1. BACKGROUND ON TIKTOK'S FUNCTIONALITY

By using TikTok and reading the app store description, the following essential functions were identified: TikTok is a mobile app available in most countries and has a minimum user age limit of 13. It is available on Apple and Android phones with limited accessibility and functions via a regular browser. The app allows users to consume various content, such as videos that users can create and share. The videos can be up to three minutes long and must be following the community guideline. Videos can contain a caption with hashtags that simplify finding it via the discover function.

Additionally, users can engage with each other by either liking or commenting on videos, sharing videos, starting live streams, or duetting videos. The duet feature allows users to respond to a video post. For instance, this means using the complete or only parts of a video while preserving the original sound. TikTok users can follow and send text messages to each other and decide if they want to have a private or public account. Regarding the consumption of videos, users can either only see videos from creators they follow, search with the discover function for new videos or use their 'For You' page to see tailored videos matching their preferences. This 'For You' page and its use of an AI algorithm for generating the user's preferred feed is the core technology behind TikTok and why the app is so popular worldwide. Consequently, it recommends videos that the algorithm predicts the users would like to watch.

2.2. RELATED WORK

2.2.1. PERSUASIVE TECHNOLOGY AND TIKTOK

According to Brian Jeffrey Fogg's definition, "a persuasive technology tool [is] ... an interactive product designed to change attitudes or behaviors or both by making the desired outcome easier to achieve" [14]. He further explains that the persuasion, however, must be conducted with neither coercion nor deception. Furthermore, Fogg argued that there are seven strategies that a persuasive technology (PT) uses to achieve its goals: reduction, tunneling, customization/tailoring, suggestion, self-monitoring, surveillance, and conditioning. In this regard, PT could raise ethical concerns since the user is not interacting with a human but with a computer. While humans would quickly exhaust when persuading interlocutors, an app would not and can even intensify its strategies. This results in constant persuasion efforts that undermine the user's possibility to opt out of using the technology. The user cannot use means of discussion or negotiation to alter the interaction, which can consequently lead to emotional stress for the user. Besides, since computers cannot take responsibility for adverse consequences of persuasion and are not moral agents, it is hard to determine who would be responsible for possible wrongdoings [14].

TikTok could be described as a persuasive technology since its desired outcome for the user could be to have the greatest entertainment on the platform while simultaneously maximizing the company's profit. The app could achieve this by having a high user usage time through high user engagement rates with its tailored content. TikTok could be defined as at least two out of the seven types of PT, 'Tailoring' and 'Suggestion, since the app's algorithm is tailoring and suggesting/recommending preferred and to the taste of user matching videos based on previously consumed content. An example of how TikTok changes its interaction strategy is the app showing content outside of users' preferences to keep them entertained and diversify the content feed [16]. This could lead to the user staying longer on the app. In addition, PT tactics of persuasion could be categorized as coercion or manipulation, particularly when it comes to social media like Facebook or TikTok. Social media is so essential in our lives that opting out of using it could put us in a disadvantaged

situation. Communication and networking with others would be limited, and one would have less access to information [17].

In addition, users with a tendency to addiction are falling at the risk of becoming dependent on PT like TikTok. Various pleas exist to research this issue further while already implementing specific measures to avoid this from happening [18], [19]. In this regard, becoming addicted to a PT restricts one's autonomy, negatively impacting the individual. People often do not read the general standard terms and conditions or simply understand what the technology is doing with their data. Therefore, users cannot give valid consent to their data usage, including potential disadvantages [20]. There are only limited studies specifically about TikTok that saw a negative impact, especially on young people, as they show signs of addiction to the app [21].

Nevertheless, researchers believe that TikTok as a PT indeed has, like other social media platforms, risks of addiction and other harm for users, especially young ones, since they use similar strategies to keep the user on the platform [22]. Furthermore, like other social media, TikTok can influence users' body image negatively or positively [23]. For instance, in this regard, the question arises, as aforementioned, of who is responsible for damaging someone's body perception.

2.2.2. TIKTOK'S ALGORITHM AND ETHICAL CONCERNS

Although it is unclear how exactly the algorithm works, there are some presumptions and an official statement by TikTok on how the app recommends videos that the user sees on the 'For you' page/feed: The company states that several factors play a role in making videos appear on the user's 'For you' page. These factors include so-called strong indicators such as hashtags, user interactions, liking videos, sharing or commenting, or weak indicators such as devices, country-, language- and account settings. It is also considered whether the "Not Interested" function is used to stop seeing the video and, consequently, similar content. All sorts of data that TikTok collects from the user is, though differently weighted, essential for the algorithm to recommend new videos. Additionally, TikTok videos are initially shown to smaller groups of users who are more likely to like the uploaded videos based on their user behavior. If they then like and watch the video to its full length, it is presented to other people with similar interests, continuing until the video goes viral. Although content creators with many followers have an advantage, the number of followers is not decisive for the success of a video [16].

TikTok scans videos graphically or manually reviews reported videos and restrict their reach to prevent violations of TikTok's community guidelines. It also restricts videos that, according to TikTok, "may be shocking if surfaced as a recommended video to a general audience that did not opt-in for such content" [16]. However, it is not entirely clear what TikTok means by this. In this context, journalists from 'The Intercept' have published internal guidelines for content moderators in 2020, including restricting content from 'unattractive' people to attract new users. At the same time, employees were obliged to publish videos from other platforms on TikTok that show 'beautiful' people to further make the platform more appealing [24].

Additionally, according to investigations of Netzpolitik.org, the reach of content from queer people was also restricted to protect users from being bullied. Although TikTok admitted that this is an inappropriate measure with allegedly good intentions and pledged to no longer use the guidelines mentioned earlier, it demonstrates the company's willingness to censor certain content [25][26]. These procedures, as algorithms could be described as "actualities that select, evaluate, transform, and produce data" [27], could be therefore problematic. This is especially the case since the AI algorithmic design is not of an objective nature but instead reflects the platform's goals making AI not neutral. It is also obliged to the biases of the creator of AI since they decide the training data and its content [10]. This also would include the moderation

policies that restrict content from 'unwanted' content creators or, in the bullying case, restrict content to protect minorities. Restricting the content of the harassed and not the harassing party could consequently, according to how the algorithms work, lead to further biases that put minority groups at an unfair disadvantage.

Filter bubbles, a term first described by Eli Pariser, are essentially intellectual isolation caused by algorithms that recommend content and select information based on user data, including user activity and personal information [15]. These filter bubbles could also be an issue with TikTok's algorithm and recommendation system. Even the company acknowledges this and vaguely states to monitor and work on [16]. Consequently, this could shut out users from perceiving diverse sources and opposing viewpoints leading the user to be trapped in an intellectual bubble that was filtered by the algorithm, which could lead to polarization making consensus building difficult [15]. Moreover, with an increase of fake news and misinformation circulating on social media, like Facebook, selecting and personalizing content and information could further negatively impact users and society [28]. Nevertheless, the theory still often has been dismissed. For instance, research on whether online communication can lead to echo chambers, which are often a synonym for filter bubbles, conducted those users even reject political information too similar to their previous consumed information contradicting the theory of contributing to polarization [29]. As another researcher states, social media with its algorithm could lead to filter bubbles from a technical perspective. However, users are not just receiving the content passively but actively consuming contradicting content and information, which undermines the theory of negative consequences for society. Users are not just having strong one-sided opinions but are ambivalent online and offline [30]. Another study about political polarization in the US pointed out that polarization among older people with less internet access grew significantly higher than that of younger people with higher internet access between 1996 and 2016 [31]. Accordingly, this contradicts correlations between potential online filter bubbles and polarizations.

2.2.3. TIKTOK AND PRIVACY

TikTok has been criticized various times for its privacy issues. TikTok might not encrypt videos or thumbnails with every phone during the sending process in the network, allowing unwanted third parties potential access to videos [32]. Moreover, the app requests several sensitive data, as shown in the following screenshot taken from the App Store:

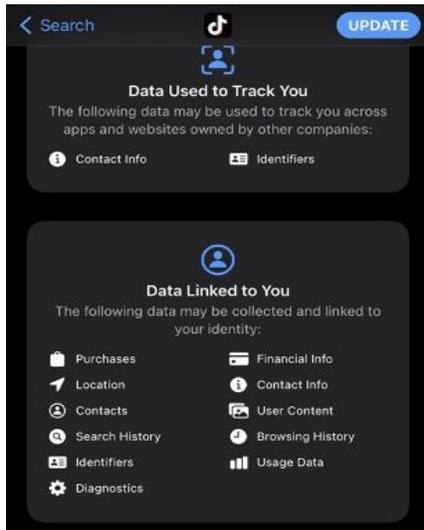


Figure 1: Screenshot of TikTok's data collection

According to TikTok's privacy policy, these data are then used for the administration of the platform, including internal operations such as data analysis or troubleshooting. The company also states that these data are necessary to customize and tailor content to provide the best experience on the app for the user. Besides, it is used for developing and further improving the platform. Regarding the information that TikTok shares, the company states that the collected data is accessible to business partners for unique personalized offers. Additionally, information is shared with advertising agencies, the company's cloud storage providers for recovery services, its data centers, and IT service providers [32], [33].

Worth noting is that similar data collection and user profile generating measures are also taken by Facebook [10]. The policy terms seem reasonable to some degree since the whole goal of the app is to provide the most personalized and tailored content to the user. Nevertheless, a Chinese law introduced in 2017 that gives the government the right to request access to data of a Chinese company is alarming [7]–[9]. The company must comply with the government putting user data at risk and could bear national security risks [9]. Besides, user data is stored on servers located in the US and Singapore [34].

2.2.3. IMPORTANT RESEARCH ON USER BEHAVIOR AND USE CASES

Like other areas, research on the usage of TikTok and experience with it, including possible usage other than entertainment, is limited due to its relative novelty. A three-year study conducted with 3500 Thai students aged between 16-25 found out that the majority enjoy the app, use it for relaxing, socializing, and entertainment purposes, predict an increase in popularity, and do not see it as a threat to society. However, TikTok also poses risks to minors as most participants stated that they were sexually approached on the app, including by older people. Since the minimum age for the app is 13, the app could bear potential harm to minors [13].

Another research area is the use case of TikTok regarding political communication. Research on American users' political behavior and the influence of the platform design on political communication has been conducted. TikTok allows a new way of political communication on the platform since, on the one hand, users generate and share information but, on the other hand, become content themselves and take an active role in representing it. This and the several audio-visual features, e.g., Duets, allow high engagement and interactivity between content creators and passive users and between the content creators themselves. In this context, political messages are often presented as entertaining to gain a wider audience. [35]. The usage of TikTok for political communication, including (youth) activism and reaching young voters, is not only widespread in the US but also increasingly becoming important in Asian countries [36] and European countries like Spain [37] or Germany [38].

Another area of research is TikTok as digital knowledge mobilization, meaning users share and educate their viewers about particular topics [39]. These could be, for instance, issues that certain communities like the trans- and nonbinary communities face [39] or LGBTQ+ activism [40].

3 METHODS

The project was conducted as a case study to acquire empirical data to investigate the phenomena of TikTok within a real-life context and support developing a strategy to answer the how and why research questions (Yin, 2009). The research for this project is based on a mixed-methods approach and includes a literature review to get a better grasp of the

current research as well as similar approaches for research in this area, a survey for gathering quantitative data, and semi-structured interviews for gathering qualitative data. This mixed research method allows both extent and depth of understanding and corroboration of a given issue [41] and supports a case study in achieving its goal [42]. Moreover, mixed methods research with its multiple approaches supports answering the research questions by connecting without restricting each method [43]. More precisely, the literature review contributed to a deeper understanding of the current level of research, including valuable knowledge that was used to develop both the questionnaires for the survey as well as the semi-structured interview transcript. The quantitative research method, i.e., the survey, allowed collecting larger sets of data to see trends that occur in the specific target group. When it comes to the interview, research was conducted on specific issues that needed further investigation to have qualitative data to answer the research questions. The literature review was conducted by finding relevant literature, summarizing its content, and adding them to the quotation tool Zotero. The questionnaire for the survey included demographic, multiple-choice, binary, 5-point Likert rating scale questions, and it was conducted via Google Forms. In this regard, the previously mentioned study conducted by Cell Dillon on Thai students' usage of TikTok [13] was utilized to prepare the questionnaire for the interviews. While primarily the prepared questionnaire was used, the interviewees were also asked follow-up questions to learn the reasoning behind their responses. The participants for this research project were acquired through personal networks and communication mediums such as Facebook, WhatsApp, Instagram, Slack, and LinkedIn. The interviews were either conducted and recorded via zoom or face-to-face and then recorded with Apple's Voice Memos app. It was then transcribed and revised with the online tool Trint. All collected research data was analyzed and evaluated by categorizing the data and calculations through Google Sheets. The data was anonymized, and interviewees were informed about the purpose of the interviews and signed a consent sheet in advance. All data were deleted after the finalization of this project.

4 RESULTS

4.1. SURVEY RESULTS

In the following section, the survey results with 36 participants are presented:

Demographics

The following figures show the distribution of participant's gender, age, and university they attend:

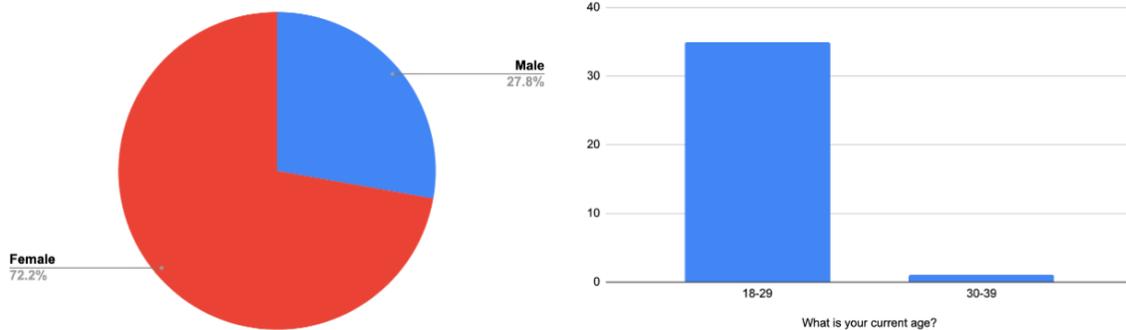


Figure 2: Gender distribution

Figure 3: Age distribution

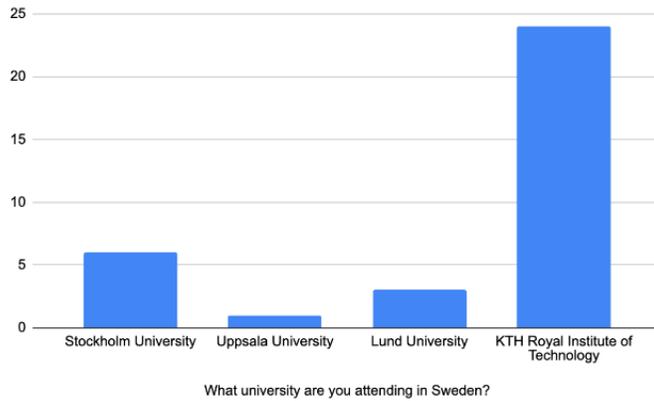


Figure 4: University distribution

As a study area 16 stated Engineering & technology (44.44%), 8 stated Social Sciences (22.22%), 8 stated Business, economics & management (22.22%) and 4 Architecture & design (11.11%). 25 students were pursuing a master’s degree (69.44%) and 11 a bachelor’s degree (30.56%). Of the participants, 20 were currently working (55.56%) besides their studies, and 16 were not (44.44%). The following figure shows the distribution of the participant’s country of birth:

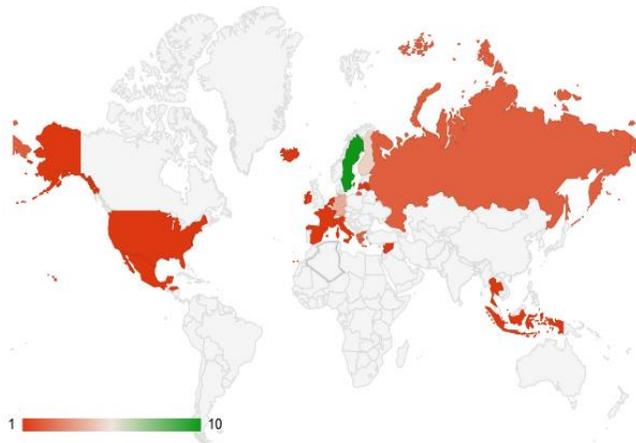


Figure 5: Participants’ country of birth

Self-evaluation

The participants tended to neither agree nor disagree with the statement ‘I am interested in politics’ (m = 3) and ‘I prioritize my studies above all’ (m = 3). With the statement ‘I am a heavy social media user’ (m = 3) the students were inclined to neither agree nor disagree. With the statements ‘I lack self-control’, ‘I have a tendency to develop addictive behavior’, and ‘I am easily influenced’, the students tended to disagree (m = 2).

General social media usage

The following figure shows the different social media the participants stated they use:

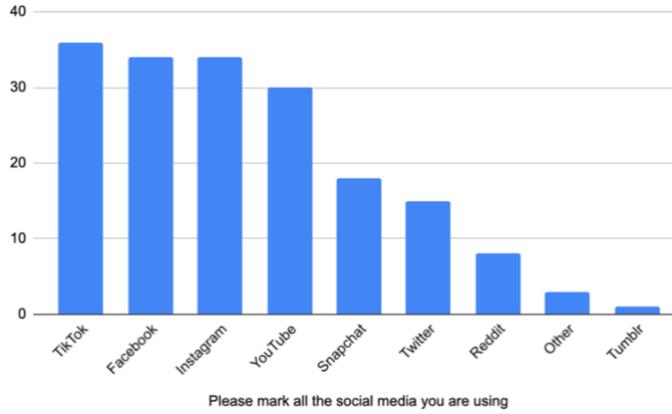


Figure 6: social media of the participants

When asked 'How important are social media in your life?', the respondents tended to be indifferent ($m = 3$). The following figures show the stated usage time in hours, first for TikTok and then for other social media:

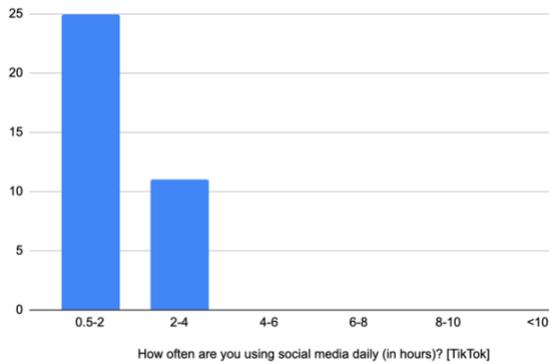


Figure 7: TikTok usage time

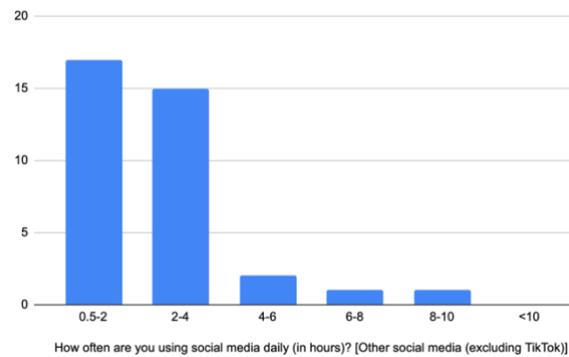


Figure 8: Other social media usage time

TikTok usage

20 respondents indicated that they do not use TikTok more often than other social media (55.56%), while 16 indicated they do (44.44%). The following figure shows the stated reasons for those respondents who used TikTok more often:

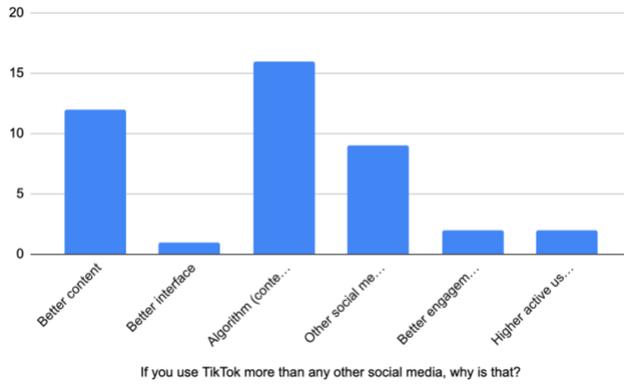


Figure 9: Reasons for using TikTok more often

34 respondents stated that at least some of their friends use TikTok (94.44%), while 2 did not know if that is the case (5.56%).

The following figures show the stated reasons for students joining TikTok, the kinds of content they consume, and how they use the app:

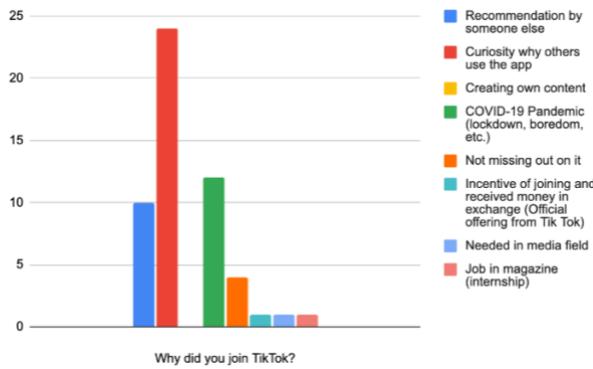


Figure 11: Reasons for joining the app

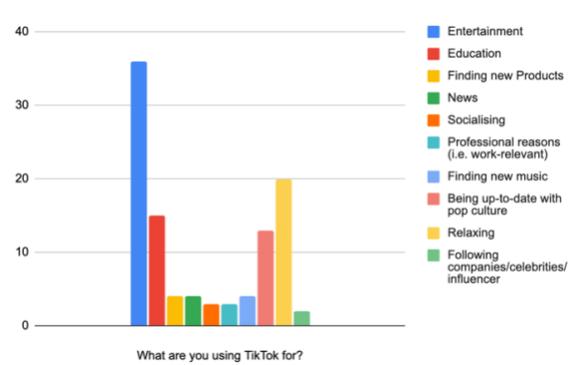


Figure 12: Kinds of content

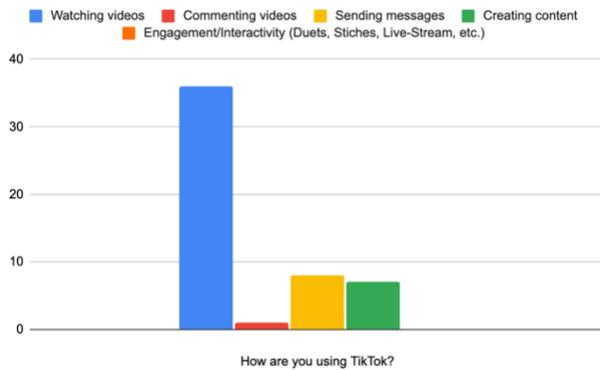


Figure 13: How participants use TikTok

27 of the students have a private account on TikTok (75.00%), and 9 have a public account (25%). Those who create content cover the topics of 'Entertainment (e.g., dance videos, funny videos, lifestyle)' with 7 responses (19.44%) and 1' Education (e.g., sharing knowledge)' (2.78%)

Accuracy of the algorithm

The students tended to agree that the algorithm is accurate in recommending videos ($m = 4$) and tended to state that they are often confronted with similar content and information on TikTok ($m = 4$). Regarding if they actively look for videos outside their 'For you' page, the participants tended to state not often ($m = 2$). Besides, the respondents tended to assess that TikTok is addictive ($m = 4$) and that it is not easy to stop watching videos ($m = 2$).

Impact on students

When it came to the overall impact of TikTok on the students, they tended to state neither positive nor negative ($m = 3$). With the statements 'I receive great product recommendation' ($m = 3$), they tended to neither agree nor disagree. With the statement 'I am using TikTok phrases offline (e.g., from trendy sounds)', they were inclined to neither agree nor disagree ($m = 3$). With both 'I see myself represented (e.g., LGBTQ+ Community on TikTok)' and 'I am getting distracted by TikTok', the students tended to neither agree nor disagree ($m = 3$). With the statements 'I learn new things on TikTok (e.g., science topics, pop culture)', 'I see content of like-minded people (e.g., share the same opinion)', 'I see content that aligns with my interest' and 'I feel like I am wasting time on TikTok' the respondents tended to agree ($m = 4$). The participants tended to disagree with both statements 'Since using TikTok I have (more) issues concentrating' and 'Since using TikTok I have difficulties to concentrate on my studies or work' ($m = 2$) and to very disagree with 'Since using TikTok my (political) opinions have become stronger' ($m = 1$).

Impact on society

Regarding the overall impact of TikTok on society, there was a tendency to rate it as neither positive nor negative ($m = 3$). With the statements 'TikTok is contributing to polarization of individuals and society' and 'TikTok has too much power as a social media platform', the students neither agreed nor disagreed ($m = 3$). Regarding the statements 'TikTok is a danger to a democratic society' and 'TikTok radicalizes people' ($m = 2$), they were inclined to disagree. With the statement 'TikTok is not safe for minors', they tended to agree ($m = 4$).

Potential use cases

The following figure shows the potential future use cases that participants stated:

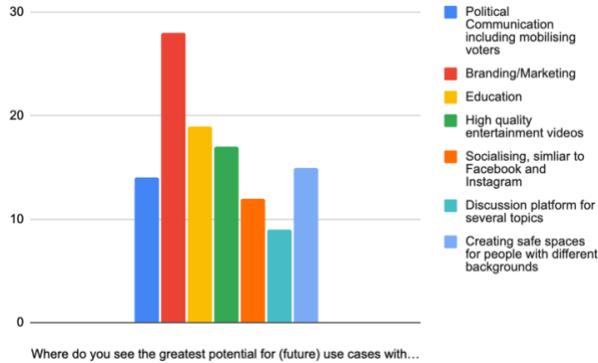


Figure 14: Potential use cases with TikTok

Misinformation and fake news

Moreover, the students tended to have encountered misinformation or fake news on TikTok neither often nor not often (m = 3). The following figure shows the kind of misinformation and fake news they stated to have encountered:

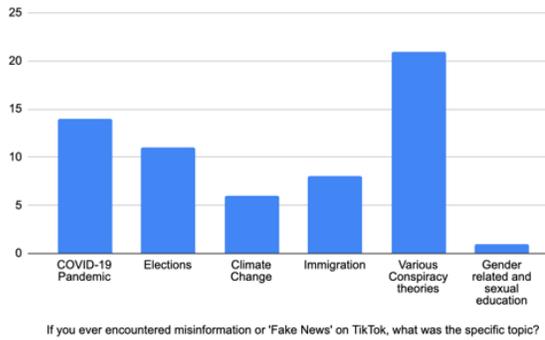


Figure 15: Kinds of misinformation and fake news the participants encountered

Privacy

When asked if they have read the general standard terms and conditions, including the privacy policy of TikTok, 34 have responded with no (94.44%) and 2 with partly (5.56%), meaning nobody has thoroughly or at all read the terms. The students tended to disagree with the statement ‘I believe my data is safe with TikTok’ (m = 2). When asked where they think their data is stored, 28 responded with China (77.78%), 14 with the USA (38.89%), 6 with Europe (16.67%), and 2 with Singapore (5.56%). After learning about the Chinese Personal Information Protection Law that allows the government to access personal user data, including biometric data, the participants tended to highly disagree with the statement ‘My data is safe with TikTok’ (m = 1). 32 respondents denied having stopped using other social media platforms after privacy violations (88.89%), while 4 stated they stopped using them (11.11%). The students tended to neither likely nor not likely

stop using TikTok when similar privacy violations would have occurred (m = 3), and they tended to neither agree nor disagree with the statement ‘I think TikTok’s use of my data, including Chinese government involvement, differs from any other social media, including US government’ (m = 3).

4.2. INTERVIEW RESULTS

The interviewees included 6 students, with 2 identifying as male (Interviewees 3 and 4) and 4 as female (Interviewees 2, 5, and 6). Each participated in a 15 to 20 min long interview. Each interviewee (I) has stated these short profiles:

Interviewee	I1	I2	I3	I4	I5	I6
Age	27	24	25	23	22	22
Gender	Female	Female	Male	Male	Female	Female
School	KTH	KTH	KTH	Stockholm university	Stockholm university	Stockholm university
Heavy social media user	No	Yes	Yes	Yes	Yes	Yes
Account	Private	Public	Private	Private	Private	Private

Table 1: Profiles of interviewees

I2, I3, I4, and I5 started using TikTok during the beginning of the COVID-19 pandemic in 2020 while lockdowns were in place, and they either stated it was due to boredom or/and fear of missing out and that it is trendy. I1's reason was due to her internship at a magazine, and I2's reason was due to her friends already being on TikTok and reuploaded TikTok videos as reels on Instagram. All interviewees are using the app mainly for entertainment reasons, and all expect I5 also for education. The educational content for I1 covers mainly skincare and makeup, for I2 sexuality and mental health, for I3 Swedish culture, for I4 working out, cooking, and American elections, and for I6 human rights and the LGBTQ community.

I3: "And also because I'm a foreign student. So, then it's easy so that I can see, like how people act and live here."

Besides, I1 also used TikTok as an inspirational source regarding skincare and makeup, and for her professional life, I2 also used TikTok for her work and for news, and I3 for being on track with current trends. I5 stated that she often uses the app for quick breaks or when she is bored, and she also acknowledged here the additive factor of the app.

I5: "I would say that it's really addictive because like it's giving your brain endorphins and also, you're like, oh, if I scroll a bit more; I'm going to get a really funny video. Mm-hmm. And. What else?"

Regarding the way the interviewees use TikTok, all, except I1 and I2, responded that they only watch videos and rarely comment on them, and I1, in addition, sometimes searches actively for videos or trends if she has an inquiry from her job

or if she needs ideas for writing a blog post. While I2 and I4 stated that they also use TikTok mainly to watch videos, they also had created content that only I2 has published.

When asked about the accuracy of the algorithm's recommendations, I2 believed it to be very accurate since she not only sees constantly relatable content but also learned, for instance, new things about her sexuality. I1, I3, and I4 believed that the algorithm is mostly accurate. I5 and I6 believed the algorithm to be sometimes accurate. All but I1 mentioned that they rarely or sometimes see videos outside their interests, which I2, I4, and I5 actively rate with 'not interested' to not see similar content again.

Concerning the evaluation of TikTok's content recommendation system, all participants indicated it is suitable for user experience since it is convenient for seeing relevant content since the user does not have to search for it actively. I2 stated that it is suitable for TikTok's business model since they can use the collected data for advertisement. Besides, I5 indicated that the content recommendation system of TikTok makes becoming viral easy. However, I1, I4, and I5 also indicated that seeing only tailored content on the 'For you' page based on the user's preferences and interests makes finding new content or information harder.

I4: "But in a sense, as I said, like, for finding new information or whatever, it's not necessarily the most useful app because you're not going to maybe find new points of view, at least because you most likely are informed in some sense about the same things."

I4 and I5 acknowledged that people could be stuck in an echo chamber or filter bubble, and I2 stated that by seeing content this way, the user confirms his or her bias. I2 also indicated that she is aware that TikTok is a persuasive technology, and due to its mentioned recommendation of tailored content, users can easily get addicted to it.

Regarding the question if they had a change of opinion due to TikTok or if they felt influenced by it, I1 believed to have been neither influenced by the app nor having experienced any real change of opinion due to her already existing strong political opinion. Moreover, she acknowledged that most content on TikTok is opinion-based and not neutral, making it a questionable reliable source.

I1: "And I keep this in mind as a pinch of salt because this is very subjective, and I don't regard it as a trustworthy source. So, like, if you talk only about politics or like global issues, I mean, it's probably like the source which will trigger my attention about something, and it will take me to, I'd say, to motivate me to look it up myself more or to start like doing my research."

I2 stated that she felt heavily influenced by TikTok, especially in her purchasing habits regarding trends where people promote certain products. Moreover, she indicated that she uses the app as a news source, although she acknowledged that it could be very opinionated and often confirms her bias. She also stated that she gets easily angry when watching emotional TikTok and that she recognizes particular polarization through TikTok. I3 indicated that he only experiences minor influences concerning consuming content about mental health and coaching. I4 implied that certain things had influenced him to learn more about topics or see different aspects and believes that his opinion became stronger if the seen content confirmed his bias. I5 stated that she has not seen a fundamental change in her opinion or has been influenced but has learned about new things, such as kinks and communities, which helped her understand these topics better. I6 indicated

that her opinion towards human rights and politics has become more radical, and she believes the reason for this is that he has been a politically interested person before.

In relation to the impact TikTok has on their life, I1 responded that she believes it to be neutral to positive since she uses the app as an inspirational source and enjoys seeing active communities on the app. She indicated not to feel addicted to the app since she can stop using the app at any time, and the app does not send out as many notifications as Instagram or Facebook. I2 stated that the impact is mostly positive since the app has a larger audience, is more open, and has tailored and accurate content for the user. However, she responded that the most negative impact on her is that she often spends around 4 hours on TikTok, which she could use for other things such as working or studying. She indicated that the app is highly addictive for her and that she has an addictive personality. I3 responded that the impact is positive and negative since, through the app, he feels part of a society and culture he recently moved to, but he also believes that he is spending too much valuable time on the app. I4 indicated that the impact is positive in the sense of entertainment, representation of certain groups and education but also negative since he feels highly addicted to the app and even has a routine where he uses the app for at least an hour before he sleeps. I5 responded that she believes the impact is primarily negative since her concentration and attention span worsened due to the short videos, as her brain became used to it.

I5: "Some of them are as short as like 10 seconds. It's like your brain is so stimulated all the time. And sometimes I feel like now it's overstimulated, and I can't focus on one thing anymore."

I6 indicated that the impact depends on her moods, meaning that if she feels energized and happy, it is positive as she only watches videos if she is bored. However, if she feels lazy, she keeps scrolling on TikTok endlessly. She implied that she is not a person with a tendency to addictiveness but feels addicted to the app. Besides, she responded that the impact on her is positive because she sees a lot of different representations, especially regarding sexuality and different types of bodies.

I6: "Yeah, I think it's like more representative for myself because like, I mean they can be like many skinny women and, you know, bodies and everything. So, I think TikTok is just more like normal people. So, I would say that that's also, like giving me confidence or something."

Regarding the impact on society, I1 implied that it depends on the individual's content feed and that TikTok, like other social media, has a toxic environment that could impact people differently based on acquired education. She indicated that she has often seen provocative content about different countries, which could trigger or affect people or communities that are passionate. I2 responded that TikTok positively impacts society since people can share personal experiences with a broad audience and raise awareness. However, the app also had a negative impact on her because she observed a toxic environment, including hate speech, negative comments, and attacks on marginalized groups. Besides, she indicated that especially vulnerable people like her are in danger of constantly comparing themselves with influencers or content creators on the platform. I3 implied that the impact depends on individuals using the app because, on the one hand, it can shine a light on topics such as harassment of women, but it could also be used to spread fake news, brainwashing, and queerbaiting. He also stated that he believes TikTok has a toxic environment and could be potentially harmful, especially to minors.

I3: I mean, from what I see, like, from what I have noticed in the, in the Greek part of TikTok, the comment section is usually fairly toxic. It's, it's like, it's very toxic."

I4 responded that the impact is similar to other social media due to addictiveness to the platform and people being constantly on their phones, but it could be helpful for spreading information and seeing communities that represent one and which one might not be able to see that way in real life. I5 indicated that the impact is negative due to the issue of echo chambers and confirmation bias and positive because users can come across, learn about and understand many different societies, cultures, and subcultures on the app. However, she stated that especially minors should not be exposed to some of the content she saw. I6 responded that the impact depends on the content the users see. She stated that although her 'For you' page would be suitable for, for instance, minors, she believes that social media still, in general, can harm underaged people. She stated that people vulnerable to radical views, for instance, extremists, that could harm society, could be further negatively influenced by TikTok, which she experiences as scary.

When asked about future use cases for TikTok, all interviewees responded with marketing. I1 and I3 also indicated education. I1 mentioned that the videos still need to be kept short as long as they are now. I2 implied that the platform could also be further used for raising awareness and more entertainment. I4 stated that TikTok could be used for political communication since it could be useful for getting more people involved in politics. However, she also mentioned that users might only see one-sided political content due to the algorithm, which leads to users not seeing the bigger picture.

Concerning the question if the participants or people they know have ever been a victim of misinformation or fake news and if there were any kind of real-life consequences, I1 stated that she had not encountered misinformation. She understands that most content is user-generated and cannot be used as a reliable source. Hence, she would probably research the content of the video if it were very emotional or triggering. I2 implied that one of her Ukrainian friends had to deal with misinformation by Russian bots and that I2 often shares information she received from TikTok with friends, although she acknowledged it is not a reliable source and is often opinion-based generated 'news'. I3 stated that he could not recall if he encountered misinformation, and he believes it is due to him not having relevant enough content for it on his 'For you' page. I4 responded that he had encountered misinformation and fake news, especially about COVID-19 and the vaccine, and he believes that we all could be in at least a small amount. I5 indicated that she believes there is a large amount of misinformation on TikTok but ignores it if she deems it unimportant. I6 stated that she was not exposed to it or did not remember.

When asked about TikTok collecting various data and the possibility that the Chinese government can force the company to access these data, I1 stated she knew about data privacy issues and that it was the reason she hesitated to join the app. Moreover, I1 stated that she understands that laws in China are fundamentally different from those in Europe and that she believes TikTok is not transparent about the data collection and processing. I1 stated that she, therefore, neither posts content nor comments on anything. I2 responded that she knew about the Chinese Law to access Chinese Company data but is not very protective about her data and does not think it would affect her personally. She stated that other big companies like Google already have all her data, but she feels safer with American companies and the US government having access to her data.

5 DISCUSSION

5.1. USER BEHAVIOR AND TIKTOK'S IMPACT

TikTok user behavior

In this study, predominantly female students participated despite using different communication channels and a diverse network. Although this could mean that the used network, in general, had more female students to begin with, it could also indicate that female student tends to use TikTok far more often than their male students. In this regard, an accumulated 70% of the participants are using TikTok for around 0.5-2 hours per day, and around 80% are using other social media for 0.5- 4 hours per day. However, from the survey results, there was only a tendency for people to be indifferent towards describing them as heavy social media and social media being important in their lives. Since all of them are studying, presumably full time, and over half the participants are working beside their studies, spending 0.5-4 hours per day on social media indicates that social media is, in fact, important in their lives to some degree. This would also explain why most survey participants stated to still use older social media such as Facebook, Instagram, YouTube, Snapchat, Twitter, and Reddit. Additionally, 5 out of 6 interviewees described themselves as heavy social media users, further contributing to the assumption mentioned above. All 16 students who use TikTok more often than other social media stated that it is due to the 'Algorithm (content-recommendation)', and 12 of them further stated it is due to 'Better content'.

According to the results, the students predominantly joined the app because of their curiosity about why others use the app, followed by recommendations by others, and they did not want to miss out on it. These responses could be interpreted that those students either wanted to be up to date with the new hype about TikTok or simply, as two interviewees have stated, to watch and send content that has been uploaded from TikTok to other social media, such as in the form of an Instagram reel. Another reason why 33% of the survey participants joined TikTok was the COVID-19 pandemic, including the lockdown and boredom. Almost all interviewees also stated this reason. Hence, this could explain why all participants in this study use the app because it offers them entertainment and, to some, also relaxing and educational value. Most of the survey and interview participants use TikTok solely for watching videos, and only a small portion for, such as, creating content or commenting on videos. Thus, the participants of the study were predominantly passive users who preferred consuming content rather than creating new one.

TikTok's algorithm accuracy and the filter bubble

According to the survey data, there was a tendency to observe that the participants regarded TikTok's algorithm as accurate and often were confronted with similar content. This was also observed in the interviews since half of the questioned students either stated that the algorithm was accurate or mostly accurate. In this context, three stated that they sometimes see content outside their area of interest, which could be explained by the TikTok approach of testing out new videos or allowing the user to have new content on their feed [16]. Consequently, this could also imply why not more survey participants evaluated the algorithm as very accurate.

Therefore, this could be why some believe the algorithm is only sometimes accurate. Both survey participants and interviewees tended to see similar content based on their interests and made by like-minded people and not actively search for other content, i.e., using the discover feature. This could potentially put them in a filter bubble. Although this was a self-evaluation and should be treated cautiously, the fact that the survey participants were inclined to disagree with having stronger (political) opinions after joining the app could contradict the idea of a filter bubble. However, half of the interviewees expressed that they experienced a strengthening of their opinion since joining TikTok, with two acknowledging that it is also due to content that confirms their biases. One expressed her concern that by selectively seeing

extremist content, dangerous people to society could further radicalize. However, the other half could not notice any significant change in their opinion. This could be because the participants in the survey tended not to be politically interested, and only two in the interview mentioned that they saw political content on TikTok. Consequently, the majority might not see any political content in the app at all and instead, as the data shows, mainly entertaining content. Only four students in the survey and one interviewee stated that they use TikTok for news. This could also contribute to why some believed their opinion was changed or why they feel influenced. Nevertheless, interviewees acknowledged that TikTok content often is highly opinionated even if presented as news and cannot be seen as a trustworthy news source. Consequently, the theory of filter bubbles [15], which, as previously mentioned, is contested, is challenging to test with the collected data. Some interviewees still acknowledged that seeing information filtered by an algorithm could be an issue.

Moreover, when it came to the representation of the user on TikTok, the survey participants tended to be indifferent. This still means that there are still participants who experience being represented on TikTok. Half of the interviewees specifically mentioned that they see content and creators that represent them. One even highlighted that she acquired new knowledge about her sexuality, implying that the algorithm, based on the interaction with the app, has shown her content that she could relate to and helped her understand her own identity better. It could be derived that TikTok is diverse and has content that includes people with different identities.

TikTok's impact on users' lives

The results from the survey and the interviewees regarding the impact on the students' lives indicated that it is neither simply positive nor negative. The most positive impact derives from the fact that the participants in the study stated that they had acquired knowledge through TikTok, to some degree see themselves represented and due to the apps' algorithm receive tailored content, especially with entertainment value. Regarding educational value, interviewees have stated a wide range of topics such as culture, politics, skincare, LGBTQ+, and human rights. Each of these topics has supported them in different aspects. For instance, one interviewee understood the culture better, or the other one learned more about American elections. This aligns with the previously mentioned study about the potential of TikTok as digital knowledge mobilization. Additionally, feeling represented on TikTok also had a major positive impact on one interviewee since, after seeing different body types on the app, she felt more confident about her own body. However, another interviewee felt negatively impacted when she compared herself with influencers on the app. This contributes to the theory that TikTok, like other social media, can negatively or positively influence body image [23].

Nevertheless, TikTok also had a further negative impact on the participants. The results show that both participant groups predominantly assess the app as addictive and that it is difficult to stop watching videos. Similar findings were observed in a study with young people in Pakistan [21]. Hence, this indicates that TikTok as a PT, indeed, undermines the user's possibility to opt-out from using the app by constantly persuading the user to stay on the app [14]. The persuasion strategy is the app offering an accurate algorithm that delivers the user almost infinite and specifically tailored content. Besides, as aforementioned, TikTok also, at one point, diversifies the user's content feed by showing them videos outside of their current content theme [16] which aligns with the theory of PTs to alter their persuasion strategy. This then leads to emotional stress, which is backed up by the survey participant's tendency to believe that they are often wasting time on the app. Additionally, most of the interviewee's participants believed this as well and further stated that they could use their time for other activities such as studying or working. One interviewee even changed his behavior regarding integrating the app into his sleeping routine by watching videos before he goes to sleep. Another issue related to the higher usage of TikTok is, as one interviewee stated, that becoming more exposed to marketing could lead to higher rates of purchasing products. One interviewee believed that her concentration and attention span became worse since using TikTok due to the

short videos and the constant stimulation of the brain. Although the survey participants stated that they do not have these issues, assessing the app as addictive, spending up to four hours on it, and finding it difficult to stop watching videos could indicate that some simply evaluated that statement wrongly.

TikTok's impact on society

The survey participants tended to have an ambiguous attitude toward whether TikTok had a positive or negative impact or if TikTok contributed to the polarization of individuals and society. This could be attributed to the reason mentioned previously that not all students see polarizing content on TikTok themselves. Concerning TikTok having too much power as a social media, they had the same attitude, which could be due to either not understanding the question or not having enough knowledge about this. The same reasoning could be applied to the finding that the student tended not to believe that the app is a danger to a democratic society or that it radicalizes people. However, they were inclined to believe that the app was not safe for minors. Similarly, two interviewees agreed with this since one had content on her feed meant only for adults, and the other one attributed this to the toxic environment on TikTok. Since there is only a minimum age limit of 13, there is another danger of minors getting approached by older users, as happened in a study with Thai students [13]. In addition, younger and vulnerable people could develop signs of addiction to the app, which further contributes to the potential harm that TikTok could further cause [20], [21]. The toxic environment was additionally confirmed by two other interviewees. They described it as an environment where often hate speech, hurtful comments, targeted attacks against marginalized groups, and provocative content about countries occurred. While the interviewees stated this also happens on other platforms, this issue could be more problematic on TikTok since, according to survey results, the app bears a higher risk for users to become addicted. Consequently, they would spend more time on this platform, meaning they are longer exposed to this toxic environment. The same could be applied to users being longer exposed to fake news and misinformation. Nevertheless, participants also saw a positive impact on society. Users can share their personal experiences with the billion active users and raise awareness, for instance, as one interviewee stated, about sexual harassment of women. As previously mentioned and by the participants stated, TikTok could also be a supporting tool for educating people on different cultures and minorities, such as the LGBTQ+ community or political communication, e.g., mobilizing new voters or having a platform to understand current political events.

Misinformation and fake news

From the results, it can be derived that there was not a clear trend on whether the participants had encountered misinformation or fake news often or not. Those survey participants who encountered misinformation stated that it was regarding various conspiracy theories, the COVID-19 pandemic, election and immigration, climate change, and gender and sexual education. One interviewee also encountered COVID-19 and vaccine-related misinformation and another one's Ukrainian friend regarding Russia's invasion of Ukraine. Thus, most of these topics are globally relevant and, therefore, often put in a political context. This could explain why other participants did not encounter misinformation or fake news since they do not receive relevant content, such as globally relevant themes or news, on their 'For you' page. Some interviewees acknowledged this as well. They were also aware that user-generated content cannot be a reliable source for these topics and that, therefore, on TikTok, many kinds of misinformation could circulate. Accordingly, TikTok could also be a platform for spreading misinformation and fake news, like other social media [28].

5.2. POTENTIAL USE CASES

Marketing/Branding

TikTok, with its tailored content and large user base, has huge potential for companies to market their products and branding. This is especially the case due to the market industry's billion-dollar potential and the high demand for influencers [5], [6]. Users could see personalized advertisements based on their past interactions with content on the app. Furthermore, every creator can advertise products as part of their regular content. Contrary to Instagram, where users actively must follow someone to see their content, a video on TikTok could potentially reach far more users. Deriving from the results, the advertisement videos should be designed in a way that matches the 'For you' page of the targeted user groups on TikTok. Since some participants also stated to use TikTok to keep up with pop culture, companies could use this to their advantage by including current pop culture references trending on the app.

Education

Since many participants stated that they learned new things on TikTok about several different topics, the app could also be further used for educational purposes. As one interviewee stated, the videos should not exceed the current duration, as this could make users avoid this kind of content. Besides, as previously mentioned, the educational videos could include digital knowledge mobilization about different communities that users otherwise would not actively seek educational content for [39], [40]. This way, the app could not only be used to educate users but also raise awareness about issues and current global or local events.

High-quality entertainment videos

Predominately, the study participants used TikTok as a form of entertainment or distraction. Creating entertainment videos with higher quality could attract more users to the app and give creators an advantage regarding new followers.

Political communication

The participants indicated that the app could be used for political communication. Thus, TikTok could be helpful in allowing politicians to communicate with their constituents and mobilize first-time voters, predominantly young people. Furthermore, like some countries are already conducting this [36]–[38], other countries could use this as an opportunity. Potentially, the app could support getting people more active and interested in politics. Since content can reach many users, the app could further spread awareness and information about different political processes or battle misinformation. However, more political content on TikTok could lead to a higher amount of misinformation since the algorithm could lead to people being exposed to selective misinformation. Consequently, users could also, for instance, not see all relevant information for an upcoming election or the stance of a politician.

Creating safe spaces for people with different backgrounds

Despite the toxic environment on TikTok mentioned by the participants, which appears to depend on the respective content, TikTok could be used for creating safe spaces for people. Users who are part of marginalized groups will probably see content they can relate to and feel free to express themselves. In this regard, they can interact with each other to support and provide relevant information.

Socializing

Since students stated that they see potential in TikTok as an app for socializing, this might indicate that users believe that

TikTok will at some time become the primary social media. Hence, people would use the platform to consume content, communicate with each other, and find new friends, like on other social media.

6 ETHICAL AND PRIVACY CONSIDERATIONS

Besides the ethical considerations due to addictiveness, the toxic environment, the safety of minors, and emotional stress on the users, there are also important privacy considerations. The main findings regarding data privacy and TikTok were that none of the study participants thoroughly read the general standard terms and conditions, including the privacy policy. Most of the study participants had a private account on TikTok, and they did not believe that their data was safe with TikTok. They also stated that TikTok's servers were in China, although they are located in the US and Singapore [34]. When they learned about the Chinese Personal Information Law [7], [9], they stronger believed that their data was not safe. However, most study participants did not stop using other social media after privacy violations, and there was also no distinct trend on whether people would stop using TikTok if similar violations happened. Since they did not read the general standard terms and conditions, including the privacy policy, the users did not give valid consent since none have fully read them [20]. Moreover, since the majority did not know the correct answer to where the server location was, they cannot possibly know what laws apply in the countries where their data is stored. Both are essential for the user to understand the risks they take when they use the app [20]. Nevertheless, the participants showed certain awareness about privacy issues since most of them have private accounts, do not actively publish any content, and believe their data is not safe with TikTok. Interviewees often acknowledged that they solely watch videos and mostly do not even comment because they do not know what can happen with their collected data. Besides, most of them knew about the Chinese Law and yet did not stop using the app. Many of the interviewees believed that their online data was already in possession of other tech companies and that it would not make a difference if another one had it. The students often stated that they do not believe that they as a person are relevant enough to fear any persecution if a foreign government gets access to their data. The results indicate that they have lost trust in social media platforms and possibly become used to either privacy violations in terms of data breaches or their data being processed by different undisclosed organizations. This could explain their indifference towards if the US government and companies or the Chinese government and companies have access to their data. While the study participants showed to some extent awareness about their data being at risk, this indifference towards their data privacy is alarming. This could give companies and governments a reason to restrict their right to sufficient online privacy further.

7 SUSTAINABILITY AND GENDER ISSUES

The study provides valuable insight into how TikTok is not only an entertainment platform but also could be used for educational purposes or for raising awareness about specific issues. The app could be used to raise awareness about climate change and mobilize people to put more pressure on companies and the government to act accordingly.

When it comes to gender issues, the goal of finding participants was to have an equally distributed amount of female, male and other students to have a diverse range of input. However, female students were overrepresented. Moreover, deriving from the survey results, TikTok could also be used to spread awareness and information about women's rights, different gender identities, and the issues they face.

8 LIMITATIONS AND FUTURE RESEARCH

Due to time limitations and difficulties, in general, in finding participants who are students in Sweden and who are using TikTok, the sample size of the qualitative research was small. It was not possible to find participants from all universities in Sweden. The same issue occurred with the interview participants. The questionnaire for the survey should have been possibly cut in the number of questions and instead included more follow-up questions to understand the reasoning behind the participant's responses. Besides, additional questions about other social media usage and its relevance in their life should have been asked. Only students who identified as male and female participated in the study, and the latter were overrepresented in the study. Due to these limitations, both research results might not be statistically significant. A deeper analysis in terms of statistical correlation between the responses should possibly have been conducted.

In accordance with the limitations, there are some suggestions for future research. Research should be conducted to understand the correlation between their usage of TikTok and other social media and to understand if users are shifting to use TikTok as their primary social media. Since different social media tend to copy from each other, such as the mentioned Instagram Reels by two interviewees, it would be interesting to understand if users observe this and how it impacts their social media usage in general. Besides, the previously mentioned use cases with TikTok could further be explored. Another interesting research topic is finding out why users become further indifferent to their own data privacy. Finally, research regarding the power dynamics between TikTok, China, and other countries, similar to the research on other social media, could be worth extending.

9 CONCLUSION

The case study began with a literature review that analyzed the current research on TikTok, which supported the development of the research methods. These quantitative and qualitative research methods included a survey with 36 participants and a semi-structured interview with 6 participants. The main findings of this case study were that all participants used TikTok for watching entertaining videos but also for education or pop culture. Besides, they joined the app mainly due to curiosity, recommendations, and the COVID-19 pandemic. The time spend on the app ranges from 0.5 to 4 hours on the app, and this indicates that the algorithm that enables them tailored content accurately meets their interests. The participants predominantly use the app only to consume content rather than interact with other users or create content. There was no distinct indication of whether they experienced a filter bubble. However, the results imply that the students evaluate the app as addictive. The impact on students was both positive and negative since they receive entertainment and educational value but often spend too much time on the app, which they perceive as a waste of time. The participants tended to believe the impact on society was neither positive nor negative but saw the app's potential. For instance, the results implied that the app could be valuable for marketing, education, or political communication. Further, the students appear to be aware of the privacy issues of TikTok to some extent but have become indifferent at the same time, especially due to the privacy violation in the context of other social media. Regarding sustainability and gender issues, the app could be used to spread awareness about these topics since the users are not only consuming educational content on the app. Several limitations occurred, such as the survey's sample size or a lack of deeper statistical analysis to understand the significant correlation between the results. Finally, future research should be conducted regarding, among other things, the social-political impact of TikTok, the potential use cases, or the growing indifference toward users' data privacy.

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