Influencing the Influencers? The Case of @CelebJets and the Role of Social Media in Empowering Citizens to Conduct Climate Justice Activism

Completed Research Full Paper

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Abstract

Online climate change activism is growing. However, its effectiveness is not yet firmly established. One of the challenges is for citizens to make sense of the vast amount of data to understand the impact of specific behaviors. The aggregation of publicly available information in a comprehensible and playful manner could potentially trigger effective evidence-based activism. However, it is not yet clear if and how such an intervention works. In this paper, we make a preliminary analysis of a use case of such an approach by investigating the @CelebJets phenomena, which automatically tracks and shares the private jet flights of celebrities on Twitter. Our analysis demonstrates that this approach can elicit user engagement and provide pertinent material for the press, potentially leading to a shift in behavior, particularly among celebrities who are promoting sustainability.

Keywords

CelebJets, climate justice, online activism, social media, sustainable HCI, virtual communities

Introduction

"Do you want to take mine or yours?" reads the caption of Kylie Jenner's July 16th 2022 Instagram post addressed to her boyfriend – rapper Travis Scott – under the picture of two private jets. In response, social media users have raised concerns about the environmental impact of flying in a luxury private plane while parts of the world face dangerous forest fires and record temperatures due to global warming. *"The lack of awareness is honestly amazing,"* read one of the thousands comments on Jenner's Instagram post.[1]

Online activism has the potential to be an effective tool for promoting social and political change, but it can be challenging to ensure that it is effective. One possible solution is to (1) use real-time behavioral data to track behavior and behavior change, (2) structure and simplify this data to overcome data literacy issue and make it understandable, and (3) share it using social media in order to gain visibility and foster engagement. In this paper, we explore this approach through the @CelebJets case study in the context of climate change and excessive use of private jet air travel among celebrities. @CelebJets (1) tracks celebrity private jet flights in real-time, (2) presents the data in a simplified format to highlight the environmental impact of each flight in terms of CO2 emissions and fuel consumption, and (3) automatically publishes this

[1]https://www.washingtonpost.com/lifestyle/2022/07/21/kylie-jenner-private-jet-climate-crisis/

information on Twitter. In examining the @CelebJets case, we seek to understand how the online shaming process was implemented and its impact on people's behavior towards greater sustainability. This paper is primarily interested in the impact that the @CelebJets campaign had on celebrities, through the following research overarching question:

How is user engagement with @CelebJets associated with a change in celebrity behavior?

To address this question, this paper first gives an overview of the related work, before it presents the @CelebJets case study. Then it discusses data collection and results. Finally it wraps up with a discussion and concluding remarks.

Related work

Online activism

Online activism, the use of the Internet and digital technologies to promote social and political change, has gained significant traction in recent years as more individuals turn to the Internet to express their views and engage in political discussions (Oh et al. 2015; Ozkula 2021; Özkula et al. 2022). Examples of recent online activism include the #MeToo movement, in which women used social media posts to expose sexual harassment (Moitra et al. 2021; Moitra et al. 2020), the use of social media to organize political protests such as the Arab Spring (Oh et al. 2015), and the Black Lives Matter movement (Stewart et al. 2017). Online tools, such as social media, blogs, and online forums, facilitate collaboration and coordination among activists, allowing for the dissemination of information and ideas, potential mobilization of large numbers of people, and the formation of networks of support for collective action (Chou et al. 2020; Ozkula 2021).

Climate justice activism online

The prevalence of online climate justice activism has increased in recent years as a result of the widespread accessibility and usage of digital technology (Boulianne and Ohme 2021). The opportunities, identified by the literature review on the subject, include the potential to reach a large and diverse audience, the facilitation of collaboration and coordination, the potential for inspiring offline action, and driving political change, as well as fostering innovation and creativity (Dourish 2010; George and Leidner 2019).

However, there are also notable challenges present, such as the digital divide, the lack of transparency and accountability of online platforms, the risk of online surveillance and repression, and the challenge of ensuring inclusivity and diversity. Finally, the effectiveness of online climate justice activism in driving change remains a topic of ongoing debate in the academic literature (Boulianne and Ohme 2021; Knupfer et al. 2023; Scherman et al. 2021).

An example of online climate justice activism is the phenomenon of flight shaming, also known as *flygskam* in Swedish. Flight shaming refers to the social shaming of individuals who choose to fly rather than use alternative forms of transportation (Chiambaretto et al. 2021). With the *flygskam* movement, social media users typically post messages or comments about their experiences of traveling without flying and encouraging others to do the same, often sharing photos or videos of themselves taking trains or buses instead of planes and using hashtags such as #flygskam or #flightshame (Mkono 2020; Winter et al. 2021). Research has shown that this approach can be effective in raising awareness about the environmental impact of flying and encouraging the use of alternative modes of transportation (Gössling et al. 2020; Mkono 2020). For example, a study found that the *flygskam* movement has affected social norms surrounding the desirability of air travel in Germany (Gössling et al. 2020). Another study found that social media played a key role in the spread and success of the movement. The study found that the movement was characterized by high levels of engagement, user-generated content, and cross-cutting networks (Mkono 2020). However, the success of such initiatives also relies on the public being climate literate, or having an understanding of the complex issues surrounding climate change and the ability to apply this knowledge in personal and civic life (Ferreira et al. 2021; Nieborg and Walrave 2017).

Climate literacy

Online climate activism can play a role in promoting climate literacy by providing information and resources about climate change and encouraging people to take action (Ferreira et al. 2022). However, it is important to recognize that not all individuals have the same level of climate literacy, and some may have limited knowledge or understanding of the issue. This gap in climate literacy can hinder the effectiveness of online activism, as it can limit the ability of activists to reach and engage a wide audience. To address this challenge, activists can employ strategies such as simplifying information through labels or visual aids. For example, infographics or videos, can be useful in conveying complex information about climate change in a more accessible way (Lumley et al. 2022; Moser 2016). It is crucial to ensure that the information provided is accurate and evidence-based, while also being presented in a way that is understandable to a wider audience, to help more people understand and take action on environmental issues (Moser 2016).

The @CelebJets Case Study

@CelebJets is a Twitter account that aims to raise awareness about the use of private jets among celebrities. It serves as a case study of the application of technology in advancing awareness and promoting action on climate change related issues. The establishment of the @CelebJets account was initially motivated by curiosity surrounding tracking systems, but it has since evolved into a widely popular phenomenon on the Twitter platform, with a sizable following keeping tabs on their favorite celebrities (Gularte 2022). Furthermore, in addition to providing information on celebrities' flight activity, the account also tracks and disseminates information related to carbon dioxide emissions and jet fuel usage. This feature inadvertently brought to light the environmental impact of air travel, in particular the high-frequency travel patterns of notable figures such as Taylor Swift, Kylie Jenner, and Drake, effectively raising awareness on the issue and supporting the growth of the flight shaming movement. The approach presents an intriguing prospect wherein altering the conduct and outlook of these influencers could potentially lead to a multiplier effect, with their actions inspiring a greater number of people to follow suit and take steps towards environmental conservation, such as reducing air travel, or making other lifestyle changes.

Genesis

In the summer of 2020, a 19-year-old student named Jack Sweeney from the University of Central Florida began tracking the private jet travel of Elon Musk via the @ElonJet Twitter account. In an interview with Vulture, Sweeney revealed that he initially began tracking the celebrity out of personal interest, but eventually recognized the potential for his efforts to shed light on the emissions produced by such travel, as well as the practices of influential individuals. Over the course of two years, by June 2022, Sweeney developed 30 bot accounts and gained over one million followers, using his platform to call attention to the environmentally harmful and excessive travel habits of celebrities.

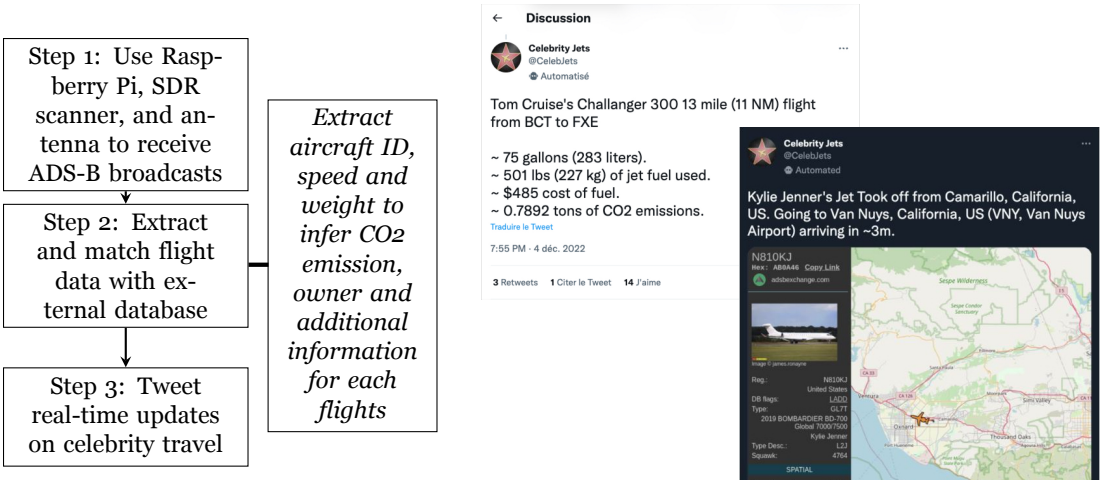

Figure 1. An overview of the steps taken by Jack Sweeney to establish the Twitter account @CelebJets.

Technology

Jack Sweeney's approach provides real-time information about private jet usage by synthesizing data from various sources, such as CO2 emissions and fuel usage, making it easily accessible and understandable for the public. As shown in Figure 1, Sweeney utilizes a crowdsourced public database known as the Automatic Dependent Surveillance Broadcast (ADS-B) Exchange.[2] By using a Raspberry Pi computer, a Software Defined Radio (SDR) scanner and an antenna (Step 1) he is able to track flights by receiving ADS-B broadcasts such as identity, position, and speed, which are then processed to track movements and determine ownership. Sweeney also inferred the associated CO2 emissions and additional information for each flight by using publicly available data on the make and model of the aircraft, its weight, and the distance traveled, providing more layer of insight into the environmental impact of celebrity travel (Step 2) (Gularte 2022).[3] This whole process is automated and results in a bot tweeting the information next to a visual map of the flight in real-time (Step 3) (Gularte 2022).

Reception

The campaign initiated by @CelebJets was launched in June 2022. Despite the early inclusion of notable figures such as Elon Musk in its tracking efforts, it was not until the end of July 2022 that the campaign gained significant traction. This is evidenced by the spike in media coverage, as shown in Figure 2, which displays the results of a Google News search filtered by the keyword @CelebJets, with a total of 276 results. The spike in media coverage coincided with Kylie Jenner's post on Instagram expressing her indecision on which private jet to take, indicating that it played a role in bringing attention to the campaign. The media often focused on the unique approach taken by Sweeney to raise awareness about environmental issues and the potential impact of his campaign on the behavior of celebrities. This coverage was featured in various outlets such as Vulture (Gularte 2022), Forbes[4], and The Guardian[5]. According to his interview with Vulture (Gularte 2022), Sweeney received threatening messages and legal threats from celebrities and their representatives. In response to his actions, some celebrities sought to have the accounts in question suspended or removed by reporting them to Twitter, others attempted to alter their identifying information on their planes in an effort to evade tracking. Some chose to publicly address the issue through statements or social media posts. However, Sweeney stated that he always made sure to follow Twitter's terms of service

[2]https://www.adsbexchange.com/
[3]https://livewire.thewire.in/out-and-about/how-a-teenagers-twitter-bot-tracks-russian-oligarchs/
[4]https://www.forbes.fr/business/twitter-suspend-plusieurs-comptes-qui-suivent-les-trajets-des-jets-prives-des-milliardaires/
[5]https://www.theguardian.com/technology/2022/feb/02/teen-tracking-elon-musk-jet-bill-gates-jeff-bezos-drake-jack-sweeney-tesla-flight-tracker-bot

and to only post publicly available information, so the accounts were not removed. It is worth noting that none of these celebrities publicly pledged to engage in more climate action or reduce private jet flights as a direct response to this campaign. As of December 14, 2022, it was reported that all Twitter accounts were closed under the order of Elon Musk, the owner of Twitter, citing "physical safety violation" as the reason for the closure.[6] Subsequently, a new account was opened on the platform, @ElonJetNextDay, which tracks the movements of Musk's private jet with a 24-hour delay to circumvent Twitter's policy restrictions.[7]

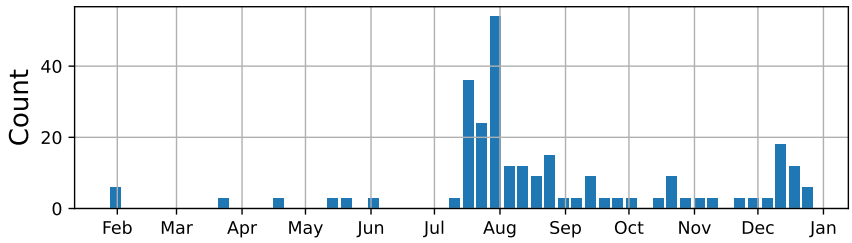

Figure 2. A histogram depicting the number of weekly news articles about @CelebJets listed by Google News in 2022.

Data collection

We conducted a thorough analysis of data from various sources in order to gain a comprehensive understanding of the case study at hand. The data analyzed pertained to two key aspects of the case study: celebrity behavior, and the activist engagement data.

Celebrity behavior (number of flights)

We obtained flight data for 18 celebrities from the @CelebJets Twitter account and expanded our dataset by tracking the flights of 5 additional individuals using 5 additional Twitter accounts (@BezosJets, @GatesJets, @TrumpJets, @ElonJet, and @VerstappenJet). This resulted in the tracking of 23 private jet flights over a four-month period from June to September. To gather the data, we used the Twitter API, and exported all related tweets which were filtered to include only those of private jet flights. Due to the closure of these Twitter accounts in December 2022, we were unable to gather flight data beyond the four-month period. This process resulted in 726 tweets, each representing a private jet flight. As the highest engagement on the Twitter account and the most media coverage occurred at the end of July (see Figure 2), we assume that behavior change due to the shaming campaign would not be visible before the beginning of August. As such, we considered the months of June and July to be the baseline for each celebrity. We considered the months of August and September to be part of the intervention period that was potentially impacted by the shaming campaign. For each celebrity we compute the mean monthly flights for the baseline and compare it to the number of monthly flight intervention period. It should be noted that whereas seasonality and variation in schedules cannot be exluded, the flight patterns between June/July and August/September does not vary much under normal circumstances. For instance, when looking at the open source flight radar data (Flightradar24 2022), the difference in the average number of commercial flights[8] for June/July (baseline value) and August/September in 2021 and 2022 are -1.75% and 0.01% respectively. This approach allows for a meaningful comparison of the number of private jet flights between the two periods for each celebrity, enabling the identification of any significant changes in behavior during the intervention period. We only used the number of flights as behavioral metric, as more fine-grained data such as CO2 emissions, fuel consumption and pricing are inconsistently reported across tweets.

[6]https://www.bbc.com/news/world-us-canada-63978323
[7]https://www.theverge.com/2022/12/23/23524060/twitter-elon-musk-jet-tracking-elonjet-elonjetnextday
[8]Commercial Flights correspond to Commercial passenger flights + cargo flights + charter flights + some business jet flights

Selection process and additional considerations

For the celebrity selection, we targeted all celebrities promoted by the @CelebJets campaign on Twitter and expanded the dataset by including five additional celebrities with specific accounts, all owned by Jack Sweeney. We decided to limit our selection to accounts owned by Sweeney to maintain coherence in our dataset and avoid introducing potential confounding factors from other accounts that may use different technologies and post types/structure. Additionally, we collected data on celebrities' involvement in climate actions through their Wikipedia page and other online sources, including any evidence of activity related to "sustainability", "climate", or "environment". Due to the limited sample size, the inclusion of further variables such as age, gender, or career in the analysis was deemed irrelevant.

Activist engagement

To obtain data on the level of shaming for each of the celebrities involved in the campaign, we used the Twitter open application programming interface (API). We measured engagement as the total likes and retweets per Tweet. While this metric does not capture the nuanced nature of public reactions to individual posts, we reasoned that it would provide a useful proxy for the overall level of attention generated by each celebrity's private jet travel. Note that more advance engagement metrics such as the evolution of number of followers, was not possible due to API limitations. It is worth noting that, as revealed through interviews with the account holders, the number of followers on each account experienced a rapid increase until their closure (Gularte 2022).

Results

The engagement on the Twitter accounts underwent considerable fluctuation over the period from June to September (as shown in Figure 3). A thorough analysis of the data on @CelebJets revealed a significant increase in the total number of likes and retweets per Tweet, with a >800% increase observed at the end of July. This peak in engagement is further validated by the corresponding increase in media coverage depicted in Figure 2, which coincides with the date. However, it should be noted that this trend was not sustained, as engagement decreased by 21% and 29% in the following months of August and September respectively. Figure 3 below provides a summary of the results, including the total likes per Tweet and retweets per Tweet from one month to the next for @CelebJets.

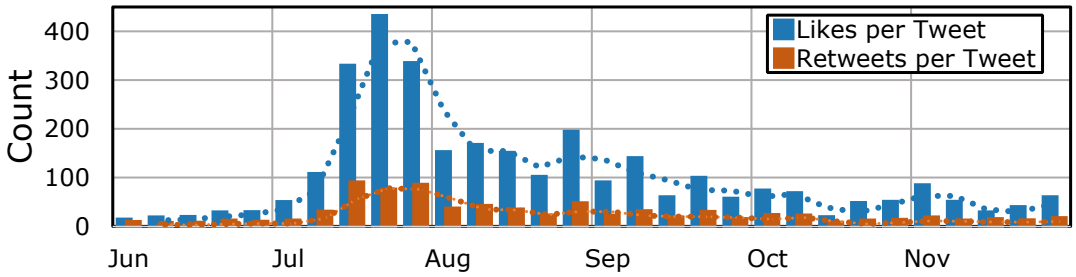

Figure 3. A histogram depicting the distribution of total likes and retweets per Tweet for the @CelebJets account from the beginning of June to the end of November.

Exploring the impact of social media engagement on celebrity behavior change

In Figure 4, we depict the association between social media engagement (shaming) and alteration in private jet usage among celebrities over two distinct periods: baseline (June-July) and treatment (August-September). The y-axis represents the percentage change in the number of flights (ranging from -100% to 300%), while the x-axis shows the total amount of shaming (displayed on a logarithmic scale with base 10 for better visualization). Negative values on the y-axis indicate a decrease in the number of flights. Each data point represents a celebrity, and the results of the regression analysis indicate a low coefficient of determina-

tion (R^2 value of 0.1194), which precludes us from making a definitive conclusion regarding the significant effect of flight shaming on behavioral change across the entire sample.

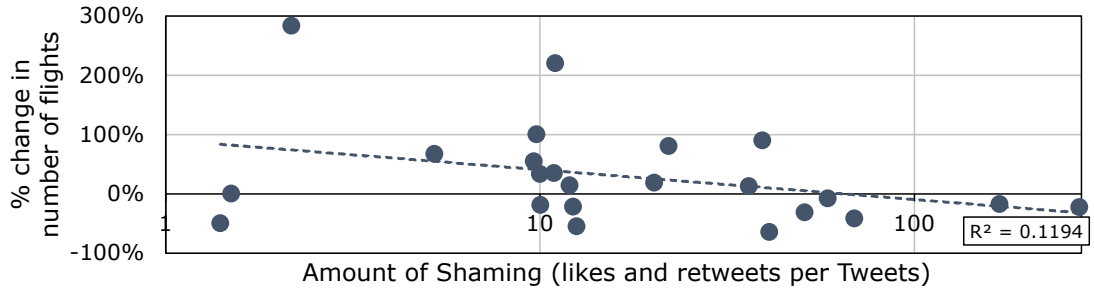

Figure 4. A scatter plot illustrating the % change in flight usage and total shaming among celebrities.

Figure 5 provides a detailed representation of the relationship between shaming and behavior change by examining the potential impact of a celebrity's involvement in climate actions. The data depicted in Figure 4 is utilized, but celebrities are categorized based on their involvement in climate actions, represented by blue circles for climate involved celebrities and orange diamonds for non-involved ones. Examination of the graph reveals that despite small sample sizes, the two groups display markedly distinct patterns of response to shaming. In particular, celebrities who are involved in climate action demonstrate no discernible trend indicating susceptibility to behavioral influence from shaming ($R^2 = 0.006$). In contrast, non-involved celebrities exhibit a moderate association of $R^2 = 0.473$ between shaming and behavior change. Given the limited sample size of $N = 14$, this relationship may indicate a potential trend ($p = 0.087$).

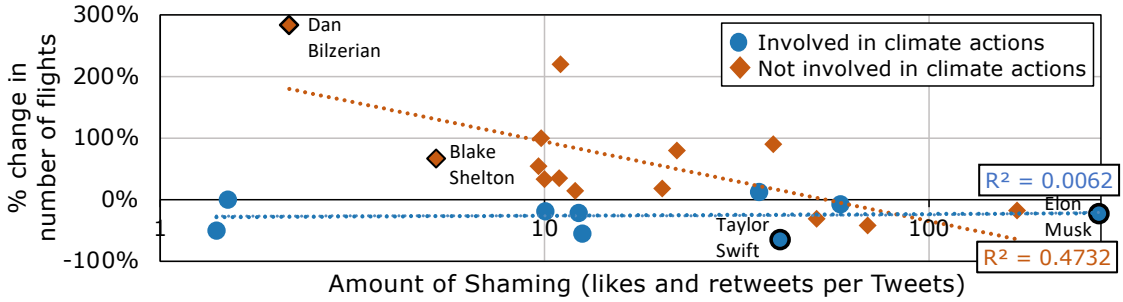

Figure 5. A scatter plot illustrating the % change in flight usage and total shaming among celebrities, with differenciation between celebrities involved in climate actions and not.

Table 1 below provides additional insight into the results observed in Figure 5. Specifically, the table displays the two celebrities who demonstrated the highest and lowest levels of change in their flight usage in response to shaming. These individuals are identified by the black border lines in Figure 5.

Celebrity	Climate actions	Shaming (log scale)	Flights baseline period	Flights treatment period	% change
Taylor Swift	Yes	41	8.5	3	-64.71%
Elon Musk	Yes	276	15.5	12	-22.58%
Blake Shelton	No	5.22	4.5	7.5	66.67%
Dan Bilzerian	No	2.17	3	11.5	283.33%

Table 1. Flight usage by celebrity category.

The scatter plot in Figure 5 also reveals that the majority of celebrities involved in climate action (8 out of 9) are positioned in the lower portion of the plot, indicating a decrease in their private jet usage. On average, this group reduced their usage by 25%, whereas non-activist celebrities increased their usage by 65%. A t-test conducted to compare the number of flights taken by climate activists ($M = -0.25, SD = 0.26$) and non-activists ($M = 0.65, SD = 0.91, t(21) = -2.8, p = .009$), revealed a significant difference between the two groups. Figure 6 depicts the results of this analysis in the form of a box plot, which visually demonstrates a positive correlation between involvement in climate action and a propensity to reduce one's carbon footprint through transportation choices.

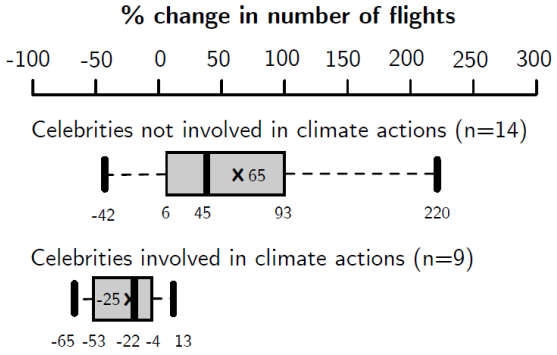

Figure 6. A box plot graph illustrating the percentage change in the number of flights taken by celebrities between the baseline period and the observation period.

Discussion & conclusion

The aim of this study was to explore the potential of utilizing publicly available data in a compelling and comprehensive way to promote effective, evidence-based activism on the use of private jets among celebrities. To do so, we examined the data of all celebrities targeted by the CelebJets campaign ($N = 23$).

Our primary finding revealed a statistically significant difference in behavior change between celebrities involved and not involved in climate action. Celebrities involved in climate action reduced their flights by an average of 25%, while those not involved increased their flights by an average of 65%. This outcome suggests that celebrities engaged in climate action were more responsive to the campaign than their counterparts. These results are consistent with prior research on the relationship between environmental attitudes and behavior and the influence of social media on behavior change (Comber et al. 2013; Wierzbiński et al. 2021). However, it is important to note that our study also found that the shaming/feedback approach appeared to have the opposite effect on celebrities not involved in climate action, i.e., they have overall increased their flights by 65%.

The second and more unexpected finding was that the intensity of shaming did not impact behavior change for celebrities involved in climate action, while a trend was observed for those not involved. This implies that celebrities involved in climate action altered their behavior regardless of the intensity of shaming, whereas those not involved were more sensitive to it. For instance, Jeff Bezos and Elon Musk, both celebrities engaged in climate action, reduced their flights by 50% and 22%, respectively, despite being among the least and most shamed celebrities. Conversely, among celebrities not involved in climate action, Dan Bilzerian and Kylie Jenner, who were among the least shamed, dramatically increased their flights, whereas Steven Spielberg and Kim Kardashian, who were among the most shamed, reduced their flights to the same extent as celebrities involved in climate action. These results give some credence to the idea that it is possible to influence the influencers.

More generally, these findings suggest that social media engagement may play a role in encouraging behavior change, which is consistent with previous research on climate shaming campaigns such as *flygskam*, which has reported similar conclusions in the literature (Gössling et al. 2020; Mkono 2020). Nonetheless, as previously noted, it is important to recognize that none of the celebrities made a public commitment to

increasing their engagement in climate action or decreasing their use of private jets in direct response to this campaign. Consequently, the objective of utilizing the power and reach of these celebrities to promote additional change appears to have been restricted.

This second finding also highlights potential differences in motivation among targeted celebrities, indicating a need to tailor climate justice campaigns according to beliefs and attitudes. For instance, celebrities not involved in climate action may be more responsive to extrinsic motivational factors, such as the desire to avoid negative publicity and financial loss, while eco-conscious celebrities may be more intrinsically motivated to reduce their carbon footprint. Feedback that aligns with eco-conscious values and beliefs may be more effective in promoting behavior change than shaming, which can have negative outcomes. This finding is consistent with previous research on the effectiveness of feedback in promoting pro-environmental behavior change (Thøgersen and Ölander 2006).

Overall, this study indicates that online activism, sometimes derided as slacktivism (Dennis et al. 2019), could nevertheless play a role in promoting sustainable practices and facilitating a shift towards more sustainable behaviors in certain contexts. These implications are important as they demonstrate the potential for slacktivism to be utilized as a means for promoting and enacting sustainable practices.

It is important to note that this study has inherent limitations. One of the primary limitations pertains to the restricted amount of data and small sample size (N=23), which restricts the generalizability and robustness of the study's outcomes. This limitation stems from the fact that the @CelebJets campaign solely focused on these specific celebrities, thereby constraining the representativeness of our dataset to the entire pool of available celebrities. Another constraint of this study pertains to the narrow scope of the analyzed data, which solely encompasses Twitter data. This exclusive focus may fail to offer a comprehensive comprehension of the reach and influence of the campaign under examination. While we acknowledge that behavior change among celebrities may be influenced by a range of factors beyond the @CelebJets campaign, such as personal circumstances or other beliefs, these factors can be difficult to identify and control for in a study of this nature. Future research could offer more comprehensive understandings regarding the response of each celebrity by thoroughly scrutinizing news articles, social media posts, and other forms of online communication. Moreover, as we relied on a natural field experiment, the methodology employed to distinguish the case study into baseline and treatment period may not be as rigorous as in a controlled laboratory experiment. Despite these inadequacies, we firmly believe that the paper offers valuable, albeit preliminary, insights into an important topic.

Future research should aim to further explore the use of online activism as a mean for promoting sustainable practices in other domains or regarding other actors. Specifically, such research could explore the most effective approaches for providing adequate feedback to sustainability-conscious individuals, enabling them to recognize problematic behaviors and facilitate behavioral change. Moreover, it could investigate the design of digital campaigns that target critical global issues by providing easily comprehensible, evidence-based information to encourage activism. Lastly, as demonstrated by this campaign, sustaining such initiatives beyond the media cycle is challenging. Therefore, system designers could investigate means of maintaining activists' motivation by furnishing them with feedback on the impact of their actions.

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