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DOI: <https://doi.org/10.1080/08841241.2023.2289009>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-239994>

Journal Article

Published Version



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Originally published at:

Sörensen, Isabel; Vogler, Daniel; Fürst, Silke; Schäfer, Mike S (2023). Platforms matter: analyzing user engagement with social media content of Swiss higher education institutions. *Journal of marketing for higher education*:1-20.

DOI: <https://doi.org/10.1080/08841241.2023.2289009>



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**To cite this article:** Isabel Sörensen, Daniel Vogler, Silke Fürst & Mike S. Schäfer (11 Dec 2023): Platforms matter: analyzing user engagement with social media content of Swiss higher education institutions, Journal of Marketing for Higher Education, DOI: [10.1080/08841241.2023.2289009](https://doi.org/10.1080/08841241.2023.2289009)

**To link to this article:** <https://doi.org/10.1080/08841241.2023.2289009>



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# Platforms matter: analyzing user engagement with social media content of Swiss higher education institutions

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## ABSTRACT

Higher education institutions (HEIs) increasingly use social media to communicate with stakeholders and the public. The success of these efforts on individual platforms has been assessed by a growing number of studies recently. However, comparative research across different platforms and types of HEIs is lacking. This study analyzes factors influencing user engagement across different HEI types and the three most widely used platforms – Facebook, Instagram, and X (formerly Twitter). The study relies on a full sample of all social media posts published in 2019 ( $n = 42,006$ ) by all 42 Swiss HEIs. Hereof, a random sample of 1500 posts per platform was manually coded. Several factors at the content-level turned out to vary across platforms, thereby pointing to the need for HEIs to tailor their social media communication to the respective affordances of different platforms. However, results also show patterns across platforms, including the importance of visual communication and the development of a large followership for driving user engagement. In contrast, we found no impact of publishing time, publishing frequency, and content length. This, among other findings, indicates that strategies focused on creating high-quality content rather than a large quantity of content yield better engagement results for the social media communication of HEIs.

## ARTICLE HISTORY

Received 2 February 2023  
Accepted 21 October 2023

## KEYWORDS


Higher education institutions; social media; engagement metrics; content analysis; organizational communication; Switzerland

## 1. Introduction

Today, higher education institutions (HEIs) increasingly compete for funding and talent (Meier, 2019) and have to meet societal expectations, which include involving stakeholders in science and its outcomes (Laredo, 2007). As a result, their communication nowadays addresses more stakeholders (Entradas & Bauer, 2019; Marcinkowski et al., 2013) and uses more channels (Fähnrich, 2018; Fürst et al., 2022). In the wake of this development, social media has become essential for HEI's communication efforts.

Correspondingly, scholarship on the communication of HEIs through social media has expanded recently (for an overview Fähnrich et al., 2020; Metag & Schäfer, 2019;

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 Supplemental data for this article can be accessed at <https://doi.org/10.1080/08841241.2023.2289009>.

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Sörensen et al., 2023). However, research shows four significant shortcomings: First, comparative studies are rare. Most studies focus on a single platform (e.g. Bonilla et al., 2020; Eger et al., 2021; Peruta & Shields, 2018; Stuart et al., 2017), neglecting that most HEIs use several platforms simultaneously (Sörensen et al., 2023; Valerio-Ureña et al., 2020). Second, a considerable number of studies focus on social media communication with only one target group, such as students (e.g. Bonilla et al., 2022; Clark et al., 2017), while research analyzing the broader spectrum of stakeholders is rare. Third, many studies focus on highly-ranked research universities only (e.g. Bonilla et al., 2022; Fähnrich et al., 2020) – albeit with a few exceptions (e.g. Wahid & Gunarto, 2022) – neglecting the different types of organizations operating in higher education. Fourth, studies on Anglo-Saxon HEIs are overrepresented in the existing body of literature (e.g. Beverly, 2013; Kimmons et al., 2017).

We aim to address all three gaps by studying the predictive factors for user engagement with content published by Swiss HEIs on social media. We analyze all HEIs in Switzerland ( $n = 42$ ), including research universities, universities of applied sciences, and universities of teacher education (sometimes also called ‘colleges of education’) across the three most widely used platforms in the domain of higher education: Facebook, Instagram, and Twitter (e.g. Sörensen et al., 2023). We ask the following research questions:

RQ1: Which factors influence user engagement with content of Swiss HEIs on social media?

RQ2: How does this user engagement differ across platforms?

## 2. Literature review

In contemporary knowledge societies, it is no longer enough for HEIs to fulfil their core tasks of teaching and research (Meier & Krücken, 2011). They must also address societal needs and market demands as a ‘third mission’ (Hüther & Krücken, 2016; Laredo, 2007). This, along with other developments, has given public communication more weight: HEI leadership see public communication as increasingly essential and allocate more funds and personnel to it (Friedrichsmeier et al., 2013; Schwetje et al., 2017). HEIs communication teams have expanded, hired better-qualified staff, professionalized, and organized their work more systematically (Fürst et al., 2022). Furthermore, a closer and more direct link between the communications teams and HEI leadership has been observed (Elken et al., 2018; Fürst et al., 2022; Leßmöllmann et al., 2017). In addition, HEIs address more stakeholders on more channels (Entradas & Bauer, 2019; Marcinkowski et al., 2013).

Social media play an important role in this respect. While early studies showed low adoption rates among HEIs on social media (Linvill et al., 2012; McAllister, 2012), more recent studies show high adoption rates across several platforms (Bonilla et al., 2022; Sörensen et al., 2023; Valerio-Ureña et al., 2020). Social media are increasingly used to enhance HEIs’ public visibility and address stakeholders directly (Metag & Schäfer, 2019). In particular, HEIs have been shown to use social media to communicate with prospective, current, and previous students, current and potential staff, as well as journalists and businesses (Bélanger et al., 2014; Opgenhaffen & Claeys, 2017; Robinson et al., 2019). Recent exploratory studies indicated that HEI communicators increasingly use social

media not only as a communication channel to ‘push’ messages to audiences but also as a monitoring tool through which stakeholders’ preferences and interests can be identified (Lo et al., 2019) and feedback in the form of engagement metrics can be used for evaluation purposes (Kaplow, 2019; Raupp & Osterheider, 2019).

### ***2.1. Measuring user engagement with social media content***

Studying user engagement with social media content is an emerging field of research dominated by quantitative methodologies (Trunfio & Rossi, 2021). Schivinski et al. (2016) distinguish three steps of user engagement on social media: ‘consumption’, where users merely view content; ‘contribution’, where users react to content by liking, sharing, or commenting, and ‘creation’, where users publish own content concerning an organization or brand. Trunfio and Rossi (2021) differentiate three approaches to measuring social media engagement: Most studies, they argue, focus on basic quantitative measures at the level of ‘contribution’ such as the total number of likes, shares, comments on a post or the number of followers of an account.

According to Porten-Cheé et al. (2018), engagement metrics at the contribution level (also called ‘popularity cues’) differ in meaning and depth. ‘Liking’ content is an indication of user approval, enjoyment, or recommendation, thus, almost always a positive endorsement of the content posted by the sender. Due to the minimal user effort associated with clicking a ‘like’ button, likes are considered as a rather superficial engagement metric (Porten-Cheé et al., 2018). Sharing content, i.e. passing it on to other users with or without an accompanying statement, is considered a more substantial form of engagement indicating endorsement unless the accompanying statement says otherwise, which is, however, rarely the case (Chandler & Munday, 2016). Commenting on a post, thus publicly voicing a statement or an opinion as a reaction to content, is seen as the most substantial form of user engagement. The majority of research – including the study at hand, which focuses on higher education, analyzes the level of contribution by using metrics on the post-level sourced through the APIs of social media platforms.

### ***2.2. Factors influencing user engagement with social media content in higher education***

While most studies analyzing social media content by HEIs applied quantitative methods (e.g. Bélanger et al., 2014; Fähnrich et al., 2020; Kimmons et al., 2017; Peruta & Shields, 2017; Stuart et al., 2017), some approached the subject from a qualitative angle (e.g. Kelleher & Sweetser, 2012; Lövgren, 2017) or in mixed-method designs (e.g. Oppici et al., 2014; Veletsianos et al., 2017). Existing literature reiterated biases in scholarship that have been shown before (e.g. Metag & Schäfer, 2019; for related fields see Comfort & Park, 2018; Guenther & Joubert, 2017): The majority of studies focus on Anglo-Saxon HEIs, mostly on research universities, analyzes one social media platform only (usually Twitter or Facebook), and examines engagement in relation to predictive factors of single social media posts only.

In this study, we organized the factors that predicted user engagement with the content published by HEIs on social media into three levels: factors of single social media posts, of social media accounts, and of entire HEIs.

### 2.2.1. Content-related factors impacting user engagement on social media

- (1) **Content topic:** Early studies such as Beverly (2013) and Linvill et al. (2012) investigated the topics of tweets published by US colleges and universities, while more recent studies looked at Facebook (Fährnrich et al., 2020; Peruta & Shields, 2017, 2018) and Instagram (Bonilla et al., 2020; Stuart et al., 2017). Results show that no topic stands out as a guarantee for high user engagement.
- (2) **Stakeholders mentioned in a post:** A dozen studies have analyzed which actors are explicitly mentioned in posts in various contexts (Metz et al., 2020; Stuart et al., 2019; van Aelst et al., 2012). Beverly (2013) and Linvill et al. (2012) found most tweets by US colleges and universities to be targeting ‘the general public’ while Bélanger et al. (2014) found ‘students’ to be the most frequently addressed group by Canadian universities on Twitter and Facebook. Studies did not assess how specific stakeholders influenced user engagement, nor did they compare with posts not mentioning any.
- (3) **Linguistic features:** Many studies included linguistic features – like calls to action (e.g. ‘share this’, ‘follow us’) or asking questions. Peruta and Shields (2018) analyzed both for posts of US colleges on Facebook. They found that calls to action resulted in lower user engagement, while questions yielded more engagement, but only if used occasionally. Beyond the field of higher education, studies looking at the use of storytelling features, metaphors, or provocative rhetoric (e.g. Liu et al., 2017) have produced some interesting results. A few studies also investigated the effects of emotional appeals in posts on Instagram (e.g. Brown Jarreau et al., 2019) and Facebook (Ji et al., 2019).
- (4) **Hypertextual features:** In other fields than higher education, studies have analyzed the effect of links and hashtags in social media posts. Links embedded in social media content were found by most studies to be ineffective as drivers of engagement. In the case of Fortune 500 Companies, Liu et al. (2017) found links to be insignificant for the number of likes and shares on Facebook, and even negatively correlated with the number of comments. This is in line with other studies (e.g. Men et al., 2018; Xu et al., 2019). For hashtags on Instagram, Krzysztof (2021) found no influence of the number of hashtags on user engagement.
- (5) **Multimodality:** Many studies investigated whether the co-presence of text, images, sound, or video in social media posts impacts user engagement (Bonilla et al., 2020; Brown Jarreau et al., 2019; Eger et al., 2021; Stuart et al., 2017). One study also included emojis (Peruta & Shields, 2018). Fährnrich et al. (2020) found images to increase user engagement with HEI Facebook posts and associated them with the highest number of shares and likes, while videos generated more shares than text-only messages. Eger et al. (2021, p. 252) also found that ‘high effectiveness in communication with Facebook users is achieved primarily by photo and video posts’. Beyond literature from the field of higher education, according to Liu et al. (2017) Facebook posts with images generated more likes and shares, but not more comments, and the combination of pictures (multimodality) and links (hypertextuality) was found to generate less engagement.

In addition to the above-mentioned factors,

- (6) **post length** was shown to have a negative impact on user engagement on Facebook (Krzysztof, 2021) and
- (7) **publishing time** of the day showed no conclusive results (Fährnich et al., 2020).

### 2.2.2. Account-related factors impacting user engagement on social media

User engagement may not only be influenced by features of published content but also by account characteristics. Existing studies included factors, which can be sorted into three basic factors at the account-level:

- (1) **Virtual lifetime:** Several studies analyzed the impact of accounts' 'age'. Studies of Instagram, YouTube, and Twitter clearly showed that the longer the virtual lifespan of an organization is on a given platform, the more user engagement its content receives, as it takes time to gain experience in using a social media platform and to build a followership (Kimmons et al., 2017; Lovari & Giglietto, 2012; Stuart et al., 2017).
- (2) **Posting frequency:** Algorithms governing social media platforms are optimized to attract and maintain users' attention (Klinger & Svensson, 2018; Zuboff, 2019). It can therefore be assumed that the frequent posting of new content is associated with more overall engagement for single posts. Stuart et al. (2017) note that the more images an institution posts on Instagram, the more followers it tends to have. This is in line with other studies analyzing engagement on Facebook (Bélanger et al., 2014; Peruta & Shields, 2018; Stuart et al., 2017) and Instagram (Stuart et al., 2017).
- (3) **Followers:** When users 'follow' an account, they subscribe to regular updates and posts appearing in their newsfeed. The total number of such subscriptions has been used as a metric for an account's popularity (Chandler & Munday, 2016). Accounts with more followers are also shown to have more user interactions with their content, because they regularly reach a larger audience. For instance, Fährnich et al. (2020) show that the number of friends of Facebook accounts of Shanghai Ranking's top 50 universities positively correlates with engagement on the platform. Furthermore, a steady growth rate in the number of followers of an account also caters to the algorithms curating social media content, as accounts with many 'followers' on social media attract new followers faster than those with smaller followership (Chandler & Munday, 2016). The little available research on the impact of follower numbers of HEIs on user engagement suggests a positive correlation due to increased exposure to content (Rutter et al., 2016).

### 2.2.3. Organizational factors impacting engagement on social media

In addition to content- and account-related factors, organizational characteristics of HEIs can impact user engagement with its social media content. Existing studies mention two such factors which are, however, rather abstract and more difficult to link to individual users' engagement. Since these factors were not yet tested on larger data sets, they should be understood as exploratory.

- (1) **Organizational size:** The influence of student and staff numbers of HEIs on user engagement has been theorized by Metag and Schäfer (2017) and Lovari and

Giglietto (2012). Organizational size is an ambiguous factor: On the one hand, larger organizations have more potential stakeholders (and potentially can reach out to more social media users), but on the other hand, smaller communities make it easier to build relationships. Bélanger et al. (2014) support the latter, showing that Canadian universities in smaller cities had a more personal touch to their communication on Twitter and Facebook, resulting in more user engagement than their counterparts in bigger cities.

- (2) **Financial resources:** Annual budgets of an HEI in general and for communication, in particular, have been mentioned by Metag and Schäfer (2017) and tested by Lovari and Giglietto (2012). The latter notes that HEIs in wealthier regions have higher engagement numbers than elsewhere. This suggests that financial resources may positively impact engagement.

Our literature review on which factors influence social media engagement with content posted by HEIs resulted in seven potential predictors at the level of posts, three at the level of accounts, and two at the level of HEIs as organizations. These were operationalized and tested in the empirical part of this study to answer the research questions.

### **2.3. The case of Switzerland**

The Swiss higher education system is diverse and competitive. It features research universities ranked highly in international university rankings and smaller research universities, as well as universities of applied sciences and universities of teacher education that do not focus primarily on research and are not allowed to award PhD titles. By including all 42 officially accredited universities, our study analyzes the full range of HEIs, typical for higher education systems in Western countries. Hence, the results of this study are arguably applicable beyond Switzerland as well, notably in other smaller and mid-sized European countries, such as Austria, Belgium, Denmark, and the Netherlands.

## **3. Data and method**

We used three data sources in this study: social media content, metadata about HEIs' social media accounts, and general background data on HEIs.

Social media data comprises all Twitter, Facebook, and Instagram posts ( $n = 42,006$ ) published by all Swiss HEIs ( $n = 42$ ) in 2019. We used two criteria for inclusion of a social media account: (1) it had to be operated in the name of an HEI and (2) by the central communication department. While the first criterion was validated by looking at the description of an account, the second was validated by interlinkage between the website of the central communication department and the social media account in question. Not all HEIs were present on all three platforms, and some HEIs operated from more than one account per platform (e.g. one for posting content in German and one for content in English). This translated into 14,930 Facebook posts by 75 accounts, 6,671 Instagram posts by 62 accounts, and 20,405 tweets by 51 accounts. We used CrowdTangle<sup>1</sup> to gather Facebook and Instagram data and the Twitter API (academic product track)



to collect Twitter data using the *academicwitterR* package (Barrie & Ho, 2021) for R studio. All posts included information on user interactions (i.e. engagement, see below) at the time of data collection. Due to Switzerland's multilinguistic nature, the dataset contained posts in German, French, Italian, and English.

A random sample of 1,500 posts per platform was drawn from the data set, for in-depth analysis. A combination of quantitative manual and automated content analysis was deployed to examine the properties of the input variables at the content level. Posts were coded by two coders independently, with parts being double-coded. Coders coded content topic (organization, research, teaching), stakeholders mentioned in a post (HEI staff, students, scientific community, other societal stakeholders, no mentioning of stakeholders), and the linguistic features call to action (1 = feature appears in a post, 0 = feature does not appear in a post) and question (1 = feature appears in a post, 0 = feature does not appear in a post) in accordance with the codebook (see the supplementary material of this paper). Intercoder reliability was tested with a random sample of 180 unique articles (60 per platform) coded by both coders. Krippendorff's Alpha was very satisfactory for questions (.98) and call to action (.90) and satisfactory for topic (.80) and stakeholders mentioned (.75). All additional variables at the content level were retrieved using automated content analysis from the metadata of posts or posted texts. We analyzed automatically if posts contained a video, photo, emoji, hashtag, or URL and saved the result to a binary variable for each feature (1 = feature appears in a post, 0 = feature does not appear in a post). Finally, we automatically determined post length (number of characters) and whether a post was published during working hours (defined as between 8 AM and 6 PM) or not.

As our second dataset, metadata for the accounts of all 42 Swiss HEIs on Facebook, Instagram, and Twitter were sourced through third parties or desk research. We determined when accounts were created, how many posts were published, and how many followers or friends the accounts had. We calculated the variables virtual lifetime (number of years since the account was created), posting frequency (average number of posts per week in 2019), and followers (number of followers).

As our third dataset, structural data on all HEIs was obtained from the Swiss Federal Office for Statistics (Bundesamt für Statistik, 2020). It included financial resources (total budget in Swiss Francs) and organizational size (number of students).

The main dependent variable 'engagement' – separately for each platform and every analyzed social media post – was quantified as follows:

- Facebook: Total sum of 'likes' (incl. reactions 'love', 'wow', 'haha', 'sad', 'angry' and 'care'), 'comments', and 'shares' per Facebook post.
- Instagram: Total sum of 'likes' and 'comments' per Instagram post.
- Twitter: Total sum of 'likes', 'retweets', 'quotes', and 'replies' per tweet.

To answer our research questions, we analyzed the level of content, account, and organization separately with regression models. We used negative binomial regression models, as the dependent variable 'engagement' consisted of over-dispersed count data on the post-level (number of engagements per post). On the level of account and organization, we used OLS regression models because the dependent variable (average engagement of all posts per account or organization) was not limited to integer

numbers. Because of expected differences between Instagram, Facebook, and Twitter in terms of engagement measurement (i.e. not all types of engagement exist on all platforms) and the number of engagements, we calculated individual models on the level of single posts, accounts, and organizations for each platform.

Indeed, average engagement differed significantly between platforms (Figure 1), which was confirmed by a one-way ANOVA ( $F(2,42003) = 4172, p < .001, n = 42006$ ). The different baselines supported our decision to analyze the platforms separately. The models were calculated with the MASS package in R studio.

## 4. Results

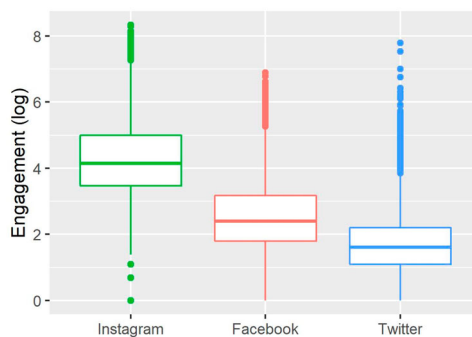
### 4.1. Which content-related factors predict user engagement?

To answer our two research questions, we first analyzed which factors at the level of single posts predict user engagement (see Table 1). For this analysis we used all manually coded posts ( $n = 1500$  per platform).

We tested the factor ‘*content topic*’ distinguishing ‘research’, ‘teaching’, and ‘organizational topics’. On Instagram, research topics ( $B = -.25; p = .004$ ) and teaching topics ( $B = -.30; p \leq .001$ ) led to less engagement than organizational ones, which was the reference category. On Facebook, teaching topics ( $B = -.25; p \leq .001$ ) led to less engagement than organizational topics. We did not find any effect of content topics on Twitter.

We analyzed which *stakeholders* were mentioned in posts, differentiating between ‘HEI staff’, ‘students’, ‘scientific community’, ‘other societal stakeholders’, and no ‘mentioning of stakeholders’. Results on Instagram show that mentioning of stakeholders from the scientific community ( $B = -.61; p \leq .001$ ) and other societal stakeholders ( $B = -.42; p \leq .001$ ) led to fewer engagement compared to posts without mentioning of stakeholders, which was the reference category. Results were similar on Facebook, where posts mentioning the scientific community ( $B = -.50; p \leq .001$ ) also received lower engagement. For Twitter, our results show the opposite, with both the mentioning of the scientific community ( $B = .23; p = .028$ ) and other societal stakeholders ( $B = .40; p \leq .001$ ) having a positive impact on user engagement when compared to tweets without mentioning of stakeholders.

Featuring a *call to action* in a post impacted user engagement negatively on Instagram ( $B = -.22; p \leq .001$ ) and Facebook ( $B = -.22; p \leq .001$ ). On Twitter, calls to action had no effect on engagement.



**Figure 1.** Boxplot for engagement (log-scale) of posts per platform.

**Table 1.** Negative binomial regression model predicting engagement on content-level.

Analytical Concept	Parameter	Instagram				Facebook				Twitter			
		B	95% CI		p	B	95% CI		p	B	95% CI		p
Content Topic	(Intercept)	3.75	3.58	3.92	<b>0.001</b>	2.58	2.36	2.79	<b>0.001</b>	0.79	0.54	1.04	<b>0.001</b>
	Research <sup>1</sup>	-0.25	-0.42	-0.07	<b>0.004</b>	-0.08	-0.24	0.07	0.287	0.03	-0.10	0.16	0.685
	Teaching <sup>1</sup>	-0.30	-0.41	-0.18	<b>0.001</b>	-0.25	-0.39	-0.10	<b>0.001</b>	-0.06	-0.23	0.11	0.496
Stakeholder	HEI staff <sup>2</sup>	-0.05	-0.17	0.07	0.387	-0.15	-0.34	0.03	0.091	0.09	-0.07	0.25	0.275
	Students <sup>2</sup>	0.05	-0.09	0.19	0.450	0.19	-0.02	0.40	0.058	-0.14	-0.39	0.11	0.259
	Science <sup>2</sup>	-0.61	-0.84	-0.37	<b>0.001</b>	-0.50	-0.74	-0.27	<b>0.001</b>	0.23	0.03	0.43	<b>0.028</b>
	Societal <sup>2</sup>	-0.42	-0.57	-0.26	<b>0.001</b>	0.01	-0.19	0.22	0.901	0.40	0.21	0.60	<b>0.001</b>
Linguistic Features	Call to action	-0.22	-0.33	-0.11	<b>0.001</b>	-0.22	-0.34	-0.09	<b>0.001</b>	-0.10	-0.22	0.03	0.122
	Question	0.12	-0.02	0.26	0.101	-0.24	-0.40	-0.08	<b>0.003</b>	0.37	0.20	0.54	<b>0.001</b>
Multimodality	Pictures <sup>3</sup>	n.a.	n.a.	n.a.	n.a.	0.58	0.43	0.72	<b>0.001</b>	0.29	0.16	0.43	<b>0.001</b>
	Videos <sup>3</sup>	-0.42	-0.54	-0.29	<b>0.001</b>	0.58	0.39	0.78	<b>0.001</b>	0.41	0.11	0.73	<b>0.009</b>
Hypertextuality	Emojis	0.24	0.15	0.32	<b>0.001</b>	0.33	0.19	0.46	<b>0.001</b>	0.29	0.10	0.48	<b>0.003</b>
	Hashtags	0.50	0.35	0.64	<b>0.001</b>	-0.02	-0.16	0.12	0.806	0.26	0.15	0.37	<b>0.001</b>
Post Traits	URLs	-0.29	-0.48	-0.08	<b>0.005</b>	0.01	-0.14	0.15	0.903	-0.22	-0.34	-0.09	<b>0.001</b>
	Post Length	0.01	0.00	0.03	0.108	0.01	-0.02	0.03	0.624	0.09	-0.02	0.20	0.091
	Time of Publ.	0.06	-0.02	0.15	0.158	-0.09	-0.20	0.02	0.098	0.00	-0.18	0.17	0.980
	Follower	0.05	0.05	0.06	<b>0.001</b>	0.02	0.02	0.03	<b>0.001</b>	0.03	0.03	0.03	<b>0.001</b>
	N		1500			1500				1500			
	AIC		16826.164			12016.004				8708.562			
	R <sup>2</sup> Nagelkerke		0.868			0.439				0.425			

Notes: <sup>1</sup>'organizational' topic is the reference category. <sup>2</sup>'no stakeholder mentioned' is the reference category. <sup>3</sup>For Instagram, 'posts with pictures' is the reference category. For Facebook and Twitter, 'posts with text only' is the reference category. CI = Confidence Interval. B = Coefficient.

*Asking questions* as a stylistic feature decreased engagement on Facebook ( $B = -.24$ ;  $p = .003$ ), while increasing engagement for tweets ( $B = .37$ ;  $p \leq .001$ ). No effect was found for questions on Instagram.

*Multimodality* – the use of pictures, videos, and emojis – was analyzed in two separate ways according to platform. On Facebook and Twitter, pictures, videos, and emojis were compared to text-only as the reference category. On Instagram, with its focus on imagery, pictures served as the reference category, as text-only posts are not possible on Instagram. Results for Instagram indicate that posts with videos receive less engagement than posts with pictures ( $B = -.42$ ;  $p \leq .001$ ). Emojis have a positive effect on engagement ( $B = .24$ ;  $p \leq .001$ ). On Facebook, multimodality was a positive driver of engagement, with pictures ( $B = .58$ ;  $p \leq .001$ ) and videos ( $B = .58$ ;  $p \leq .001$ ) both showing strong effects when compared to text-only posts, and emojis having a moderate effect ( $B = .33$ ;  $p \leq .001$ ). On Twitter, multimodality showed positive effects on engagement, with videos having a strong effect ( $B = .41$ ;  $p = .009$ ), followed by pictures ( $B = .29$ ;  $p \leq .001$ ) and emojis ( $B = .29$ ;  $p = .003$ ).

Regarding *hypertextual elements*, hashtags on Instagram had a strong positive effect on engagement ( $B = .50$ ;  $p \leq .001$ ), while URLs had a negative effect ( $B = -.29$ ;  $p = .005$ ). Similarly, results for Twitter showed a positive effect of hashtags in tweets ( $B = .26$ ;  $p = .001$ ) and a negative effect of URLs ( $B = -.22$ ;  $p \leq .001$ ). On Facebook, no effects were found for hypertextual elements.

Our analysis of post length and time of publishing showed no effect on any platform. As a control variable, we also included the number of followers or ‘friends’ of the account posting the content. The number of followers significantly and positively influenced engagement on Instagram ( $B = .05$ ;  $p \leq .001$ ), Facebook ( $B = .02$ ;  $p \leq .001$ ), and Twitter ( $B = .03$ ;  $p \leq .001$ ). This indicates that account-level characteristics, on which we focus in the following section, are important predictors of engagement with single posts.

#### 4.2. Which factors at the account-level predict user engagement?

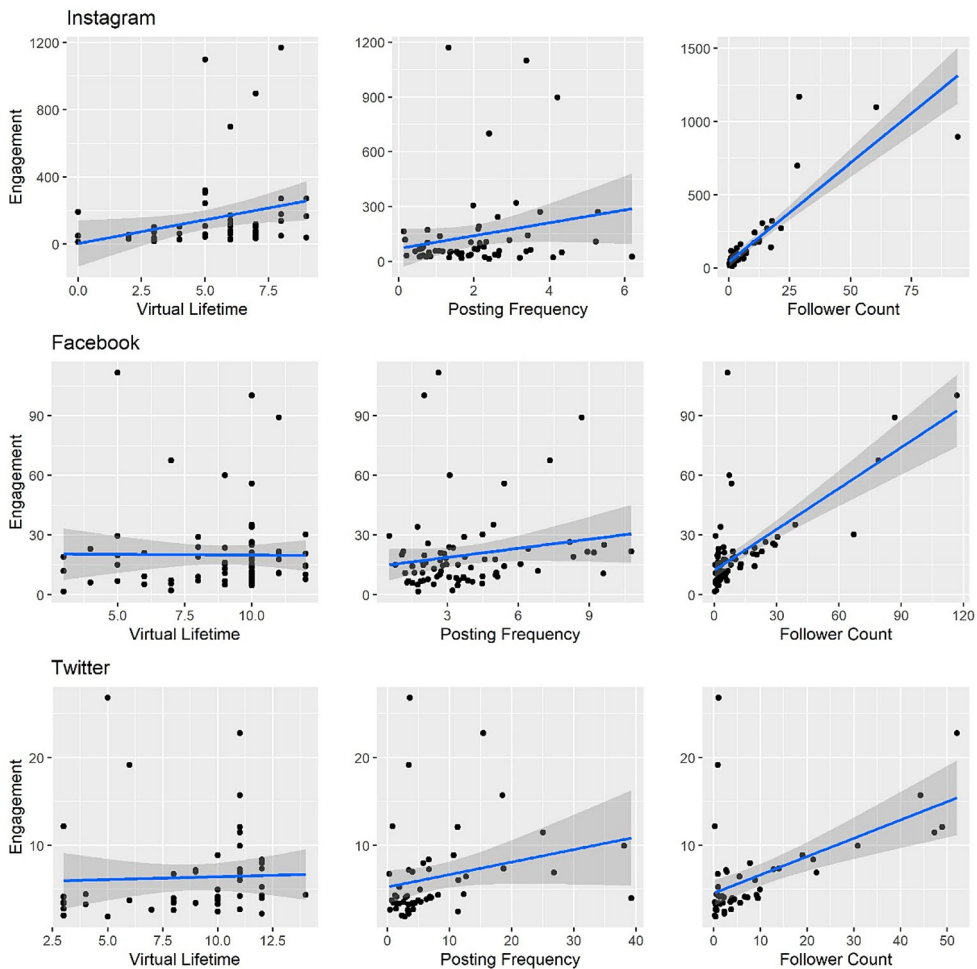
To analyze our two research questions at the account-level, we aggregated the data per platform for the individual accounts using all Instagram posts ( $n = 6671$  posts from 62 accounts), all Facebook posts ( $n = 14,930$  posts from 75 accounts), and all tweets ( $n = 20,405$  posts from 51 accounts). We then calculated linear regression models (see Table 2) and plotted the data to visually interpret the results (see Figure 2).

The *virtual lifetime* of an account – its virtual ‘age’ – did not influence the average user engagement on either of the three platforms (Instagram ( $B = 8.43$ ;  $p = .239$ ), Facebook ( $B = -1.43$ ;  $p = .062$ ), Twitter ( $B = -.31$ ;  $p = .162$ )).

**Table 2.** Linear regression model predicting engagement on account-level.

	Instagram	Facebook	Twitter
variable	B	B	B
(intercept)	43.46	24.31 **	7.37 ***
virtual lifetime	8.43	-1.43	-.31
posting frequency	-22.41	.11	-.06
follower count	13.91 ***	.72 ***	.26 ***
N	62	75	51
R <sup>2</sup> adjusted	.727	.478	.288

Notes: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



**Figure 2.** Scatterplot of average engagement per account in dependency of follower count, virtual lifetime, and posting frequency for Instagram ( $n = 62$  accounts), Facebook ( $n = 75$  accounts), and Twitter ( $n = 51$  accounts).

The *posting frequency* also had no effect on engagement on Instagram ( $B = -22.41$ ;  $p = .083$ ), Facebook ( $B = .11$ ;  $p = .882$ ), or Twitter ( $B = -.06$ ;  $p = .501$ ). The *number of followers* of an account, however, strongly influenced engagement on Instagram ( $B = 13.91$ ;  $p \leq .001$ ), Facebook ( $B = .72$ ;  $p \leq .001$ ), and Twitter ( $B = .26$ ;  $p \leq .001$ ). The more followers an HEI account had, the higher the engagement was across all platforms on average. The effect was strongest on Instagram, followed by Facebook and Twitter. This result on the account-level also confirms our finding for the content-level.

### 4.3. Which organizational characteristics predict user engagement?

To analyze our two research questions at the organizational level, we aggregated the data for each individual HEI per platform again using all Instagram posts ( $n = 6671$  posts from 32 HEIs), Facebook posts ( $n = 14,930$  posts from 35 HEIs), and tweets ( $n = 20,405$  tweets

from 29 HEIs). We then calculated linear regression models (see Table 3) and plotted the data to visually interpret the results (see Figure 3).

Instagram ( $B = .84; p \leq .001$ ), Facebook ( $B = .05; p = .002$ ), and Twitter posts ( $B = .01; p = .005$ ) were found to perform better the larger the *financial resources* of the respective HEI were. This effect was strongest on Instagram and somewhat weaker on Facebook and Twitter. *Organizational size* had a significant effect on user engagement on Instagram and Twitter – but a negative one when controlling for financial resources. Across all platforms, larger HEIs were shown to be less successful with their Facebook posts ( $B = -1.99; p = .025$ ), Instagram posts ( $B = -24.84; p \leq .001$ ) and tweets ( $B = -.53; p = .024$ ) than smaller ones. Visual inspection of the plot shows that the results are partially driven by outliers even though the general trends persist without the outliers.

Overall, the results reveal varying effects across platforms with a few general traits. Across all platforms, posts with visual content like images and videos were found to significantly enhance engagement. This was also true for the total number of account followers, showing effects on Facebook, Instagram, and Twitter.

We also found several similarities between engagement factors for the platforms Instagram and Twitter: On these two platforms, both the organization's size as well as hashtags positively influence engagement while the use of URLs had a negative effect. Facebook did not show similar results. No general traits were found for topics of a post, with negative effects found for the subjects 'teaching' and 'research' on both Facebook and Instagram and no effects found on Twitter. Similarly, the inclusion of stakeholders in content had varying effects across platforms, e.g. the mentioning of the scientific community generated lower engagement on Facebook and Instagram and higher engagement on Twitter.

## 5. Discussion and conclusion

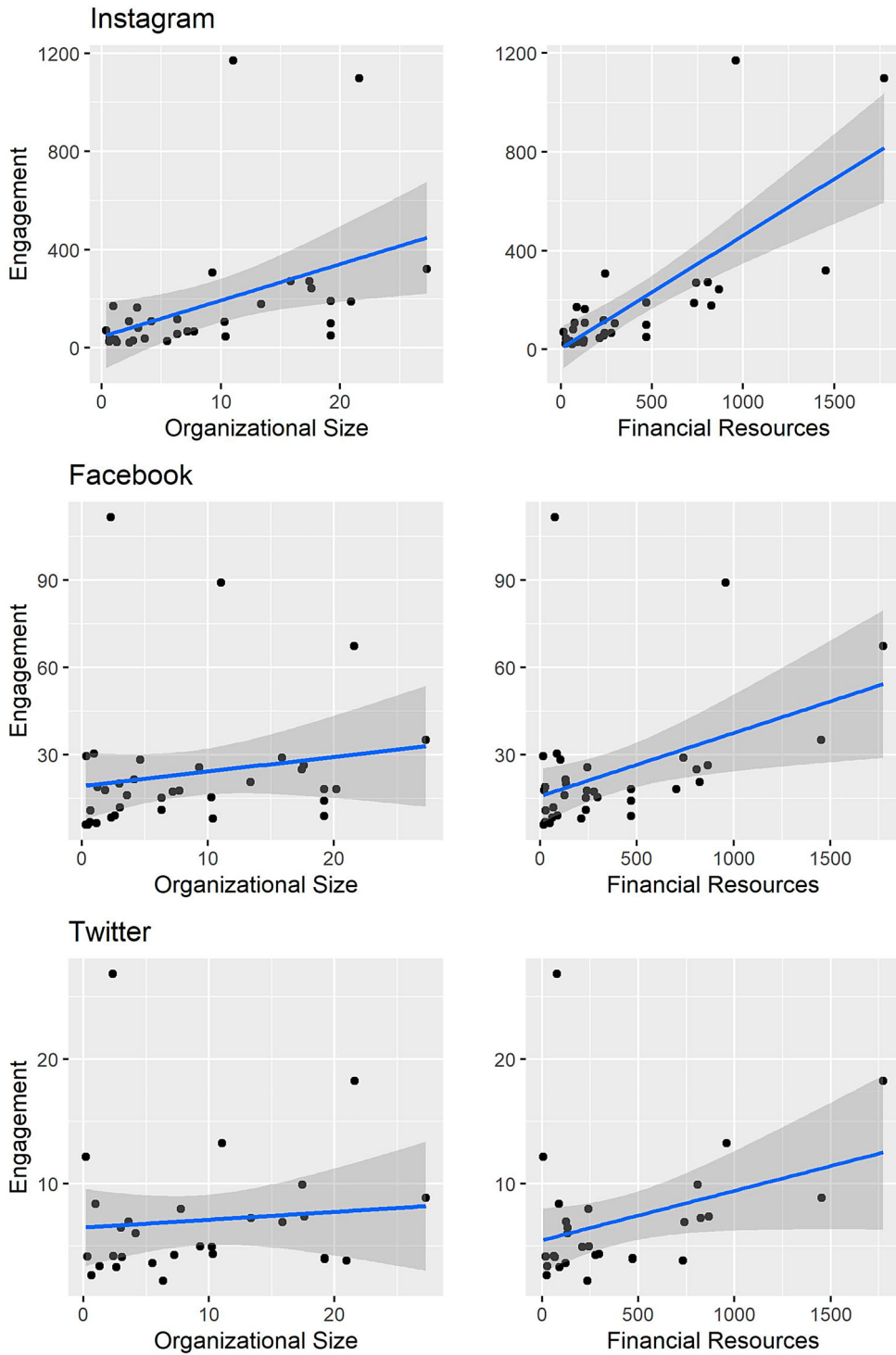
The study at hand explored factors influencing user engagement with social media content of all Swiss HEIs on Instagram, Facebook, and Twitter. The analysis was based on a comprehensive literature review in which 12 factors potentially influencing user engagement with social media content of HEIs were identified, showing that scholars have conceptualized and analyzed factors relevant to user engagement on social media at different levels, from content over accounts to organizational characteristics. These factors were then tested empirically. Results reveal differences in which factors influence engagement – both positively and negatively – and also differences across platforms.

At the content level, results for stakeholders and topics on Instagram are noteworthy. Instagram has been shown to be most popular among the younger segment of the

**Table 3.** Linear regression model predicting engagement at the organizational level.

	Instagram	Facebook	Twitter
variable	B	B	B
(intercept)	84.94	21.53 ***	7.14 ***
organizational size	-24.84 ***	-1.99 *	-.53 *
financial resources	.84 ***	.05 **	.01 **
N	32	35	29
R <sup>2</sup> adjusted	.703	.290	.278

Notes: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



**Figure 3.** Scatterplot of average engagement per HEI in dependency of organizational size and financial resources for Instagram (n = 32 HEIs), Facebook (n = 35 HEIs), and Twitter (n = 29 HEIs).

population, including HEI students (Wahid & Gunarto, 2022). Results indicate that the topics ‘teaching’ and ‘research’ – both specific to HEI communication – have a negative impact on engagement compared to ‘organizational’ topics. Communicating effectively on these two subjects on social media must be considered a priority for any university. There might be several reasons why this is still a challenge. Nested in characteristics of Instagram as an image-dominated platform, it might be that users show more interest in organizational topics because these are easier conveyed in visually stimulating ways, such as imagery of events, campus life, etc., while teaching- and research-related content might be harder to communicate visually. It might also be that teaching- and research-related content are not resonating well with Instagram users due to diverging user expectations on this platform. How well these topics lend themselves to specific platform affordances should be the subject of future research on HEI communication. The finding of lower engagement on Facebook when mentioning scientific communities is less surprising since this platform is not strongly embedded in the scientific community. The respective positive effect on Twitter is in line with other studies showing that Twitter is a strong outreach platform for HEIs seeking dialogue with the scientific community, politicians, and journalists (Vogler, 2020).

Our results also show that certain linguistic features – like embedding a call to action in a post or asking a question to generate feedback – did not work well on Instagram and Facebook. This is in line with previous research of HEIs on Facebook (Peruta & Shields, 2018) and might also be related to Facebook changing its algorithms in 2016 following discussions about the dysfunctional effects of click-baiting, a linguistic strategy to create social media posts in a curiosity-arousing way that tempts users to click on the referring content (Lischka & Garz, 2021).

Regarding hypertextual features, we found differences between URLs as negative predictors and hashtags as positive predictors on both Instagram and Twitter. These findings differentiate previous studies examining hypertextuality in general and found only a negative impact (e.g. Men et al., 2018; Xu et al., 2019).

The comparison across platforms revealed that only multimodality, i.e. embedding photos, video, or emojis in content, was found to positively effect user engagement on Facebook, Instagram, and Twitter. This is in line with previous studies (e.g. Eger et al., 2021; Fähnrich et al., 2020) indicating that visual content is rewarded by users. Interestingly, when looking at single sub-dimensions of multimodality, videos tend to have a negative impact on engagement on Instagram when compared to posts with pictures only. On Facebook and Twitter, however, posts containing videos or pictures receive more engagement than text-only posts. The negative effect for Instagram could also be further examined by future studies looking specifically at video content only. It might also be an effect of sampling through Crowdtangle, which does not provide data currently on Instagram stories, a format widely used for dynamic visual content.

Overall, findings at the content level provide support for the perception of Twitter as a strong outreach platform, while Instagram and Facebook show lower engagement when mentioning the scientific community, thus lending themselves stronger to internal communication with students and staff of HEIs. Second, findings at the content level provided evidence that effective HEI communication on social media should be platform-specific, as the factors influencing user engagement positively or negatively differ across platforms.



At the account level, our results confirm assumptions about the positive influence of follower numbers (Rutter et al., 2016) but challenges previous findings on the effects of the lifetime of accounts and posting frequency (e.g. Peruta & Shields, 2018; Stuart et al., 2017). Considering this, future research could explore how HEIs best grow their online followership with an eye to tracking repeated engagement and engagement overlaps, moving research beyond the vanity of metrics towards dynamic retention of engagement.

Furthermore, looking at results from both the content- and account-level combined, it is noteworthy that effects on Facebook and Instagram deviate for five out of nine factors. This deviation could be interpreted to suggest that the algorithms of Facebook and Instagram, both owned and operated by the company Meta, are not completely identical, but it could also be due to differences in audiences or strategies of HEIs. A deeper exploration of this could be the subject of future research.

In addition, we interpret the absence of effects for posting frequency, time of publishing, and length of content as good news. These findings indicate that none of the algorithms that automatically curate social media content from HEIs have strong preferences for large quantities and that regularity of posting content seem to play no role for engagement. This is to some extent contradicting scholars assuming that large and frequently posted output leads to higher engagement rates (Peruta & Shields, 2017; Stuart et al., 2017).

At the organizational level, our results were exploratory. Due to their ambiguity, they leave many questions open. The analysis revealed that smaller HEIs are more successful than larger HEIs on Instagram and Twitter, and budgets of HEIs are a positive driver of user engagement. We consider this as an indication that small but well-resourced HEIs might have an easier case in building relationships with their stakeholders on social media because of a more intimate setting. This is in line with findings from a previous study of Canadian universities (Bélanger et al., 2014). Future studies could operationalize further organizational variables in relation to number of students and/or staff to gain a better understanding of the impact which organizational characteristics have on HEIs' social media performance. The question of whether social media can compensate for such structural disadvantages, for instance, by allowing actors with fewer resources to gain influence and visibility in online and social media, has been controversially discussed in scholarship on political communication (Rauchfleisch & Metag, 2016). On the one hand, our findings support the equalization hypothesis, meaning that social media leads at least to equal visibility for smaller actors. On the other hand, when looking at financial resources, the results support the normalization hypothesis, meaning that offline structures of economic and other sources of power are also being mirrored online. Further research into the influence of organizational characteristics of HEIs could provide answers to these open questions.

Overall, the study contributes to a better understanding of HEIs social media communication, its target audiences, and the techniques applied to engage these audiences.

### **5.1. Practical implications**

The findings of this study have several practical implications for HEI communication on social media. First, and most generally, it shows that it is essential to tailor social media communication to the logic and affordances of specific platforms. For example, on Instagram and Facebook, mentioning stakeholders from the scientific community and focusing on teaching topics may

lead to less user engagement. At the same time these factors have a positive impact on engagement on Twitter. Thus, such content should be conveyed carefully on Instagram and Facebook to avoid negative effects. Second, visual communication is essential for reaching and engaging audiences on social media. The study showed that multimodal content, including photos, videos, and emojis, had a positive effect on user engagement across all three platforms. HEIs should therefore leverage the share of visual content to enhance user engagement. Third, attracting followers is crucial for increasing engagement. The study confirmed the positive influence of total follower numbers on user engagement. HEIs therefore should focus on growing their online followership and track repeated engagement to foster dynamic retention of engagement. Fourth, the study revealed that factors such as publishing time, publishing frequency, and length of content had no significant impact on engagement. This indicates that resources invested in creating high-quality content rather than a large quantity of content are likely to yield better results in terms of user engagement.

### 5.2. Limitations

As every study, ours has its limitations as well. First, the findings are solely based on data from Switzerland, which is a specific case – albeit an interesting one due to its globalized and competitive higher education system (Swiss Academies of Arts and Sciences, 2021). However, caution should be exercised when generalizing the results to countries with different higher education systems. Second, the study focuses on the centrally operated social media accounts of HEIs only, limiting the transferability of the findings to decentralized communication efforts. These limitations point to the need of more comparative research to gain a deeper understanding of the underlying dynamics affecting engagement and dialogue with stakeholders on social media.

### 5.3. Future research

The study identified areas for future research to deepen our understanding of user engagement with social media content of HEIs. First, comparative research across different countries with diverse higher education systems could provide insights into the generalizability of our findings and help understand the influence of contextual factors better. Second, investigating social media content provided by decentralized communication structures at HEIs (e.g. by single researchers, departments, schools, centres) would provide a more comprehensive understanding of engagement with HEIs' social media communication. Third, further research is needed to explore the impact of organizational resources and characteristics, such as the number of students and staff, on HEIs' social media communication and performance. Understanding how these factors influence engagement can shed light on the potential for social media to compensate for structural disadvantages and equalize visibility among different institutions in the higher education sector.

### Note

1. Data from CrowdTangle, a Facebook-owned tool that tracks interactions on public content from Facebook pages and groups, verified profiles, Instagram accounts, and subreddits. It

does not include paid ads unless those ads began as organic, non-paid posts that were subsequently 'boosted' using Facebook's advertising tools. It also does not include activity on private accounts, or posts made visible only to specific groups of followers.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This research was funded by the Swiss National Science Foundation (SNSF) under Grant Agreement No. 184992.

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