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Do organizational differences matter for the use of social media by public organizations? A computational analysis of the way the German police use Twitter for external communication

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Abstract

Using a neo-institutional framework, this study investigates how German police use Twitter for their communication. This is relevant, because the police increasingly use social media to bypass the media's gate-keeping function and attain increased agency in communication activities. However, little is known about their different communication strategies and their impact on user engagement. The analysis is based on an automated content analysis of all tweets ($N = 137,771$) sent out by the German police in 2019. It identifies different patterns regarding the usage of Twitter between police entities on different levels of governance and in differing types of environments and examines how these patterns translate into different levels of user engagement. We find that German police entities differ in their use of Twitter and that environmental and organizational aspects can explain these differences. Moreover, different patterns of social media usage also lead to differing levels of user engagement.

1 | INTRODUCTION

Public organizations increasingly use social media in general and Twitter in particular for their communication (Mergel & Bretschneider, 2013). For the police, this is especially visible during situations of ongoing threats, such as shootings (Akkaya et al., 2019; Fowler, 2017). However, the police also increasingly use Twitter to communicate about their daily work.

While Twitter has become more common in day-to-day police work, there are still gaps in our knowledge of how the police use Twitter (Walsh & O'Connor, 2019; Williams et al., 2018). Especially the German police seem to be somewhat understudied, and our analysis aims to provide a first comprehensive exploratory insight into this matter (Bayerl & Rüdiger, 2017; Houy et al., 2019).

The introduction of social media can have a significant effect on communication of public organizations (Mergel & Bretschneider, 2013). Social media enables organizations to build new communicative networks with their publics as well as interact with citizens in a faster and more dialogical manner (Meijer & Torenvlied, 2016; van Dijck & Poell, 2013). This can generate more openness of public services for citizens, create new opportunities for citizen participation, enable citizens to collaborate with public organizations, and increase trust of citizens. Especially microblogging services such as Twitter are increasingly seen as valuable for communication (Etter, 2014; Meijer & Torenvlied, 2016). However, in how far public organizations make use of these new possibilities regarding more interactive communication is a separate question.

The police are a special and interesting case for studying how public organizations approach social media, because they are a bureaucratic organization with strong hierarchies, a high degree of formality, and strong legal regulations on their behavior (Dekker et al., 2020; Meijer & Torenvlied, 2016). At the same time, they have a special role in society as they are the only organization that can enforce law and order in the population and use coercive measures for this (Denef et al., 2013). Thus, they rely on institutional legitimacy and the public's support, because they need their collaboration in fulfilling their tasks while they are simultaneously increasingly under public scrutiny regarding how they approach their societal functions (Meijer & Thaens, 2013; Walsh & O'Connor, 2019).

Existing research on the police's use of Twitter is still somewhat limited. Studies point to a high level of interest on the side of the police in engaging with social media, as well as a matching demand from the public. A reason for this might be that social media allows for dialogue which might strengthen the relation between the police and the public and thereby help the police to fulfill their societal function (Meijer, 2014; Meijer & Torenvlied, 2016; Williams et al., 2018). However, while Twitter is able to foster dialogue between the police and citizens, studies indicate that it is so far mainly used as a unidirectional tool to spread information (Crump, 2011; Hu et al., 2018; Meijer & Thaens, 2013; Meijer & Torenvlied, 2016).

In this, Germany is an especially interesting case as the German police is described as a late-comer to social media (Bayerl & Rüdiger, 2017). Moreover, their top-down strategy focusing on departmental Twitter accounts as well as their stronger hierarchical and legal limitations make them particularly challenged in their use of social media (Bayerl & Rüdiger, 2017; Ingold, 2017). Finally, studies have not presented a comprehensive overview over Twitter activities of the German police, but rather focused on the historical development, legal background, specific incidents, or organizational rationales (Akkaya et al., 2019; Bayerl & Rüdiger, 2017; Houy et al., 2019; Ingold, 2017).

This study addresses this gap and presents an exploratory but comprehensive overview of the Twitter activities of the German police for the entire year 2019. We use an automated content analysis of all tweets ($N = 137,771$) sent out in 2019 by 155 Twitter accounts—representing all active Twitter accounts of German police entities—to investigate how they use Twitter and in how far there are differences between police entities. In doing so, we focus on preexisting organizational differences between police departments and their organizational environment, namely their position in the organizational hierarchy, the population of the policed area, and the level of urbanization. Moreover, the study examines whether organizational differences and different communication strategies lead to different levels of user engagement.

Conceptually we combine arguments from organizational research regarding isomorphism (DiMaggio & Powell, 1983) and organizational path-dependence (Sydow et al., 2009) with insights from communication science regarding different approaches to organizational communication strategies and the public's responsiveness to them (Bortree & Seltzer, 2009; Grunig & Grunig, 2008; Guidry et al., 2017; Watkins & Lewis, 2014).

2 | ORGANIZATIONAL RESPONSES TO THE RISE OF SOCIAL MEDIA

Public organizations have structured their communication activities throughout the 20th century based on centralized and formal practices (Mergel, 2013). Especially external communication was perceived as something that needed to be hierarchically controlled.

The rise of new technologies at the beginning of the 21st century symbolized by the use of social media challenged these communication strategies in multiple ways (Macnamara & Zerfass, 2012; Mergel & Bretschneider, 2013; Walsh & O'Connor, 2019). First, external communication in the age of social media can be inherently decentralized. While in the predigital era press officers were able to handle most communication, the digital era and its accelerated dynamic communication cycles call for larger communication departments and/or more decentralized ways of communicating. Simultaneously, social media communication often tends to be less formal. As a result and in order to adjust to dominant communication practices on social media, public organizations use less formal language to address citizens (Bullock, 2018; Meijer & Thaens, 2013).

Some claim that the rise of social media will have a unified transformational effect on all types of organizations as this shift in technology impacts them equally (Meijer & Thaens, 2013; van Dijck & Poell, 2013). As social media focus on interactions in communication, they are different from classical tools of online communication such as web sites that only distribute information unidirectional. While initially being geared toward the private sector, the fact that social media is cheap, easy, and fast to implement makes it also an attractive addition for public organizations (Allagui & Breslow, 2016). However, public organizations' traditionally centralized, hierarchical, and risk-averse approach to communication can be challenged by these new tools (Mergel, 2012). In this, social media and its logic is seen to facilitate converging communication practices leading to a universal shift in communication strategies (Meijer & Thaens, 2013).

Following classic ideas from neo-institutional theory, one can argue that the rise of social media creates isomorphic pressure on public organizations leading them to adopt similar communication approaches (DiMaggio & Powell, 1983; Frandsen & Johansen, 2013). DiMaggio and Powell (1983) describe the process of homogenization or isomorphism as one in which organizations are drawn toward compatibility with other organizations in the same organizational field. In this understanding, isomorphism is linked to shared values, organizational structures, and common beliefs that spread over time as they are supported either by regulatory, mimetic, or normative pressures. Thus, if there is disruptive change in the environment, organizations have to adapt and, following the neo-institutional argument, they do so by showing isomorphic responses (Meijer & Thaens, 2013).

At the same time, it is a separate question in how far organizations make use of these new tools of communication or if they use social media in the same way they approached classical unidirectional communication. One could argue that implementing social media is based on a set of practical decisions regarding how the medium will be used by the organization (Bullock, 2018; Walsh & O'Connor, 2019). This involves choices of technology, the aims for which social media will be employed, or the organizational tasks that will be the basis for social media activities (Bullock, 2018; Meijer & Thaens, 2013). This would mean that organizational differences play a greater role in determining the way how public organizations approach the use of social media (Walsh & O'Connor, 2019; Williams et al., 2018). Thus, there is potential for strategic responses by individual organizations to environmental pressures that can lead to divergent reactions to changes in the organizations' environment. Factors such as the organizational capacity, taken-for-granted ways of communicating, organizational environment, or tasks can play a role here leading

to some form of path-dependence in the implementation of social media (Mahoney, 2000; Scott, 2010; Sydow et al., 2009).

Based on these lines of argument, one can formulate two contradicting expectations:

2.1 | Isomorphism

The use of social media by public organizations will be similar due to the common communication practices that these technologies facilitate.

2.2 | Divergence

The use of social media by public organizations will differ due to preexisting organizational differences that will be reinforced in the adaptation of social media.

3 | SOCIAL MEDIA LOGIC

To conceptualize different approaches to social media and to identify potential differences between police entities, we turn to literature on social media usage. This literature is based on the idea that social media platforms possess their own functional logic that is different from traditional mass media (van Dijck & Poell, 2013).

First, social media allows organizations to bypass traditional mass media and directly reach out to stakeholders. In this, organizations can use social media platforms to share information through unidirectional means of communication, but they can also use it to enter into a dialogue (Bortree & Seltzer, 2009; Rybalko & Seltzer, 2010). Scholars repeatedly indicated that dialogue-oriented communication can help to build and maintain relationships with key stakeholders, to overcome organizational crises, and to maintain organizational trust (Romenti et al., 2014; Watkins & Lewis, 2014). This is in line with ideas from the *excellence theory* that defines excellence in public relations as a set of practices and attributes that help organizations to craft quality and long-term relations with constituents. In this, scholars emphasize the crucial role of dialogue-orientation for excellent communication strategies (Grunig & Grunig, 2008). Whereas unidirectional communication focuses on the distribution of information, interactive strategies try to create linkages (Mergel, 2012). Twitter offers two different forms of dialogue-orientation: spreading messages of others in form of retweets and engaging in back-and-forth exchange through replies (Heldman et al., 2013; Park et al., 2016).

Second, social media offers the possibility to distribute visual information to stakeholders. Scholars increasingly emphasize the high relevance of including visual elements in organizational communication, because visuals have the ability to draw recipients' attention and can have persuasive effects on public opinion (Guidry et al., 2017; Schill, 2012).

Third, social media logic also encompasses a stimulation of user activity in form of communication behavior that affects the subsequent flow of information through social media platforms by means of so-called popularity cues, that is, the number of likes and retweets of content (Porten-Cheé et al., 2018). Popularity cues thereby mainly describe positive user reactions and, at least on an aggregated level, suggest the assigned relevance and endorsements of online messages. On the one hand, they are an indicator of successful communication efforts as there is evidence of an impact of social media engagement on organizational trust (Dessart, 2017). On the other hand, popularity cues can affect the audience's perceptions of as well as the attitudes and behaviors toward social media content (Haim et al., 2018; Porten-Cheé et al., 2018). Research suggests that content with a large user engagement, that is, content that contains stronger popularity cues, is more likely to be clicked,

ascribed a higher quality as well as credibility and has a stronger impact to stimulate behavior such as comments or shares (Haim et al., 2018).

Social media logic can also be expected to hold advantages for the police. In this, more direct and dialogical communication with the public might have a positive impact on public support and collaboration and in the long run on the police's institutional legitimacy (Grimmelikhuijsen & Meijer, 2015; Meijer, 2014; Meijer & Torenvlied, 2016; O'Connor, 2017; O'Connor & Zaidi, 2020; Ruddell & Jones, 2013). In addition, as studies point to an increasing demand from the public for more dialogue with the police, especially from younger generations, actively using social media cannot only create improved relations now, but also build increased trust in the future (Ruddell & Jones, 2013).

4 | THE POLICE AND THEIR USE OF TWITTER

Literature on the use of social media by the police is a growing field of research and different studies mapped the *emergence*, *adoption*, and *engagement* with social media. Most studies argue that the use of social media by police can be seen in the context of a growing general interest by the public sector in this technology (Hu et al., 2018; Meijer & Torenvlied, 2016; Mergel, 2013; O'Connor & Zaidi, 2020).

Police Twitter accounts in different countries *emerged* at different points in time. In some countries, like the United Kingdom or the Netherlands, the use of Twitter by the police started in a bottom-up manner from initiatives of single officers, which were subsequently integrated into organizational communication of police departments (Crump, 2011; Meijer & Torenvlied, 2016). Other countries such as Germany (see Section 5) followed a top-down approach starting at the organizational level (Bayerl & Rüdiger, 2017). While there is only limited international comparative data, single studies provide insights into national developments. Crump (2011) found that the oldest Twitter account of a UK police force dates back to 2008, making them an early-adaptor. He also reports that Twitter spread rather fast as by 2010 most police forces in England and Wales used social media (Crump, 2011). For the United States, Williams et al. (2018) report that a 2014 nationwide survey of social media use by 500 US law enforcement agencies reported that around two thirds use Twitter. Unfortunately, no exact date for the first social media or Twitter account of a US police entity could be identified, but a 2016 survey reports that 21 police agencies in the United States started using social media before 2006 (Kim et al., 2017). In the Netherlands, the first police tweets are reported for March 2009 and the same study points out that the decentralized strategy that the Dutch police used on Twitter created a situation in which today almost every police department has an account (Meijer & Torenvlied, 2016). In addition, many Dutch community officers have own accounts for specific neighborhoods. Also in Canada the first police officers started engaging with Twitter in 2009 following an initiative from an individual officer (Schneider, 2016). It seems that the trend toward social media is also welcomed by citizens, as a survey in six countries (the United States, Canada, the United Kingdom, the Netherlands, Germany, and Spain) found that three quarters of respondents would like to see the police use more digital communication (Williams et al., 2018).

The widespread *adoption* of social media by the police is linked to the many different purposes it can serve. In this, social media is used to support crime investigations, communicate quickly to large audiences, manage rumors, increase trust, as well as enlist the public to support the reduction of crime (Crump, 2011; Lieberman et al., 2013; Meijer & Torenvlied, 2016; van de Velde et al., 2015; Varano & Sarasin, 2014).

At the same time, the culture of the police to be more careful in their communication constrains *engagement* with social media especially regarding more dialogical approaches (Crump, 2011; Walsh & O'Connor, 2019). This is based on the police's special role in society as the only organization that can enforce law and order and their reliance on the public's cooperation in this (Denef et al., 2013). This creates a contentious relationship and makes communication especially important. Image and legitimacy are therefore central for the police making an adaptation of open communication, which lies at the heart of social media, a challenging task (Dekker et al., 2020; Denef et al., 2013).

It is therefore not surprising that studies so far report mixed results regarding the effect that social media had on police communication. On the one hand, studies suggest that the use of Twitter had a largely nontransformational effect, and that Twitter is mainly used as an additional channel to transmit information and not as a means to enter into dialogue (e.g., Crump, 2011). This is explained with the tension between a push for openness and engagement, and the hierarchical structures of the police. Similar results are also reported from the United States, Canada and the Netherlands (Brainard & Edlins, 2015; Fowler, 2017; Heverin & Zach, 2010; Huang et al., 2017; Kudla & Parnaby, 2018; Meijer & Torenvlied, 2016).

On the other hand, another study from the United States finds that the police use social media interactively, highlighting that it holds potential to advance community policing through a better relation between the police and the community (Williams et al., 2018). Similarly, also studies of the Canadian police highlight the use of Twitter for image management and community building (O'Connor, 2017; Walsh & O'Connor, 2019). Thus, it seems that while many studies point to a unidirectional use of Twitter, there is also evidence for more dialogical approaches.

5 | THE GERMAN POLICE AND THEIR USE OF TWITTER

The German constitution gives the *Bundesländer* the authority to regulate police (Frevel & Groß, 2008; Ritsert & Pekar, 2009). This means that the *Bundespolizei* that operates at a federal level has only very limited responsibilities such as border protection or investigating certain major crimes (for a detailed overview of the operational responsibilities see Ritsert & Pekar, 2009). Each *Bundesland* has its own internal organizational hierarchy structuring the police, but following reforms in the 1970s that centralized municipal police entities the fiscal and legal authority is entirely in the hands of the state governments and parliaments (Ritsert & Pekar, 2009; Wilz, 2012). The 16 state police entities differ in the number of organizational units and levels of organizational hierarchy that structure their police, but by and large each state entails three nested levels of organization (see Table 1). The highest of the three levels is then under the direct supervision of the respective state Ministry of the Interior (Das & Palmiotto, 2004; Frevel & Groß, 2008).

Looking at the public perception of German police, the picture of the police as an authoritative arm of the state is especially dominant, which has an impact on the relation between police and citizens (Bayerl & Rüdiger, 2017). Moreover, proactive communication from the police is historically not something that is expected by the population nor was it feasible before the rise of social media. The use of social media can therefore be argued to have an especially strong effect on the relationship between German police and citizens (Bayerl & Rüdiger, 2017). This also provides the opportunity for more transparency of police work and enhanced relationships between the police and citizens. One study reports that the German police started to use social media in the early 2010s and that by 2012 only 19 police organizations had a social media presence, which highlights their role as late-comers (Bayerl & Rüdiger, 2017). At the same time, the police have to fulfill legal requirements that arise from their role as a public actor that fulfills executive functions for the state when communicating through Twitter. This includes legal provisions that might hinder their use of social media (Ingold, 2017) (see the following text).

By and large, the literature distinguishes five main usages for social media by the German police (Bayerl & Rüdiger, 2017; Houy et al., 2019): (1) to spread information to citizens; (2) to collect information from citizens and enlist them in ongoing investigations; (3) to improve the police's image and the publics' trust; (4) to find new recruits and promote the police as a work place; and (5) sharing police-internal communication. One study suggests that the German police mainly focus on the first and the fourth of these functions and most departments were found to prefer Facebook or Twitter for their social media activities (Bayerl & Rüdiger, 2017).

Contrary to results from the United Kingdom or the Netherlands, German police use a more centralized and top-down strategy for social media, meaning they mainly rely on organizational Twitter accounts and refrain from using personal accounts (Bayerl & Rüdiger, 2017). Some departments also create thematic accounts, for example, for tracing current investigations or for specific branches such as the river police, but also these remain on an organizational

TABLE 1 Organizational structure of the German police

Federal level police force (*Bundespolizei*)							
16 state (*Bundesland*) police entities (*Landespolizei*)							
Regional police entity A (*Polizeipräsidium*)				Regional police entity B (*Polizeipräsidium*)			
Subregional entity A1 (*Polizeiinspektion*)		Subregional entity A2 (*Polizeiinspektion*)		Subregional entity B1 (*Polizeiinspektion*)		Subregional entity B2 (*Polizeiinspektion*)	
Local entity A1-A I (*Polizeirevier*)	Local entity A1-B II (*Polizeirevier*)	Local entity A2-A I (*Polizeirevier*)	Local entity A2-B II (*Polizeirevier*)	Local entity B1-A I (*Polizeirevier*)	Local entity B1-B II (*Polizeirevier*)	Local entity B2-A I (*Polizeirevier*)	Local entity B2-B II (*Polizeirevier*)

level. As the German constitution stipulates that the police are by-and-large regulated through laws in the different states (*Bundesländer*), there are no federal guidelines for the usage of social media by the police (Rogus & Rüdiger, 2014). Thus, the trend to focus on organizational accounts seems to be anchored in culture or norms and not in a common legal framework giving the different *Bundesländer* room for diverging implementations.

Finally, social media activities by German police happen in the shadow of federal legal regulations regarding questions of data privacy and the legal norm to investigate every potential crime (including crimes arising from inappropriate behavior on social media, e.g., in replies to police tweets) (Bayerl & Rüdiger, 2017; Houy et al., 2019; Ingold, 2017). While the federal level has limited legal competencies to regulate the police as such, federal laws that regulate, for example, citizens' rights regarding data privacy effect police entities and their online communication. In combination with factors such as limited training, a lack of additional funding, a hierarchical top-down organization, and the late adoption of social media (Bayerl & Rüdiger, 2017; Rüdiger & Rogus, 2014), German police can be regarded to be in an especially challenged position in their use of social media.

Building on this literature, we can adapt the general conceptual expectations developed above. On the one hand, the top-down approach to the use of Twitter and the hierarchical and authoritative culture of the German police are unifying features throughout the country. Moreover, the federal laws regarding issues of privacy and the need to investigate every potential crime are also common features. Focusing on these aspects, one could expect that the approach to the use of Twitter follows isomorphic patterns as the culture and norms of police departments in Germany would be rather similar.

On the other hand, the fact that the police are regulated by laws on the level of the *Bundesländer* in combination with the lack of a federal regulation on the use of social media creates possibilities for diverging approaches. Given that German police use only Twitter accounts representing different levels of organizational hierarchy, one can argue that differences between the level of the organizational hierarchy that is represented as well as environmental characteristics of the area which is policed, such as the size of the population and the degree of urbanization, can lead to differences in the usage of social media. The idea that organizational differences translate into different patterns of social media usage is supported by literature on marketing and public relations (Koski et al., 2019; Sharif et al., 2015), but also an argument put forward in Bullock's (2018) work on English police.

Based on these expectations, we formulate two research questions. The first focuses on differences in the use of social media:

RQ1: In how far do police entities with different environmental and organizational characteristics differ in their usage of social media?

The second research question addresses variation in user engagement:

RQ2: In how far do different patterns of social media usage by police entities result in different levels of user engagement?

6 | DATA AND METHODOLOGY

We conducted an automated content analysis of the Twitter communication of German police accounts. In a first step, we identified all Twitter accounts that were run by the German police and that were active in 2019, meaning they published at least one tweet during the year. We used the list of Twitter accounts provided by Reuter et al. (2018) and supplemented them by searching for the term "Polizei" (German for police) in the Twitter search mask. We validated each account individually to ensure that they are official accounts. Overall, we identified 155 unique Twitter profiles that distributed at least one tweet in 2019.

Through access to the Twitter Developer application programming interface, we then scraped all tweets that the 155 accounts distributed in 2019, leading to an overall sample of 137,771 tweets. For this task we relied on Facepager (Jünger & Keyling 2019). For each tweet we scraped its number of retweets and likes and information on

TABLE 2 Distribution of the sample across organizational characteristics

Urbanization	Accounts (%)	Tweets (%)	Organizational hierarchy	Accounts (%)	Tweets (%)
Federal	11 (7%)	12,460 (9%)	Federal	11 (7%)	12,460 (9%)
State	11 (7%)	14,960 (11%)	State	14 (9%)	23,702 (17%)
Metropolitan	9 (6%)	28,699 (21%)	Regional	46 (30%)	63,707 (46%)
Larger Cities	42 (27%)	36,796 (27%)	Subregional	76 (49%)	33,922 (25%)
Rural Areas	82 (53%)	44,856 (33%)	Local	8 (5%)	3980 (3%)
Total	155 (100%)	137,771 (100%)	Total	155 (100%)	137,771 (100%)

TABLE 3 Descriptive analysis

	M	SD	Range
Number of tweets	888.85	1093.34	1–7358
Replies (share)	0.38	0.49	0–0.82
Retweets (share)	0.04	0.21	0–0.79
Tweets with visual (share)	0.37	0.48	0.03–1
User engagement: Likes	13.67	116.27	0–14,770
User engagement: Retweets	4.14	39.90	0–5662
Number of followers	61,501.36	116,871	544–476,639

whether a tweet contained a visual element, that is, a photo or a GIF. Finally, we created a variable that differentiates whether a tweet was a retweet, a reply to another tweet or an organic tweet, meaning a regular tweet sent out neither as a reply nor as a retweet.

Moreover, we extracted information on the accounts and their policed area from the Twitter pages and the police entities' websites. We first created an account-level variable for the police entities' position within the *organizational hierarchy* differentiating between *federal*, *state*, *regional*, *subregional*, and *local* police entities (see Table 1). As information on the budget and resources of police entities are not easily available on the organizational level, we also rely on this variable as a proxy for available resources. This is based on the idea that police entities that are placed higher within the organizational hierarchy are more likely to have more resources and personnel at their disposal.

Second, we created a variable that differentiates the accounts based on the *degree of urbanization* of the jurisdiction that they represent. We manually classified them as one of these five categories: (1) federal police, (2) state police, (3) police in large metropolitan areas, (4) police entities in cities, or (5) police entities in rural areas. This is based on the idea that police entities in more urban districts might be subject to a different pressure to adopt a professional social media strategy and might thus communicate differently. Table 2 shows the distribution of the analyzed accounts and tweets across organizational characteristics. It is noteworthy that we decided to code three state-wide accounts—the police in Berlin, Hamburg, and Bremen—as organized on a state level, but as policing a metropolitan area. The reason for this is that these city-states do not have the same spatial spread as the other states, thus the area they police rather resembles a metropolitan environment.

Third, we derived information on the *population of the policed area* of each account based on population data of the administrative district. This is based on the idea that differences in the policed population might create a different pressure to adopt to social media and result in a different communication strategy. Finally, we collected account-level information on when the different Twitter accounts were created and how many followers they have. To avoid

potential biases as some of the scraped data constantly changes, all account-level data was scraped on the same day, namely April 23, 2020.[1]

The paper's analytical strategy is as follows: (1) First, we will present descriptive results on how Twitter is used by police entities to unravel if the usage is uniform or whether entities differ in their social media strategies. (2) Second, we will analyze if potential differences in social media strategies can be explained by organizational differences. To do so, we will present results from a series of multilevel models. (3) Third, we will examine if organizational differences and/or differences in the used communication strategies can explain differences in user engagement in the form of likes and retweets. In doing so, we will again rely on multilevel modeling.

7 | RESULTS

In general, Germany can be regarded as a late adopter to Twitter. Even though the oldest Twitter account was created in 2010 (@polizeisachsen), 92% of accounts were only formed in 2014 or later. A descriptive analysis of characteristics of the communication strategy, that is, number of tweets in 2019, share of dialogic forms of communication

TABLE 4 Influence of account characteristics as well as Bundesland on whether a tweet is organic

	Odds ratio	SE	Odds ratio	SE	95% CI [LL; UL]
Intercept	**1.92***	**0.18**	**1697.38***	**0.28**	**[982.26; 2933.15]**
Account characteristics					
Urbaniz.: state police			0.30[+]	0.63	[0.09; 1.04]
Urbaniz.: metropolitan police			**0.16***	**0.54**	**[0.05; 0.45]**
Urbaniz.: police in larger cities			**0.28***	**0.26**	**[0.17; 0.46]**
Urbaniz.: rural police			**0.29***	**0.22**	**[0.19; 0.46]**
Population in policed area (log)			**0.64***	**0.02**	**[0.61; 0.67]**
Organizational level: Landespolizei			2.16	0.69	[0.56; 8.30]
Organizational level: regional			**1.75****	**0.21**	**[1.15; 2.66]**
Organizational level: subregional			**2.46***	**0.22**	**[1.60; 3.77]**
Random effects					
Account-level variance	0.95		0.77		
Bundesland-level variance	0.43		0.15		
Model fit					
ICC: account-level (Level 2)	0.20		0.18		
ICC: Bundesland (Level 3)	0.09		0.04		
AIC	152,127.5		152,106		
BIC	152,157		152,214.1		
Log-likelihood	−76,060.7		−76,042		
Deviance	152,121.5		152,084		
df	137,761		137,753		
Marginal R^2 (delta)	—		0.07		
Conditional R^2 (delta)	0.24		0.23		

Note: Logistic multilevel model with dummy for organic (=1) or dialogic (=0) tweet as dependent variable, N(tweets) = 137,764, N (accounts) = 153, N(Bundesländer) = 17. Significant predictors are printed in bold. LL, lower limit; UL, upper limit.
***p < 0.001, **p < 0.01, *p < 0.05, [+]p < 0.1, confidence intervals (CIs) are centered around odds.

TABLE 5 Influence of account characteristics as well as Bundesland on whether an organic tweet contains a visual

	Odds ratio	SE	Odds ratio	SE	95% CI [LL; UL]
Intercept	**2.05**	**0.13**	0.31[+]	0.61	[0.10; 1.03]
Account characteristics					
Urbaniz.: state police			1.17	0.42	[0.51; 2.67]
Urbaniz.: metropolitan police			0.44[+]	0.43	[0.19; 1.02]
Urbaniz.: police in larger cities			0.67	0.38	[0.32; 1.39]
Urbaniz.: rural police			0.70	0.34	[0.36; 1.35]
Population in policed area (log)			**1.13****	**0.04**	**[1.03; 1.23]**
Organizational level: Landespolizei			0.76	0.40	[0.34; 1.66]
Organizational level: regional			**2.03***	**0.33**	**[1.07; 3.84]**
Organizational level: subregional			**3.04*****	**0.32**	**[1.62; 5.71]**
Random effects					
Account-level variance	1.47		1.39		
Bundesland-level variance	0.06		0.00		
Model fit					
ICC: account-level (Level 2)	0.31		0.30		
ICC: Bundesland (Level 3)	0.01		0.00		
AIC	85,882.7		85,886.4		
BIC	85,910.5		85,988.4		
Log-likelihood	−42,938.3		−42,932.2		
Deviance	85,876.7		85,864.4		
df	79,185		79,177		
Marginal R^2 (delta)	—		0.03		
Conditional R^2 (delta)	0.26		0.27		

Note: Logistic multilevel model with dummy for tweets with visuals (=1) as dependent variable, N(tweets) = 79,195, N (accounts) = 153, N(Bundesländer) = 17. Significant predictors are printed in bold.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, [+]$p < 0.1$, confidence intervals (CIs) are centered around odds.

and reliance on visual communication elements, points toward stark differences in how police entities use Twitter and in how much user engagement the accounts create on average (see Table 3). The share of tweets that are replies or retweets and that therefore can be characterized as dialogic, for instance, varies substantially between accounts (replies between 0% and 82% of tweets, retweets between 0% and 79%) as does the share of tweets that contain a visual (between 3% and 100%). Consequentially, the initial results point toward a divergence of communication practices and raise the question whether organizational characteristics can account for these differences.

To analyze this, we computed a series of multilevel models, in which tweets (Level 1) are nested in accounts (Level 2) that are nested in *Bundesländer* (Level 3). To be able to calculate reliable models, we had to drop two Twitter accounts (polizei_nrw_wes, polizei_nrw_gm) from the analysis due to their low number of distributed tweets ($N_{polizei\_nrw\_wes} = 6$, $N_{polizei\_nrw\_gm} = 1$) resulting in a subsample of 153 accounts and 137,764 tweets. Moreover, the dummy variable for the local level of organizational hierarchy had to be excluded due to multicollinearity.

We first analyze whether organizational characteristics account for variation in the reliance on dialogic means of communication. To do so, we used information on whether a tweet was organic or dialogic (i.e., retweet or reply) as the dependent variable and calculated two multilevel logistic regression models, one including only random effects and one which also included fixed effects on the account level (see Table 4).

As the second model shows, the differences between the reliance on dialogic means of communication can be explained by the degree of urbanization in the policed area. In this, accounts run by police entities in metropolises, larger cities and rural areas use significantly more dialogic means of communication than federal police as indicated by the significant predictor and the odds ratio values of below 1. Moreover, the degree of dialogic communication by the state police does not differ from federal accounts or metropolitan accounts (see confidence intervals) but differs significantly from entities that police larger cities and rural areas.

Second, a higher population in the policed area leads to an increased usage of dialogic means of communication. Finally, accounts that belong to police entities that are lower within the organizational hierarchy and thus potentially have less resources use Twitter less often for dialogic means. This is visible in the fact that the regional and subregional level of hierarchy differ significantly from the federal level with odds ratio values

TABLE 6 Influence of tweet, account characteristics, as well as Bundesland on number of likes

	B	SE	B	SE	95% CI [LL; UL]
Intercept	2.34***	0.13	−5.52***	0.18	[−5.88; −5.16]
Tweet characteristics					
Tweet type: retweet			−25.52***	2.84	[−31.08; −19.95]
Tweet type: reply			−1.32***	0.01	[−1.34; 1.30]
Visual			0.30***	0.01	[0.29; 0.32]
Account characteristics					
Urbaniz.: state police			−0.05	0.24	[−0.53; 0.43]
Urbaniz.: metropolitan police			0.15	0.19	[−0.23; 0.52]
Urbaniz.: police in larger cities			0.43*	0.21	[0.02; 0.83]
Urbaniz.: rural police			0.37*	0.18	[0.02;0.71]
Population in policed area (log)			0.21***	0.04	[0.13; 0.28]
Organizational level: Landespolizei			0.46+	0.24	[−0.01; 0.92]
Organizational level: regional			−0.03	0.18	[−0.39; 0.32]
Organizational level: subregional			0.17	0.19	[−0.20; 0.53]
Number of follower			0.51***	0.05	[0.41; 0.61]
Random effects					
Account-level variance	0.58		0.35		
Bundesland-level variance	0.45		0.11		
Model fit					
ICC: account-level (Level 2)	0.10		0.00		
ICC: Bundesland (Level 3)	0.07		0.00		
AIC	844,628.6		803,430.9		
BIC	844,668.0		803,588.2		
Log-likelihood	−422,310.3		−401,699.4		
Deviance	844,620.6		803,398.9		
df	137,760		137,748		
Marginal R^2 (trigamma)	—		0.86		
Conditional R^2 (trigamma)	0.14		0.88		

Note: Negative binomial multilevel model with number of likes as dependent variable, N(tweets) = 137,764, N (accounts) = 153, N(Bundesländer) = 17. Significant predictors are printed in bold.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, +$p < 0.1$.

TABLE 7 Influence of tweet, account characteristics, as well as Bundesland on number of shares

	B	SE	B	SE	95% CI [LL; UL]
Intercept	1.30***	0.12	−8.98***	0.16	[−9.30; −8.65]
Tweet characteristics					
Tweet type: retweet			2.73***	0.03	[2.68; 2.78]
Tweet type: reply			−2.30***	0.01	[−2.32; −2.27]
Visual			0.35***	0.01	[0.32; 0.37]
Account characteristics					
Urbaniz.: state police			0.46**	0.14	[0.18; 0.75]
Urbaniz.: metropolitan police			0.51**	0.17	[0.18; 0.84]
Urbaniz.: police in larger cities			1.00***	0.19	[0.62; 1.38]
Urbaniz.: rural police			1.03***	0.14	[0.75; 1.30]
Population in policed area (log)			0.29***	0.03	[0.22; 0.35]
Organizational level: Landespolizei			0.33*	0.14	[0.05; 0.61]
Organizational level: regional			−0.08	0.15	[−0.37; 0.21]
Organizational level: subregional			0.15	0.18	[−0.21; 0.51]
Number of follower			0.56***	0.05	[0.46; 0.66]
Random effects					
Account-level variance	0.64		0.36		
Bundesland-level variance	0.26		0.04		
Model fit					
ICC: account-level (Level 2)	0.07		0.00		
ICC: Bundesland (Level 3)	0.02		0.00		
AIC	519,622.3		472,867.7		
BIC	519,661.7		473,025.0		
Log-likelihood	−259,807.2		−236,417.8		
Deviance	519,614.3		472,835.7		
df	137,760		137,748		
Marginal R^2 (trigamma)	—		0.16		
Conditional R^2 (trigamma)	0.03		0.20		

Note: Negative binomial multilevel model with number of likes as dependent variable, N(tweets) = 137,764, N (accounts) = 153, N(Bundesländer) = 17. Significant predictors are printed in bold.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, [+]$p < 0.1$.

greater than 1. Overall, the results suggest that dialogic means of communication are more common in the communication of police entities with a larger potential target group, with higher resources and from jurisdictions that do not belong to the state or federal level. The latter might be a consequence of differences in the tasks that different police entities fulfill and simultaneously indicates the relevance of localization for an orientation toward dialogic means of communication. This resembles findings from other contexts, such as the United States or the Netherlands, that highlight the importance of contextual factors for social media usage (Meijer & Thaens, 2013; van de Velde et al., 2015).

In a next step, we rely on the same modeling strategy but use information on whether a tweet contains a visual as dependent variable. Since dialogic tweets usually tend to contain no visual elements (only 4% of dialogic tweets have visuals), we decided to focus this model solely on organic tweets (N = 79,195). The results indicate that the

higher the population in the policed area and the lower a police entity is placed within the organizational hierarchy the higher the likelihood of a tweet containing a visual (see Table 5).

Overall, in response to our first research question, the models suggest that organizational characteristics indeed account for variation in the police's usage of Twitter. Police entities in larger cities, metropolises, and rural areas as well as in areas with a larger population and entities that are placed higher in the hierarchy (and thus have more resources) more often use dialogic communication. Similarly, visual communication seems to be affected by the size of the policed population and the level of hierarchy, while it seems to be independent from the degree of urbanization.

Next, our analysis focused on how often users engage with police communication. In doing so, we calculated two sets of negative binomial multilevel models because the dependent variables, that is, the number of likes and shares, are overdispersed count variables. The models use the same data clustering as above and analyze the effects of variables on the tweet level—a dummy for whether a tweet is a reply, whether it is a retweet and whether it contains a visual—and variables on the account level—the same variables as above plus the number of followers—on the number of likes or shares a tweet received.[2]

Table 6 highlights that the models explain a substantive share of variance in the number of likes that a tweet receives (conditional R^2 [trigamma] = 0.88). Moreover, it reveals that retweets and replies lead to less likes than unidirectional communication, as indicated by the significant and negative estimates. Visuals, however, increase the average number of likes. Turning to account-level characteristics, the analysis unsurprisingly reveals that the higher the number of followers an account has the higher the number of likes a tweet receives. In addition, the model shows that the larger the policed population is the more likes a tweet receives. Finally, accounts from rural areas and larger cities receive significantly more likes than federal accounts—ceteris paribus—while they do not differ in that regard from other account types.

The final set of multilevel regressions analyzes variation in the number of retweets. Compared to previous models, these models account for a lower share of overall variance (conditional R^2 [trigamma] = 0.2), suggesting a difference in people's motivation to like or retweet a post (see Table 7). Posts that were retweeted by the police have a higher probability of receiving further retweets, while replies are retweeted significantly less often than organic tweets. Moreover, visuals significantly increase the number of retweets that a post receives. Turning to the account-level variables, the analysis shows that the number of followers significantly increases the number of retweets. Moreover, the models suggest that all accounts linked to different degrees of urbanization in their policed area receive significantly more retweets than federal accounts, while they do not differ significantly from one another (see confidence intervals). In addition, the larger the population of a policed area the more shares a tweet receives. Finally, the level of organizational hierarchy does not seem to be a relevant predictor for the number of retweets as the only difference accounted for by the model is between federal and state-run accounts.

TABLE 8 Key results and how they correspond to prior studies

Prior studies	Our analysis
German police as latecomer to social media (e.g., Bayerl & Rüdiger, 2017)	Supported: 92% of accounts established in 2014 or later
Social media mainly used to distribute information unidirectionally (e.g., Kudla & Parnaby, 2018, Meijer & Torenvlied, 2016)	No full support: We find strong differences between entities' share of communication that is unidirectional
Social media also used for interactive communication (e.g., O'Connor, 2017, Walsh & O'Connor, 2019)	Supported: we find both unidirectional and dialogical forms of communication
Police use of social media mediated by organizational factors (Bullock, 2018)	Supported: we find that the use of social media and the level of user engagement is affected by organizational aspects

Overall, in response to the second research question, our analysis suggests that while the communication strategy, that is, the share of tweets with visual elements, is helpful in explaining differences in user engagement, the level of organizational hierarchy and the urbanization of the policed area only offer limited explanatory power. Moreover, the analysis highlights that the number of followers and the size of the policed population are meaningful predictors of user engagement.

8 | DISCUSSION

The results of our analysis point to the central importance of organizational and environmental aspects in the use of Twitter by German police. This is in line with findings from studies on other contexts (see e.g., Dekker et al., 2020; Meijer & Torenvlied, 2016; Williams et al., 2018). We also find that the number of tweets, the share of dialogical communication, and the use of visuals in tweets differ along certain organizational aspects, which is also in line with findings from studies of other countries (e.g., Bullock, 2018; Dekker et al., 2020).

The difference in use of dialogical communication can be explained by looking at the degree of urbanization of the policed area with metropolitan, city, and rural accounts having a higher degree of dialogical interaction. One explanation for this can be that if an account represents a federal or state area the target population is more diffuse because the policed area is of such a size that tweets are more likely to inform about issues which are further away from the daily life of the population. This can make people less likely to interact with the account (Williams et al., 2018). Moreover, federal and state accounts also represent different areas of responsibility regarding policing and thus can have different priorities in their messaging such as the types of topics addressed, or functions Twitter is used for. This echoes earlier findings from the United States that argue that a police account also needs to be responsive to the interests of their target audience if they want to increase dialogical interaction (Williams et al., 2018). However, this becomes more difficult the more diverse the policed area becomes and based on our results it seems that in Germany especially accounts representing entire states, or the federal level seem to be challenged by this.

At the same time, accounts that represent police entities that are lower in the organizational hierarchy were found to show less dialogical forms of interaction. As we used this variable as a proxy for the available resources, our results here are in line with one of the structural barriers identified by Dekker et al. (2020) in their study of Dutch and British police, namely insufficient resources, which limit the effectiveness of social media in police work. At the same time, we also found that accounts that serve an area with a larger population use more dialogical forms of communication. This can be related to another barrier identified by Dekker et al. (2020), digital inequalities, which describes the fact that certain parts of the population, such as older people, are less inclined to use social media. As large and medium-sized cities in Germany have a significantly lower average age of the population than rural areas,[3] this result is in line with earlier arguments that highlight that the level of dialogical communication is not only driven by the communication of the police but also by characteristics of the target audience (Williams et al., 2018).

Similarly, accounts that serve an area with a higher population and accounts that represent entities that are lower in the organizational hierarchy have been found to use visuals more often in tweets. The former could again be linked to the lower average age of the target audience as younger recipients could be more inclined to respond to a more diverse use of Twitter. The latter is harder to interpret.

Regarding user-engagement we found that the more dialogical retweets and replies create less likes than organic tweets, while tweets with visuals create more likes. These results are in line with earlier findings that showed that characteristics of tweets, for example, the use of visuals, influence user engagement (Schill, 2012). Moreover, as organic tweets create more user-engagement it seems that the police need to use this form of unidirectional communication to create visibility among the target population. This could offer a positive interpretation of the findings from previous studies that the police mainly use social media as another channel to unidirectionally spread messages (Crump, 2011; Dekker et al., 2020; Meijer, 2014). Maybe this is not only the result of organizational hindrances that

prevent a more dialogical use, but instead police also pursue this strategy as it has a positive effect on their user engagement. However, as organic tweets also come with more limited dialogical communication, which is found to increase trust in the police (e.g., Ruddell & Jones, 2013), a blended strategy that includes both types of communication seems to emerge as a best-practice.

We also found that environmental aspects were an important factor for user engagement because tweets from accounts with more followers and those that serve areas with higher population generate more likes and retweets. Both results are not surprising and are another example for the importance of considering characteristics of the target audience to use Twitter effectively (Williams et al., 2018). Also, the urbanization of the policed area mattered as accounts from rural and city police entities generated more likes than federal accounts. However, besides this difference, the level of urbanization and the level of the organizational hierarchy that the account represents only had limited effect sizes. Thus, it seems that the police are less limited by organizational aspects regarding the creation of user engagement and can more actively shape the effectiveness of their Twitter presence through the right communication strategy.

Getting back to our two research questions, our analysis showed that police entities with different organizational characteristics do differ in their use of Twitter and that different patterns of Twitter usage result in different levels of user engagement. These results are more in line with our divergence expectation than our isomorphism expectation. It seems that factors such as environmental conditions, organizational capacity, or organizational tasks can create path-dependence in the implementation of social media. The lack of a common federal guideline for the use of social media by the police gives the different organizations room to adapt the use of this new set of tools to their specific needs. The lack of support for the isomorphism argument highlights that different police organizations in Germany do not experience the shift to social media as a homogenous pressure. While the police entities still operate in the same organizational field, it seems that the disruptive change in the environment, symbolized by the rise of social media, is not affecting them equally. In this, it seems that their organizational environments, capacity, and tasks weigh heavier than their shared values, organizational structures, and common beliefs.

Our analysis offers a first overarching explorative perspective on how German police make use of Twitter. The data affirm earlier findings indicating that German police was a late-adopter to Twitter compared, for example, to their colleagues in the Netherlands or the United Kingdom. However, our analysis delivers somewhat mixed results in relation to other studies. A large part of the literature suggests that police mainly use social media in a unidirectional way to share information (e.g., Crump, 2011). Only a smaller set of studies finds more dialogical engagement (e.g., O'Connor, 2017; O'Connor & Zaidi, 2020). Our results fall somewhere in between and are more in line with Bullock's (2018) argument, as we show that organizational and environmental characteristics play a role in determining how Twitter is used and in how far this leads to more public engagement. This is also in line with arguments made in studies of Dutch, British, or US police (Dekker et al., 2020; Meijer, 2014; Meijer & Thaens, 2013; Meijer & Torenvlied, 2016; Williams et al., 2018). Table 8 provides an overview of how our results relate to key findings from previous studies conducted on other countries.

Overall, our analysis showed that even though German police departments operate under a common culture and norms as well as face common communication practices facilitated by social media, preexisting organizational and environmental differences matter for how these organizations use Twitter and in how far their usage leads to differing levels of user engagement. It seems that in a situation without a prescribed approach, implementation and use of social media are adapted to the specific organizational environment, leading to a situation characterized rather by path-dependence than isomorphic adaptation (DiMaggio & Powell, 1983; Sydow et al., 2009). This echoes the three-stage adoption process for social media use in government suggested by Mergel and Bretschneider (2013), in which only after a phase of organizational experimentation that can be somewhat chaotic, norms, regulations, and institutions evolve that lead to a more common communicative behavior. Therefore, the German police might have to enter this next stage in their adoption process of social media before one can observe more unified approaches to the use of this technology. Such a unified approach should combine a focus on user engagement and dialogical communication to create a best practice that maximizes both outreach and improved relations with the population through, for example, increased trust, while at the same time leaving space to tailor the use of Twitter to certain characteristics of the target audience.

9 | CONCLUSION

The results outlined above also point to some practical implications. If a coherent and more dialogical approach to the use of Twitter is desired, then there might be a need for coordinated guidelines on how local branches of public organizations such as the police should use social media to ensure that departments move in the same direction, especially in federal countries. An open question that our study could not address in detail, due to unavailability of data, is in how far variations in organizational capacity, meaning resources and skills to properly use social media, are a relevant factor. While a police entity's level in the organizational hierarchy can be expected to correlate to a certain degree with the level of available organizational resources, a closer examination, for example, through a survey of police departments would be desirable.

As this study only presents an explorative analysis, it has several limitations that should be addressed in future research. First, the analysis is focused on a single social media platform. Even though due to its openness and its widespread usage, Twitter is a good starting point, future work should broaden the scope to include communication on other social media platforms as well as interactions between them. Similarly, future research should extend the analysis to other countries and offer a comparative perspective on police communication. Finally, in a next analytical step, one could extend the existing analysis and focus on differences regarding what is being communicated, for instance by means of topic modeling.

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT
Tweet Ids are available on the Harvard Dataverse Repository: https://doi.org/10.7910/DVN/WOO84X

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ENDNOTES
[1] This day was chosen randomly. As some social media metrics are subject to constant change, it was necessary to select one specific day to scrape account-level data from all accounts.

[2] By including the number of followers alongside the population of the jurisdiction into the analysis, the model considers that differences in user engagement might mainly be a consequence of different sizes in the target group. By controlling for these variables the analysis can identify differences beyond these two relevant factors.

[3] See: https://www.iwkoeln.de/fileadmin/user_upload/Studien/Kurzberichte/PDF/2019/IW-Kurzbericht_2019_Alterung_der_Gesellschaft.pdf (February 24, 2021).

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