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Social Media and Crisis Communications: A Survey of Local Governments in Florida

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Abstract:

Social media platforms are increasingly being used by public agencies and emergency managers to communicate with the public in times of crisis. However, while the adoption of these technologies has been well documented at the federal level, little is known empirically about the extent to which social media are being utilized for emergency management communications by local agencies, and less still is known about how rates of adoption vary based on the organizational and demographic characteristics of local municipalities. This exploratory study provides an empirical analysis of social media use by local municipalities in the State of Florida and examines the organizational and demographic factors related to social media adoption for emergency and crisis communications. The study suggests that social media are still underutilized by local agencies in many regards. Findings also indicate that larger municipalities which serve younger, more highly educated populations are more likely to adopt social media for crisis communications, while agencies representing traditionally under-served populations are less likely to utilize social media for these same purposes. The implications of these findings are discussed, particularly the role of higher education in preparing public administrators and emergency managers for careers in a networked society.

Keywords: crisis communications, Facebook, local government, social media, Twitter

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1 Introduction

Over recent years, the use of social media by public agencies has been increasing at all levels of government (Karakiza 2015; Mergel 2012a). These trends have been driven in part by the Obama Administration's *Memo-randum on Transparency and Open Government* (Obama 2009), as well as its subsequent *Open Government Directive* (Orszag 2009), each of which called upon federal agencies to harness "emerging technologies" in an effort to enhance transparency, collaboration, and public participation. Following these directives, social media usage has grown substantially at the national level (Mergel 2012a). While adoption at the local level has been less widespread, Mearns, Richardson, and Robson (2015) suggest that the use of social media by local agencies has recently been "gathering pace" (p. 191).

As these technologies have become more prominent among public agencies, one emerging area of interest has been the use of social media for crisis communications (i.e. emergency management and disaster preparedness). Recent studies have found that social media platforms are increasingly utilized by government agencies to communicate emergency preparedness, mitigation, response, and recovery information to the citizenry (for examples see: Merchant, Elmer, and Lurie 2011; Mergel 2012a; Bernier 2013; Conrado et al. 2016). It has been suggested that social media helps not only to expand public access to emergency information, but also to increase the speed with which information can be distributed and retrieved in emergency situations (Hughes and Palen 2012; Graham, Avery, and Park 2015). Furthermore, social media allows citizens to become active participants in the emergency response process by creating and redistributing emergency information to peers in their social network (Hughes and Tapia 2015).

However, despite the perceived benefits of social media for crisis communications, little is empirically known about the prevalence of social media usage by emergency managers at the local government level. Considerably less is known with regard to the nature of social media usage and how it varies across municipalities based on differences in social, economic, and cultural demographics (Graham, Avery, and Park 2015). This exploratory study seeks to address those concerns and contribute to the growing body of social media literature by providing an empirical examination of adoption among local municipalities in the State of Florida, with a focus on the communication and dissemination of emergency information.

In order to conduct this study, we administered a web-based survey to all active Florida City and County Management Association (FCCMA) members. The sampling frame included 180 cities, with 83 usable responses received, for a response rate of 46%. The research findings discussed later in this article address three specific research questions. (1) What portion of local municipalities have adopted social media to disseminate emergency information? (2) Which social media platforms are most frequently utilized to distribute emergency information? (3) Which demographic and institutional factors influence the likelihood of social media adoption? We believe that these findings will be of interest to both scholars and practitioners in the fields of public administration, emergency management, and information technology. We hope that they will also provide a baseline for comparison in future studies.

The section that follows provides a cursory overview of recent literature regarding the expansion of social media as well as its adoption by public agencies. We consider the emergence of social media as a new paradigm for government communication in general and its particular relevance in the areas of emergency management and disaster preparedness. We also look briefly at some specific examples of social media usage during recent emergency/disaster scenarios, and we consider barriers to the adoption of social media by local government agencies. From there, the study turns to an analysis of the survey results obtained from the FCCMA's member agencies.

2 Background Information

"Social media" describes a variety of online, web-based applications that facilitate social interaction and the direct transmittal of information between networked actors/members. As several scholars have noted, social media is marked by both the rapid transmission and multi-directional flow of information, wherein individual actors within a networked environment can act simultaneously as originators, redistributors, and recipients of content and information (i.e. Kietzmann et al. 2011; Thackery et al. 2012; VanMeter, Grisaffe, and Chonko 2015). Popular examples of social media include *networking* sites such as Facebook and LinkedIn, *media sharing* sites such as YouTube and Instagram, and *microblogging* sites such as Twitter, which allow for real-time information updates (Kietzmann et al. 2011; Osatuyi 2013). Many studies have also included tools such as web-blogs within the broader umbrella of social media, as these forums allow individuals from any and all backgrounds to create and distribute content that can influence public opinion and promote social interaction. In defining social media for the purposes of this paper, we adhere to the broad approach outlined above, which is succinctly summarized by VanMeter, Grisaffe, and Chonko (2015), who define social media as "... an interactive platform that allows social actors to create and share in multi-way, immediate, and contingent communications" (p. 71)

In the United States, participation in social media has increased dramatically over the past decade. The Pew Research Center – which has tracked social media usage since 2005 – recently reported that 65% of American adults use some form of social media. This marks a sharp increase over the last decade, up from only 7% in 2005 (Perrin 2015). Moreover, during the same time period, social media participation has gone up significantly among non-traditional users, including senior citizens, ethnic minorities, rural residents, and individuals from low-income households (Madden and Zickuhr 2011; Perrin 2015).

These trends have led to significant changes in how Americans seek-out and engage with public information. Mitchell, Rosenstiel, and Christian (2012) report that more than 50% of digital news consumers now turn to social media sites such as Facebook and Twitter for important news and information. As a result, public expectations regarding government adoption and usage of social media are changing, and the pressure on local agencies to engage with their citizens through social media is increasing (American Red Cross 2012; Mergel 2012a). While these emerging technologies have by no means replaced traditional methods of information seeking (Mitchell, Rosenstiel, and Christian 2012), the instant accessibility of information afforded by social media, as well as its growing popularity, has unquestionably altered the landscape of information seeking and mass communication.

Over the same time period, government usage of social media has increased as well, though significant questions remain regarding the extent of government engagement via social media, particularly at the local level. Following the aforementioned directives from the Obama Administration, social media at the federal level has become highly visible. Mergel (2012a, 2012b) notes that "As of May 2012, the 698 departments, agencies, and initiatives of the US federal government have created 488 Facebook pages, 363 Twitter accounts, 247 YouTube channels, and 71 Flickr pages..." (p. 282). The most active user of social media during this period has been the Department of Defense, which on its own has created nearly 2500 Facebook pages and over 650 Twitter accounts (Mergel 2012a, 2012b).

Participation rates at the local level have been more meager, as well as more difficult to measure. Graham and Avery (2013) conducted a national survey of local government officials in which 70% of respondents report

that their respective municipalities have at least one active social media account. However, a deeper look at the data suggests that the actual use of these accounts is fairly scant. In contrast, a report to the New Jersey State League of Municipalities (NJLM) questions the veracity of such numbers, suggesting that ambiguous definitions of social media have led to an overstatement of usage in some instances. A related study of 200 local municipalities within the state of New Jersey found that only 30% of local agencies are using social media to interact with the public¹ (Enyeart 2011). In each case, the findings have suggested that social media is typically underutilized by local governments, and that the majority of public agencies do not employ social media in a way that increases social interaction or facilitates democratic participation on the part of citizens.

2.1 Social Media Usage in Times of Crisis

While these cultural and technological developments are changing how governments communicate with citizens, their impact appears to be particularly acute in the case of emergency management and disaster response. As Americans become more connected via social media, they also become increasingly reliant on these technologies and platforms for information in times of crisis (American Red Cross 2012; Jin, Liu, and Austin 2014; Lachlan et al. 2016; Rene 2016). Recent research has suggested that citizens frequently seek out real-time information on social media sites during emergencies, including updates pertaining to weather, traffic, damage, and safety instructions (American Red Cross 2012). These trends have led to increased expectations for emergency managers to engage with citizens through social media (Jin, Liu, and Austin 2014; Mergel 2012a). For example, a study conducted by the American Red Cross (2012) found that over two-thirds of Americans believe emergency responders should actively engage the public during crises via social media, while nearly three-quarters expect timely responses to calls for help placed through social media platforms.

Social media's growing importance in crisis communications is due in large part to its widespread accessibility, its provision of instant access to real-time information, and its multidirectional communication capabilities. For emergency managers in particular, social media provides more direct lines of communication with the citizenry in times of crisis, thereby minimizing the time that it takes for critical information to flow through traditional communication channels (Palen and Liu 2007; Hughes and Palen 2012).

For example, during Hurricane Sandy, social media use swelled, including a spike in online followers for official actors such as Con Edison and the City of New York (Bernier 2013; Stewart and Wilson 2016). Over 20 million hurricane related tweets were sent in the days immediately surrounding the storm, with more than half of them including news, information updates, and storm related videos (Guskin and Hitlin 2012). Official actors such as the Governors of New York and New Jersey, as well as emergency management agencies, used Twitter and other social networking sites to quickly and directly distribute critical storm related information to the public. This included power outage and impacted area updates, evacuation plans, and notices about safe drinking water (Stewart and Wilson 2016). Notably, citizens were able to receive many of these updates via social media even after the storm knocked out power and disrupted cellular phone service, effectively cutting them off from traditional information sources. A similar expansion of social media usage occurred following the 2011 F5 tornado in Joplin, MO. A Facebook page created shortly after the tornado directed residents to critical resources, recovery related information, and volunteer opportunities, while also allowing victims of the storm to reconnect with loved ones (Skarda 2011; Plotner 2014).

Not only does social media allow emergency managers to distribute critical information to citizens in a timelier manner, but it may also reduce the communication workload for local agencies and first responders. Evidence has suggested that posting press-releases and incident information in readily available, online formats reduces the number of information requests received from the public (Latonero and Shklovski 2011; Hughes and Palen 2012), which may allow emergency management personnel to focus their energies on other critical aspects of disaster response.

Some scholars argue that social media also has a "democratizing" effect on government communications, both by improving transparency and accountability (Gladwell and Shirky 2011; Karakiza 2015), as well as by creating innovative new forms of citizen participation in public life, such as crowdsourcing and collaborative development (Alexander 2014). As Karakiza (2015) notes, the earliest e-government applications allowed public agencies to communicate with their citizens in a one-way, mono-directional fashion. However, social media provides the opportunity for governments to both distribute and receive information, creating a more interactive relationship with citizens. This creates the potential for a more rapid recognition of public problems and preferences, as well as an increased sense of trust in the transparency and accountability of government.

Due to this multidirectional nature of social media communications, the public is able to become more engaged during times of crisis (Hughes et al. 2008; Palen and Liu 2007). Hughes and Tapia (2015) note that because of social media, "Members of the public can now participate more broadly in times of crisis as they collect, create, share, and seek online information through social media" (p. 679). For example, following the Deepwater Horizon Oil Spill in 2010, Gulf Coast residents used mobile phones and social media to post photographs of

affected animals and impacted areas in order to more efficiently direct the efforts of first responders (Merchant, Elmer, and Lurie 2011). During Hurricane Sandy, citizens not only used social media to receive information from public officials, but also to redistribute news and emergency information, connect with loved ones, and post eye-witness videos that were subsequently used by traditional news outlets to report on the storm (Stewart and Wilson 2016). Social media was also prominent following the 2013 Boston Marathon bombing, when citizens used Twitter to redistribute and submit information concerning the FBI's ongoing manhunt. The FBI's reports and photographs went "viral", creating enhanced awareness and vigilance on the part of the public (CBS News 2013).

While these are a limited number of examples, they demonstrate that the expansion of social media has redefined the role of public participation during times of crisis. Due to these technological developments, citizen involvement is no longer limited to simple information seeking. Members of the public can now create and share emergency information with others in their social network, provide incident updates for emergency managers and the general public, respond to volunteer opportunities, and even post requests for assistance. It should be emphasized that while many users may not follow or track official public agencies or news outlets on social media, the ability of individuals to redistribute information through their social network means that many more users receive the "viral" content.

However, while social media allows citizens to become actively engaged in times of crisis, these technologies are not without their potential drawbacks. Researchers and practitioners alike have raised concerns over the potential for social media to proliferate inaccurate data, unverified rumors, and even malicious misinformation (Hughes and Palen 2012; Conrado et al. 2016). For example, during the 2013 Boston Marathon bombing, early reports on social media misidentified the suspects, leading to inefficiencies in resource deployment and wrongful accusations (Henn 2013). Along with concerns over the reliability of social media posts, some researchers have suggested that the sheer volume of information circulated via social media can overwhelm emergency managers, making it difficult to locate accurate and up-to-date information. For example, in March of 2011, after the Tohoku Earthquake triggered a massive tsunami in Japan, requests for assistance made through Twitter continued to be retweeted after the victims had been rescued, making it difficult for first responders and others to identify which information was current (Acar and Muraki 2011).

In an effort to minimize these potential pitfalls and optimize the strategic value of social media for crisis communications, scholars have identified a number of best practices for government agencies and emergency managers (i.e. Conrado et al. 2016; Houston et al. 2014; Hughes and Tapia 2015; Lin et al. 2016; Ma and Yates 2014; Pechta, Brandenburg, and Seeger 2010; Roshan, Warren, and Carr 2016). For example, Lin et al. (2016) emphasize the importance of proactively incorporating social media into the process of crisis management and policy development, rather than treating it as an afterthought once disasters strike. Doing so may ensure the efficient flow of information during emergencies, while also limiting the space in which misinformation can take hold. This includes collaborating with reliable partners who can facilitate the diffusion of critical information during crises (Hughes and Tapia 2015; Lin et al. 2016).

In a recent study of social media usage during the US Zika virus outbreak, Hagen et al. (2017) identified influential actors based on popularity, authority, and connectivity. Their findings show that professional experts and political actors are well positioned to serve as boundary spanners, linking disparate communities and facilitating the flow of information across social networks. Identifying and partnering with such actors in advance of a disaster may limit the time that it takes to circulate information in the early stages of a public emergency. Other common recommendations include (1) establishing "official" social media accounts to increase credibility and visibility (Lin et al. 2016), (2) actively monitoring social media for misinformation and promptly "correcting the record" (Lindsay 2011; Lin et al. 2016), (3) employing consistent hashtags (#) and common search terms in order to make pertinent information more easily identifiable, (4) training public employees in the proper use of social media (Eikenberry 2012; Mergel 2012b), and (5) engaging in active, bi-directional communications with the public, thereby allowing citizens to contribute to the discussion and make requests for information and/or assistance (Lin et al. 2016).

2.2 Barriers to Adoption

Despite the perceived benefits of engaging citizens through social media, there remains a lingering sense that public agencies lag behind their private sector counterparts in both the adoption and deployment of social media technologies (i.e. Mergel 2012a; Mearns, Richardson, and Robson 2015). Mearns, Richardson, and Robson (2015) examined a number of potential barriers to adoption, which may be slowing or even deterring the adoption of social media by many public organizations. In particular, they noted resource/cost factors, a skills deficit and dearth of digital leadership, as well as a general sense of risk aversion as major barriers to adoption for many agencies. From a financial perspective, the tightening of public budgets over recent years, coupled with the sometimes high cost of integrating new technologies into existing platforms, has created a disincen-

tive for many public agencies to invest time and resources into developing new, internet-based communication tools (Mearns, Richardson, and Robson 2015). Furthermore, a perceived lack of digital leadership among senior managers (Mearns, Richardson, and Robson 2015), as well as limited resources for training and guidance (Hughes and Tapia 2015), have led many public agencies to shy away from full-fledged social media adoption. On top of these concerns, Mearns, Richardson, and Robson (2015) suggest that a general aversion to risk and a “fear of getting it wrong” has slowed adoption on the part of many agencies (p. 194). This latter observation may be particularly relevant in the high-stakes area of crisis management.

Risk aversion may also be exacerbated by legal concerns, which may be a significant barrier to adoption for many local agencies. Writing specifically to Florida municipalities, Hennessy (2012) notes that significant “legal issues include privacy, intellectual property, defamation, self-incrimination, and open government laws” (p. 17). While these concerns pervade all facets of public communication, Hennessy suggests that they are amplified in online settings where communications are inherently less private and potentially permanent. Many public agencies may be deterred from adopting social media due in part to the inherent challenges of identifying and maintaining information that is subject to the state’s robust Public Records Law, as well as the potential for costly, unforeseen lawsuits in the case that social media accounts are mishandled or improperly maintained.

On top of slow adoption rates, several scholars have suggested that there is a significant gap between public expectations and the actual use of social media by government agencies (Graham and Avery 2013; Mearns, Richardson, and Robson 2015). In many instances, those public agencies which have adopted social media are underutilizing its technological capabilities (Graham and Avery 2013; Lin et al. 2016), in part by limiting themselves to one-way communications, with an eye toward transparency, rather actively engaging citizens in collaborative, bi-directional communication efforts (Mergel 2012a; Graham and Avery 2013; Karakiza 2015). This may be a consequence of the digital skills deficit highlighted by Mearns, Richardson, and Robson (2015), as well as the rapidity of technological development in social media, which makes it difficult for government agencies to keep up with the practices and expectations of the public (i.e. Hughes and Palen 2012; Mergel 2012a). Lachlan et al. (2016) note that in many instances “... official sources are not ready or do not know how to use social media the same way the public does” (p. 649). These hurdles may be further exacerbated by the organizational challenge of incorporating these ever-evolving technologies into the traditional “command-and-control reporting structure” of emergency response agencies (Hughes and Tapia 2015, p. 686).

In defense of public agencies, Herman (2014) notes that slower rates of adoption in the public sector may not be alarming in and of themselves, and comparisons with the private sector could be spurious given the fundamentally different goals of public and private organizations. In particular, Herman argues that the added value of social media may be less evident for government agencies – whose primary objective is to improve the delivery of public services – when compared to private enterprises who utilize social media to increase popularity, visibility, and profitability. This justifies a more conservative approach on the part of public organizations, but despite these valid concerns, there is a prevailing sense in the literature that social media has significant potential as a crisis communication tool, and that by and large, public agencies have substantial room to grow in their use of these technologies.

While the exploratory data analyzed in this study do not directly address these or other specific barriers to adoption, we do examine general rates of adoption among local agencies, as well as how demographic differences are related to the likelihood of adoption. We hope that these findings may provide some baseline information regarding both how widespread social media adoption is among local agencies and how institutional and demographic factors are impacting the likelihood of adoption.

2.3 Research Questions

Drawing from the literature reviewed above, we consider three specific research questions and five testable hypotheses. We first examine the rate at which local municipalities utilize social media to distribute emergency information. While evidence suggests that usage by local agencies is on the rise (i.e. Mearns, Richardson, and Robson 2015), a number of scholars have suggested that these agencies continue to lag behind their federal counterparts in social media adoption (i.e. Mearns, Richardson, and Robson 2015; Mergel 2012a). As such, we hypothesize that rates of adoption among local agencies will be notable but below known levels of federal adoption.

RQ1: What portion of local municipalities have adopted social media to disseminate emergency information?

H1: Rates of adoption among local agencies will lag behind federal levels.

Next, we consider the specific social media tools utilized for emergency management purposes. As Mergel (2012a) demonstrates, Facebook is the most commonly employed social media platform by government agencies

at the national level (488 pages), followed by Twitter (363 accounts) and YouTube (247 channels). Following this pattern, we hypothesize that Facebook, Twitter, and YouTube will be commonly used social media platforms among local agencies.

RQ2: Which social media platforms are most frequently utilized to distribute emergency information?

H2: Facebook, Twitter, and YouTube will be commonly employed social media platforms among local agencies.

Lastly, we examine demographic and institutional factors that may influence the likelihood of social media adoption among local agencies, again with a focus on the circulation of emergency information. Using logistic regression models, we examine how a variety of factors (discussed further below) influence the likelihood of adoption. Based on the patterns of social media usage described by the Pew Research Center (Madden and Zickuhr 2011; Perrin 2015), and the increasing expectations for government agencies to communicate with citizens through desired forms of media (American Red Cross 2012; Mergel 2012a), we hypothesize that municipalities serving younger and more educated populations will be more likely to adopt social media for the purpose of emergency management. Given the role of cost and budget factors as an imposing barrier to adoption (Mearns, Richardson, and Robson 2015), we also hypothesize that agencies with larger municipal budgets will be more likely to adopt social media for these purposes.

RQ3: Which demographic and institutional factors influence the likelihood of social media adoption.

H3: Local agencies with larger municipal budgets will be more likely to adopt social media for emergency management purposes.

H4: Local agencies serving younger populations will be more likely to adopt social media for emergency management purposes.

H5: Local agencies serving more educated populations will be more likely to adopt social media for emergency management purposes.

The section below provides an overview of the data and research methods used to conduct this analysis. This is followed by a summary of the findings and a discussion of the study's major conclusions.

3 Data and Methodology

The data analyzed in this study were gathered through a survey of local government leaders from the state of Florida, which was conducted in the Spring of 2015. The survey was administered in collaboration with the Florida City and County Management Association (FCCMA), and the initial sampling frame consisted of 180 cities with either City Managers or Assistant City Managers who were active members of FCCMA. A total of 83 usable responses were obtained, for a response rate of 46%. The survey was conducted using a web-based platform and followed Dillman's (2007) Tailored Design Survey Method, including pre-testing and multiple contacts (i.e. pre-survey notifications, personalized follow-ups, etc.). The questionnaire gathered responses on a variety of public information related topics, including public records compliance, open-data platforms, and social media usage. The data analyzed in this paper focus exclusively on the use of social media for the dissemination of emergency information.

Municipal governments in Florida provide a unique and important perspective vis-à-vis emergency management and crisis communications. According to an NBC news report from 2013, Florida ranks 5th among the 50 states for natural disasters, with a total of 65 disaster declarations since 1953 (Whiteman 2013). This is primarily due to the state's susceptibility to hurricane force winds and inland flooding. Severe storms such as Hurricane's Andrew (1992) and Charley (2004) can cause extensive damage and dangerous conditions within the state. Furthermore, the Insurance Information Institute (2015) has noted that no significant portion of the state is free from flooding risks. According to their study, Florida's economic risk from storm surge is the largest in the nation, with over \$200 billion more in home value exposure than any other state. In 2014, the *Insurance Journal* ranked Florida as the most at-risk state using a Hazard Risk Score (HRS) that considers a variety of potential natural disasters. Despite these risks, there is some concern that the State is largely unprepared for future disasters. A 2014 study ranked Florida 48th out of the 50 states in resiliency, noting that the state's per capita disaster budget was inadequate in light of its heightened risk (Johnston 2014). Collectively, this suggests that effective emergency management and crisis communications at the local level are essential in the state, making Florida an ideal sample for examining the use of emerging technologies such as social media in crisis management.

For the purposes of this analysis, survey responses were supplemented with secondary data from the U.S. Census Bureau and the University of Florida's Bureau of Economic and Business Research. Local government payroll and employment statistics were collected from the U.S. Census Bureau's *2012 Census of Governments*. City population estimates, including the percent of non-white residents, were collected from the University of Florida's Bureau of Economic and Business Research. Finally, a variety of demographic variables, including population density, home values, household income, median age, poverty, civilian employment, and educational attainment were collected from the U.S. Census Bureau's *Quick Facts* tool. It should be noted that these latter variables are aggregated at the county-level due to data availability limitations. This means that the demographic variables are county-level averages, not city-level statistics. While the county-level aggregation of demographic variables raises some concerns over the validity of these measurements, they are the best data currently available for many of the local governments included in this study and are sufficient proxy measurements given the exploratory nature of this research. Table 1 contains a summary of the variables examined in this analysis.

Table 1: Characteristics of Survey Respondents (n = 83).

Characteristics	\bar{x}	σ	Min.	Max.
Total city payroll*	\$1,139,985	\$1,584,557	\$9,406	\$9,866,610
Total city employees*	281	354	4	2177
April 2015 population estimate**	26,456	30,756	396	174,132
Population per square mile (county)***	950.65	981.63	43.5	3,347.5
Median home value (county)***	\$155,559.04	\$40,409.61	\$84,200.00	\$379,700.00
Median household income (county)***	\$47,444.51	\$4,618.89	\$36,094.00	\$59,103.00
Median age (county)***	44.49	9.55	24.9	70.4
Percentage of population in poverty (county)***	15.71	2.89	1.00	88.40
Percentage of population with bachelors' degree (county)***	25.89	5.76	10.00	40.80
Percentage of population non-White**	22.73	17.29	1.59	92.00
Percentage of population 16+ in civilian labor force (county)***	57.13	7.62	25.60	68.20

Sources: *U.S. Census Bureau, 2012 Census of Governments: Employment; **University of Florida, Bureau of Economic and Business Research; ***U.S. Census Bureau, County Level Quick Facts.

Collectively, these data allow for comparisons of social media usage across different size governments and different community settings. The findings discussed below include an examination of the general and specific use of social media platforms by local municipalities in Florida, particularly for disseminating emergency information. Several logistic regression models are also presented in order to determine how the various institutional and community characteristics discussed above are related to the likelihood of social media usage among local governments.

4 Findings

Table 2 reports general findings about the number of social media outlets currently utilized by responding agencies to disseminate emergency information. As the data suggest, the breadth of social media usage is fairly limited, with a small majority of agencies (50.6%) reporting that they do not use any social media platforms to disseminate emergency information, and only 28.9% indicating that they use more than one social media platform for this purpose. Based on these raw frequencies, we can conclude that social media usage among local municipalities, at least in the area of emergency information, is prevalent but far from universal.

Table 2: Number of Social Media Outlets Used for Emergency Information (n = 83).

Number of Social Media Outlets	Count	Percentage	Cumulative Percentage
None	42	50.6	50.6
One	17	20.5	71.1
Two	18	21.7	92.8
Three	5	6.0	98.8

Four	1	1.2	100.0
Total	83	100.0	100.0

Source: 2015 FCCMA/USF Public Records Survey.

This appears to affirm Hypothesis 1, which states that rates of adoption among local agencies will lag behind federal levels. Mergel (2012a) found that “As of May 2012, the 698 departments, agencies, and initiatives of the U.S. federal government have created 488 Facebook pages, 363 Twitter accounts, 247 YouTube channels, and 71 Flickr pages...” (p. 282). Based on our findings, local levels of adoption remain significantly below these levels in the State of Florida. It is also noteworthy that Florida’s local municipalities appear to be adopting social media at lower rates than local agencies throughout the country. As the findings indicate, the 49% adoption rate is considerably below the 70% reported in Graham and Avery’s (2013) study of local agencies nationwide.

Table 3 shows the specific social media platforms utilized to distribute emergency information. The most commonly used social media platform for disseminating emergency information is Facebook, with nearly half (49.4%) of the responding municipalities indicating that they use the social networking site to disseminate emergency information. The second most frequently used platform is Twitter, though a significantly smaller number of agencies (27.7%) report using it for these same purposes. The remaining social media platforms included in the survey show very little usage, with less than 10% of respondents using YouTube, LinkedIn, or blog sites to disseminate emergency information. (No respondents report using 4Square for these purposes).

Table 3: Specific Social Media Platforms Used for Emergency Information – in Percentages (n = 83).

Social Media Platform	Yes	No
Facebook	49.4	50.6
4Square	0.0	100.0
Blog Site	2.4	97.6
LinkedIn	1.2	98.8
Twitter	27.7	72.3
YouTube	6.0	94.0
Any social media platform	49.4	50.6

Source: 2015 FCCMA/USF Public Records Survey.

Based on these results, we can conclude that Facebook is overwhelmingly the most frequently used social media tool for disseminating emergency information. While Twitter is used with some regularity, it is not widely employed for these purposes. This is perhaps surprising given the prevalence of research focusing on the use of Twitter in emergency situations (i.e. Acar and Muraki 2011; Guskin and Hitlin 2012; Davis, Alves, and Sklansky 2014; Simon et al. 2014). In each case, there appear to be opportunities for local governments to expand their use of social media for the dissemination of emergency information, particularly in the area of microblogging (i.e. Twitter), which has become increasingly prominent over recent years, particularly among younger citizens (Madden and Zickuhr 2011; Perrin 2015), and has had a demonstrated impact in the area of crisis communications (i.e. Acar and Muraki 2011; Guskin and Hitlin 2012; Davis, Alves, and Sklansky 2014; Simon et al. 2014).

These findings are consistent with practices at the federal level, and they provide some support for Hypothesis 2, which states that Facebook, Twitter, and YouTube will be commonly employed social media platforms among local agencies. However, while these are the three most common social media tools among responding agencies, it should be noted that Twitter and YouTube are used at substantially lower levels than among federal agencies, and YouTube is far from “commonly employed” among local agencies in Florida.

4.1 Logistic Regression Results

Table 4 reports the results of three binary, logistic regression models, which examine how institutional and demographic characteristics influence the likelihood of social media usage among Florida’s local governments. The initial model reported in Table 4 examines the use of social media in general for disseminating emergency information. In this case the dependent variable denotes the use of any social media platform for emergency information purposes; no distinctions are made between the number or type of platforms used. The subsequent models look specifically at the use of Facebook (Model 2) and Twitter (Model 3) for disseminating emergency information, as these are the most commonly used social media platforms among responding agencies.

Table 4: Logistic Regression Results for Emergency Information Social Media Usage (n = 83).

Variables	Model 1 (All Social Media)		Model 2 (Facebook)		Model 3 (Twitter)	
	<i>b</i>	<i>e^b</i>	<i>b</i>	<i>e^b</i>	<i>b</i>	<i>e^b</i>
Independent variables						
Total municipal payroll (in thousands of dollars)	0.0005**	1.0005**	0.0006**	1.0005**	0.0002	1.0002
Population density (county)	-0.0004	0.9996	-0.0004	0.9996	-0.0002	0.9998
Coastal county (1 = yes)	-1.7053**	0.1817**	-1.7053**	0.1817**	-1.0926	0.3354
Median home values in thousands of dollars (county)	-0.0151	0.9850	-0.0151	0.9850	-0.0041	0.9959
Median income in thousands (county)	-0.1035	0.9017	-0.1035	0.9017	-0.0278	0.9726
Median age (county)	-0.0844**	0.9191**	-0.0844**	0.9191**	-0.1315**	0.8768**
Percent of population with a bachelors' degree (county)	0.2081*	1.2314*	0.2081*	1.2314*	0.1864*	1.2049*
Percent of population non-White	-0.0503*	0.9510*	-0.0503*	0.9510*	-0.0545**	0.9470**
Constant	7.8050**	2452.904**	7.8050**	2452.904**	3.7461	42.3549
Model χ^2	22.53**	22.53**	22.53**	22.53**	16.88**	16.88**

** $p \leq 0.05$; * $p \leq 0.10$.

In each case, non-usage is coded as the reference category (i.e. No = 0), so that the effect of each independent variable on the likelihood of usage is measured by the parameter estimates. The *b* coefficients indicate directional changes in the log-odds of usage, meaning that negative coefficients denote a decrease in the likelihood of social media usage, while positive coefficients denote an increase in the likelihood of usage. While these estimates are helpful for detecting the direction of statistical relationships, they are often difficult to interpret and lack substantive meaning for many readers (Long and Freese 2003). Therefore, exponentiated odds ratios (*e^b*) are also included in the output. These estimates are easier to interpret because they represent changes in the odds of social media usage based on a one unit increase in the independent variable (*ceteris paribus*). Odds ratios are multiplicative coefficients, so ratios greater than 1 indicate a positive impact on the likelihood of social media usage, while ratios of less than 1 indicate a negative impact on the likelihood of usage (Long and Freese 2003). For ease of interpretation, odds ratios of less than 1 can be inverted for comparison purposes ($1/e^b$), resulting in a positive ratio that denotes the decreased likelihood of social media usage. (This is demonstrated in the discussion below).

Collectively, the models presented in Table 4 suggest that organizational size (as measured by municipal payroll), age, education, and race all significantly influence the likelihood of a municipality using social media to disseminate emergency information. In the case of organizational size, larger municipalities are slightly more likely to use social media in general and Facebook specifically. However, this relationship is statistically nonsignificant in the case of Twitter. This at least partially affirms Hypothesis 3, which states that local agencies with larger municipal budgets will be more likely to adopt social media. Municipalities serving older populations are less likely to use any social media platform; this relationship is strongest in the case of Twitter. This finding affirms Hypothesis 4, which states that municipalities serving younger populations will be more likely to adopt social media. The same relationship holds true for race/ethnicity, where municipalities serving larger populations of non-white citizens are less likely to use social media for the dissemination of emergency information. In the case of education, municipalities serving more educated populations are more likely to use social media for emergency information purposes, which is consistent with Hypothesis 5.

None of these results are surprising given the overlap of these variables with access to and awareness of technological resources. However, one surprising finding does emerge in the case of municipalities located in coastal counties. Coastal communities are significantly less likely to use social media in general and Facebook in particular for disseminating emergency information. In fact, this is the largest effect size found in any of the logistic regression models. By inverting the odds ratio for this variable in Model 1 ($1/0.1817$), we see that municipalities located in coastal counties are 5.503 times less likely to use social media to disseminate emergency information than their non-coastal counterparts. While the relationship between coastal counties and Twitter usage is statistically nonsignificant, the directional coefficient is negative. This finding is perhaps surprising given the susceptibility of coastal communities to natural disasters, as well as the fact that many of Florida's

more developed cities and municipalities are located in coastal areas. This finding suggests a need for further research on social media usage and the prevailing barriers to adoptions in coastal communities.

While these models are exploratory in nature, they provide some valuable information from which we can begin to better understand the use of social media by local agencies for emergency management purposes. Collectively, these models show that larger municipalities serving younger, more educated communities are more likely to use social media for emergency information purposes, while usage is more limited in coastal communities. These findings suggest that social media usage by local agencies may in fact be lagging behind societal trends, notably the increased use of social media by low-income citizens and ethnic minorities (Madden and Zickuhr 2011; Perrin 2015). They also lend credence to the suggestion that financial resources may be a significant barrier to adoption (Mearns, Richardson, and Robson 2015), as suggested by higher rates of adoption among municipalities with larger payrolls.

5 Discussion

This analysis has undertaken an exploratory examination of social media use for emergency management purposes among local municipalities in the state of Florida. Three specific research questions were examined: (1) What portion of local municipalities have adopted social media to disseminate emergency information? (2) Which social media platforms are most frequently utilized to distribute emergency information? (3) Which demographic and institutional factors influence the likelihood of social media adoption?

The findings show that less than half of the responding municipalities are currently utilizing social media to disseminate emergency information. This appears to support the contention that public agencies are lagging behind other sectors in the adoption of social media (Mergel 2012a; Mearns, Richardson, and Robson 2015). It also suggests that local agencies in particular may be lagging behind their federal counterparts in the use of social media (see Mergel 2012a). Among those agencies using social media for emergency information purposes, Facebook is by far the most popular platform, with just less than half of the municipalities (49.4%) indicating that they use the social networking site to disseminate emergency information. This is consistent with practices at the federal level, where Facebook is the most commonly used social media tool among public agencies (Mergel 2012a).

Twitter was found to be the second most popular social media tool in this analysis, though only 27.7% of responding agencies report using it for emergency information purposes. While this is consistent with practices at the federal level, where Twitter is also the second most popular social media tool, the percentage of agencies utilizing Twitter at the local level lags significantly behind federal levels. Mergel (2012a) reported that as of 2012, "... the 698 departments, agencies, and initiatives of the US Federal government have created... 363 Twitter accounts" (p. 282). This suggests that there is considerable room for expansion of Twitter use at the local level, particularly given the reported value of Twitter in times of crisis (i.e. Acar and Muraki 2011; Guskin and Hitlin 2012; Bernier 2013; Davis, Alves, and Sklansky 2014; Simon et al. 2014).

The remaining social media outlets examined in this analysis were used minimally, with no more than 6% of respondents indicating that they used 4Square, Blog Sites, YouTube, or LinkedIn to disseminate emergency information. The limited use of YouTube was particularly surprising given that federal agencies have created over 240 YouTube channels (Mergel 2012a). YouTube presents a potentially powerful vehicle for creating and distributing disaster preparedness content, and it may warrant further consideration by local agencies going forward.

The results of this analysis also suggest that social media adoption by local agencies may be lagging behind societal trends, particularly the expanded use of social media by non-traditional users (Madden and Zickuhr 2011; Perrin 2015) and the increased public expectations for government to engage with citizens through social media (American Red Cross 2012; Mergel 2012a). This is underscored by the logistic regression results, which show that municipalities serving less educated and lower-SES clients, as well as those with larger minority communities and more aged populations, are less likely to use social media. It should be stressed that these findings do not demonstrate causation, and it may be the case that these communities have been slower to adopt social media due to organizational and financial constraints. However, regardless of cause, the results do demonstrate that these populations are less likely to be engaged by their local public agencies via social media in times of crisis, leaving already at-risk populations potentially underserved in the area of crisis communications.

This overall adoption gap, particularly in the aforementioned communities, may be driven in part by the learning curve associated with integrating social media into existing crisis communication frameworks (Hughes and Tapia 2015), and it could be supportive of the claim that local agencies suffer from a digital leadership and skills deficit, wherein they don't yet fully understand how to utilize social media in a manner consistent with public expectations (Hughes and Palen 2012; Mearns, Richardson, and Robson 2015; Lachlan et al. 2016).

However, as an exploratory finding, this is speculative, and further research would be necessary in order to support this claim.

Institutions of higher education may be an effective avenue for bridging the perceived skills gap for local agencies (Mergel 2012b). For example, Eikenberry (2012) argues that integrating social media instruction into formal education settings, such as Masters of Public Administration programs, may help current and future administrators better understand how to use social media and apply it to public interactions and citizen empowerment. Specifically, she notes that “Using social networking applications in more formal learning environments may provide an excellent opportunity to enable public administration and affairs students to learn how to more effectively use these tools for civic engagement” (p. 450). Mergel (2012b) goes further, proposing the development of “Government 2.0” courses, specifically designed to train students in the use of emerging technologies for the public workplace.

Ross, Taylor, and Fitzgerald (2015) also argue that given the emerging importance of social media in crisis communications, sound classroom instruction is essential in order to teach future public administrators and emergency responders how to use social media “effectively, safely, and legally” (p. 21). They suggest that case study approaches (i.e. examining scenarios where social media have been used effectively and ineffectively in crisis communications) as well as problem-based learning projects, may be effective means of achieving these goals. Specifically, they document the success of a problem-based simulation project, wherein students use social media platforms to practice bidirectional communication over several days during a “mock” emergency. The project allows students to practice both providing clear communications and appropriately responding to communications from the public in a real-world, problem-based setting. While this approach would currently be categorized as novel, the growing ubiquity of social media in crisis communications suggests that perhaps it should not be. Given the demonstrated effectiveness of problem-based learning approaches (i.e. Goodman 2008), increasing the use of these pedagogies in crisis communications and social media may help to mitigate the skills-deficit that inhibits many local agencies from adopting social media (Mearns, Richardson, and Robson 2015) and others from using it for effective, bidirectional communications (Graham and Avery 2013; Karakiza 2015).

6 Conclusion

This has been an exploratory examination of social media use by local governments, with a particular focus on the dissemination of emergency information. There are opportunities for future research which could considerably improve the knowledge base in this area. For starters, we have undertaken an exclusively quantitative analysis, attempting to measure the extent to which local municipalities are employing social media to disseminate emergency information, as well as which platforms are most prominent, and which institutional/demographic factors influence the likelihood of adoption. A more qualitative analysis of social media posts could provide further insight into the quality and effectiveness of these communications. These efforts could improve crisis communications at the local level and provide a foundation of knowledge upon which public agencies could develop social media strategies and best practices for future use. The current study was also limited by data availability issues, as many of the demographic variables were only available at the county level. Future studies might consider an original data collection strategy and/or a county level analysis in order to ensure more valid demographic comparisons.

While the benefits of social media for emergency management and crisis communications appear to be substantial, the results of this study concur with recent suggestions that the rate of adoption among local government agencies has been slow, lagging behind that of both federal agencies and the private sector. While organizational strategies exist for effectively integrating social media into crisis communications, adoption appears to be slowed in many instances by both a lack of resources and a digital skills deficit, whereby public administrators and emergency responders lack the knowledge and formal training necessary to get the most out of social media communications and engage the citizenry through these platforms in a manner consistent with public expectations. In order to develop a well-trained workforce, prepared to effectively engage the public through social media in times of emergency, a more deliberate effort on the part of practitioner-oriented, academic programs in the areas of public administration and emergency management is needed. While maturation will invariably occur with time, formal educational efforts to improve social media knowledge should help to accelerate the adoption and effective use of social media as a crisis communication tool.

Notes

1 The New Jersey study measured social media use by counting those applications linked directly to the municipalities' websites.

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