

**Analysis of Factors Influencing Facebook User Engagement for New York Mid Atlantic
Caribbean (NYMAC) Regional Genetics Network**

by

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University of Pittsburgh, 2022

Abstract

As social media becomes more prevalent, public health entities have become active in the online community. The New York Mid Atlantic Caribbean Regional Genetics Network (NYMAC) utilizes a Facebook page to convey their mission and share resources with stakeholders. Data analysis of Facebook analytics was done to understand the factors that impact reach and engagement of NYMAC's posts. This data analysis examined how post type (bin categories), media richness, and reading level impacted user engagement and reach of posts. Data were collected from NYMAC's Facebook Insights and were analyzed using Stata. ANOVA and pairwise comparisons were used to examine the relationship between post engagement and bin categories as well as the relationships between media richness and post engagement and reach. A linear regression was used to examine the relationship between engagement and Flesch Kincaid Grade Level. This study found that (1) more personable (first party) content receives the most engagement, (2) posts containing photos have the highest level of reach of all media types, and (3) NYMAC's Facebook posts have an average Flesch Kincaid Grade level that is much higher than the recommended reading level. These findings support recommendations from the author that can be applied to social media posts for public health entities. The author recommends (1) creating more personable content, (2), including photos in all posts, and (3) creating posts at a 5th to 6th grade reading level. The results from this study can be used as a guide for NYMAC and other

public health entities to better utilize social media to promote health education and public health initiatives.

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Preface

I would first like to thank my advisor and primary reader, Andrea Durst, for her constant support and help throughout the writing of this paper as well as my academic career at the University of Pittsburgh. I would also like to thank Alissa Bovee Terry from New York Mid Atlantic Caribbean Regional Genetics Network (NYMAC) for the opportunity to work with NYMAC's social media team and conduct this research under their supervision. My experience with NYMAC has been crucial to my education and I am beyond grateful for my time spent at NYMAC. I would also like to thank my wonderful family and friends for their constant support throughout the past two years. I am so lucky to be surrounded with a wonderful support system both here in Pittsburgh and from afar. Your support means everything to me and has helped me to excel throughout my education. Lastly, I would like to thank the faculty and staff of the University of Pittsburgh School of Public Health. Each of my professors has played an integral role in my progress and success through this program and the writing of this essay and I am extremely grateful for all of their help along the way.

1.0 Introduction and Background

The New York Mid-Atlantic Caribbean Regional Genetics Network (NYMAC) works to increase access to genetic services in their region, which includes Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Puerto Rico, US Virgin Islands, Virginia, and West Virginia. NYMAC is composed of healthcare providers, public health groups, family groups, and other partners to create a network of professionals to aid in the improvement of access to genetics services. Funding for NYMAC is sourced from the New York State Department of Health through a federal HRSA grant. During the funding cycle for 2020 to 2024, the National Coordinating Center for the Regional Genetics Networks (NCC) has set goals that specifically look at social media analytics as a performance measure (Networks, 2021). Performance measure 1B of this cycle examines the number of resources developed by the regional genetics networks and NCC (Networks, 2021). This performance measure is measured through website and social media analytics, the number of unique individuals on listservs for external communications, and other qualitative information (Networks, 2021). The social media analytics include engagement, impressions, and reach on Facebook (Networks, 2021). Each regional genetics network, including NYMAC, is expected to report this information to NCC for this funding cycle (Networks, 2021).

NYMAC utilizes a Facebook page to interact with their community and convey their mission to patients, providers, and the general public in a less formal environment. Since establishing this Facebook page, NYMAC has experienced low engagement with their posts. In response to this low level of engagement, NYMAC hired a team from a social media agency, FMN Creative, to curate and post to Facebook on NYMAC's behalf. FMN Creative began working with NYMAC in November of 2020 and began posting on behalf of NYMAC as of January 1, 2021.

Facebook engagement for the page has increased over the years, but there are still low levels of engagement and reach for most posts. At the end of 2021, NYMAC's Facebook page had 381 total Facebook users who like the page with very slow growth in terms of page likes, post reach, and post engagement. NYMAC aims to increase their level of reach and engagement to better communicate with their network of patients and providers, as well as those in the community outside of the NYMAC network.

To gain insights into how NYMAC can increase their Facebook engagement, this project will analyze how certain factors impact user engagement with posts. This project will also analyze posts and categorize them based upon bin category, media type, and reading level. Analysis of these factors will lead to the development of a plan to create posts that curate higher levels of engagement and allow NYMAC to better reach their audience through Facebook.

1.1 Specific Aims

1. Analyze NYMAC Regional Genetics Network's community engagement through Facebook from January 1, 2021 to December 31, 2021 by assessing the reach and engagement of social media posts.

2. Determine which bin categories of Facebook posts lead to the largest amount of engagement. These categories include NYMAC website content, first party content, outside source content, events, and awareness.

3. Determine which media types produce the most engagement with NYMAC's Facebook posts.

4. Analyze how the reading level of NYMAC's Facebook posts impacts engagement.

5. Develop and propose a plan to increase NYMAC's community engagement through social media in order to increase utilization of NYMAC's services by community members and medical professionals.

2.0 Literature Review

NYMAC Regional Genetics Network works to expand access to genetic services in their designated region. Their mission is for the network of family groups, health care providers, public health groups, and other partners in the region to work together toward a goal of making it easier for families to connect to the genetic services and information they need. To increase access and education, NYMAC works on projects including, but not limited to, telegenetics training, an online directory of genetics providers in the region, and educational resources through their website, webinars, and annual meetings. NYMAC's use of social media is critical to reaching the public and providers to promote their services, events, and educational materials. Examining factors that contribute to user engagement on social media will allow NYMAC to use their Facebook page more efficiently to reach their target audience.

2.1 Social Media and Public Health

Public health entities are becoming more active on social media platforms as social media gains prevalence in our society. The majority of state health departments in the United States have been shown to use social media (Thackeray, Neiger, Smith, & Van Wagenen, 2012). A study investigating social media use among public health departments found that they traditionally use their social media to provide accurate and factual health information, but social media can be used by public health entities for various purposes (Thackeray et al., 2012). Social media can serve as a platform to distribute educational materials, communicate with stakeholders, organize advocacy

events, and provide support for the community (Stellefson, Paige, Chaney, & Chaney, 2020). These are all actions that are important to the functioning of public health and can be implemented on a larger scale and reach a larger audience by utilizing social media. Reaching a larger audience through social media pages and campaigns can help public health entities reach low income, rural, and underserved populations that they may not be able to reach in physical programming and campaigns (Mendoza-Herrera et al., 2020). Public health entities can better communicate with hard-to-reach communities and expand the reach of their campaigns through social media platforms.

Public health organizations can effectively use social media to disseminate educational materials and to combat misinformation by providing access to accurate information (Pagoto, Waring, & Xu, 2019) and sharing resources on social media (Kantor, Bright, & Burtchell, 2018). Public health entities are also able to distribute or direct patients towards peer-reviewed scientific articles through social media posts (Kantor et al., 2018). Social media is an excellent tool in making health information more accessible to the community while saving money (Miller, Snook, & Yoder, 2020). Social media campaigns can be useful for public health entities such as health departments or non-profits that are working with small budgets to effectively reach a large and more targeted audience. The audience reached through social media is more targeted than other forms of media, ensuring that the information is relevant to the audience it is presented to (Miller et al., 2020). Social media places resources directly into the hands of the community on a scale that is not always possible through physical campaigns (Miller et al., 2020). As public health expands and evolves, it is important to keep the community engaged and involved as much as possible. Social media serves as a great platform for this work and increases access to information and services important to their health and education.

2.2 Health and Genetics Education Through Social Media

As we advance in our understanding of genetics, it is important for the general public and patients to learn about genetics and keep up to date with relevant research. A study by Middleton et al (2020) found that 42 percent of individuals in the United States feel as though they are not familiar with genetic material (Middleton et al., 2020), indicating there is a need for an increase in genetic literacy in the United States. A working group from the National Human Genome Research Institute examined genomic literacy and education through an initiative called Genomic Literacy, Education, and Engagement (GLEE). This initiative investigated K-16 education surrounding genomics. In their inventory of the state of the field of genetics in public K-16 education, they found that most genetics resources used in education pertain to Mendelian genetics, with little to no emphasis on “modern” genetics topics (GENOMIC LITERACY, 2017). They also found that many genetic resources are potentially difficult to access for lower income individuals (GENOMIC LITERACY, 2017). A lack of genetics education and access to genetic resources at the K-16 level can lead to a lack of knowledge on the topic and low genetics literacy in the general population. With little public school education on genetics, the public and patients are left to do genetics research on their own.

Patients and families often use the internet to seek out health information. It is important to ensure that accurate and clear information is readily available to patients when they are searching the internet or social media. A study was done to examine how parents use the internet regarding their child with a rare condition. In this study, it was found that only 37.7 percent of parents reported finding relevant information most of the time when using the internet to learn more about their child’s condition (Nicholl, Tracey, Begley, King, & Lynch, 2017). Parents in this study also stated that they value relevancy, accuracy, and trustworthiness when searching for

information (Nicholl et al., 2017). These findings emphasize the need for an increase in accessible and accurate health information on the internet and social media. Public health organizations can utilize social media as a platform to share this information with the public. Public health organizations are typically regarded as reliable sources for information, so individuals may feel more confident in the information shared by these organizations than by other pages or sites on the internet.

Social media is a unique platform that encourages engagement from users. Social media fosters deep learning through encouraging direct engagement with the material (Pal, 2014). Studies have found that individuals are more likely to retain information delivered in an interactive way, and social media is a format that allows for community members to engage with the information as it is presented. Social media is largely based on peer-to-peer interaction, allowing peer learning to be facilitated through the use of social media (Pal, 2014). Interactive and community-based learning allows patients to use social media as a resource to learn more about their health.

Although social media has been proven as a useful education tool in healthcare, patients are still skeptical of most information they find on the internet. In a study examining barriers to internet-based communications in the field of human genetics, participants stated that they often take what they learn from the internet about genetics “with a grain of salt” (Bernhardt, Lariscy, Parrott, Silk, & Felter, 2002). The findings of this study show the importance of increasing the number of reliable resources regarding genetics on the internet. Although many reliable resources are on the internet, patients may not be able to discern between reliable and unreliable sources of information. Patients also stated that they often feel as though they have to search through resources for themselves and try to determine if they are accurate or not (Bernhardt et al., 2002).

Social media pages for public health entities can serve as an easily accessible database for patients to turn to when searching for information. Public health entities can use their official social media pages to establish accreditation while engaging with their community (Miller et al., 2020). Public health genetics entities are known reliable sources and should utilize their social media and internet presence to educate the public and provide easy access to genetics resources.

Genetics education can take place in both formal and informal settings, is important to public health, and is crucial in informed decision making (Institute of Medicine Committee on Assessing Genetic, 1994). Informal genetics education takes place outside of the formal educational setting and is crucial to expanding public knowledge surrounding genetics (Institute of Medicine Committee on Assessing Genetic, 1994). Social media can serve as a platform to deliver informal genetics and health education to the public. Medical providers can also use social media for learning and to expand their professional knowledge by engaging with social media pages of professional institutions (Pal, 2014). Overall, social media can serve as a platform for patients and providers alike to learn in an informal setting.

2.3 Stakeholder Engagement

Public health organizations can also use social media to facilitate stakeholder engagement. NYMAC works with a range of stakeholders including patients, providers, family groups, and public health groups to accomplish their mission. Stakeholder engagement can be facilitated through social media (Walsh et al., 2021), which is an active form of engagement and encourages direct participation from stakeholders (Chou, Prestin, Lyons, & Wen, 2013). The use of social media for stakeholder engagement allows healthcare organizations to reach a wider range of

stakeholders through a singular platform that they may not have been able to engage through traditional means (Walsh et al., 2021). In public health genetics, it is important to engage with a diverse population of providers and patients alike. A study by Miller et al (2020) showed that social media engages patients from diverse backgrounds as well as those who are hard to reach geographically (Miller et al., 2020). Diversity is key to genetics research and closing disparities in access to genetics services. Using social media allows public health genetics entities to reach a larger and more diverse audience, which in turn can increase the participation of these individuals in research and utilization of services.

Social media can not only engage stakeholders, but attract new users (Pentescu, Cetină, & Orzan, 2015). Many individuals use the internet to learn more about health concerns and find information and support groups related to those health concerns (Pentescu et al., 2015). A study examining the use of social media among patients with inflammatory bowel disease found that a large majority of patients use the internet, including social media, to search for health information (Ahmed, Taft, & Charabaty, 2021). The study also found that patients often use social media as a source of social and emotional support from fellow patients and advocacy groups (Ahmed et al., 2021). The primary platforms that patients used to search for this information and support were Facebook, Instagram, and Twitter, with most patients using Facebook and Instagram for support purposes (Ahmed et al., 2021). Public health entities can serve as a source for patients seeking out these resources on social media.

Social media can serve as an interactive platform for patients and providers to seek information (Pentescu et al., 2015) and public health entities can utilize their social media to disseminate information while creating a community online. Along with information seeking, patients often use social media to seek out support during the process of finding and receiving a

diagnosis (Rocha et al., 2018). Patients often engage in conversations about diagnosis and connect with patients with similar diagnoses through social media (Rocha et al., 2018). Social media can be used as a space to provide information, support, and connections between users. Social media can also be used by public health entities to encourage connections between patients, providers, and other stakeholders in an engaging and interesting way.

2.4 Factors in Engagement on Social Media

The importance of increasing NYMAC's social media engagement is clear, and a plan to increase engagement should be put into place. In order to create a plan to increase engagement, factors that contribute to user engagement must be examined. One of the main factors that impact engagement with social media posts is media type. In a study examining user engagement on social media using text posts as the baseline, it was found that video and link posts receive the most clicks and comments, while photos receive the most likes (Moran, Muzellec, & Johnson, 2020). Overall, research supports that posts with greater media richness produce the highest amount of engagement on social media (Moran et al., 2020). Videos can also be used to supplement text and simplify information. Studies have shown that videos can increase the readability of materials and can make information more accessible for the general audience and individuals with disabilities (Adams, 2010). Increasing media richness of social media posts should increase rates of engagement.

Studies have shown that increasing readability leads to an increase in engagement (Pancer, Chandler, Poole, & Noseworthy, 2019). Posts that have an appropriate reading level for the audience will be more effective in communicating the message of the post. Readability is an issue that has been reported in studies examining patients' ability to understand educational materials.

Studies examining the readability of health education materials found online uncovered that most resources are written at reading level that is too high for the general public (Daraz et al., 2018). Closing this gap in readability could lead to better comprehension of educational materials. It is important that patients can comprehend health education materials so that they can properly utilize the information. It has been found that health literacy is closely associated with patient health outcomes (Rooney et al., 2021). Misinformation can stem from a misunderstanding of information that is written above a patient's literacy level and can have negative effects on their health as a result (Daraz et al., 2018). Posts and resources with lower reading levels are more accessible and understandable for the general public and may allow for better health outcomes. Educating the public through social media is most effective when the reading level is accessible to the target audience.

In 2021, NYMAC only used organic post interactions on Facebook for engagement, meaning that they did not pay for advertisements on Facebook. Only users that "like" NYMAC's Facebook page see their posts in their feed. Studies have found that social media is a great platform for companies to advertise, and paid posts are often successful in reaching the target audience (Paquette, 2013). Pages that do not use paid advertisements on social media may be less likely to reach their target audience. This makes an organization less likely to communicate effectively with the correct users on social media. Increasing a page's number of paid posts will ensure that they will reach those who are interested in their content and increase the reach of their posts.

Developing a plan to increase NYMAC's Facebook engagement will include analyzing media richness, reading level, and bin categories. This will allow the development of a plan that allows NYMAC to utilize their Facebook in an impactful way. Increasing NYMAC's engagement

with the community through their Facebook page will hopefully result in an increase of use in their services and will provide more accessible informal genetics education.

3.0 Methods

All data were collected directly from Facebook using the Insights feature, and included text and content of posts, number of reactions, comments, and reach, and media type. The data included information on all posts to the NYMAC Facebook page during the timeframe of January 1, 2021 to December 31, 2021. After the data were collected, statistical analyses were done in Stata to examine the effects of bin type, reading level, and media richness on engagement and reach.

3.1 Bin Type

Each of the posts were categorized by bin type by the author. Bin categories included first person content, outside source content, NYMAC site content, events, awareness posts, Spanish posts, and uncategorized posts (**Table 1**). The bin type was determined by reading the content of each post and assigning them to the appropriate category. An ANOVA was done to examine the effect of bin type on the number of likes a post receives. This ANOVA was followed by pairwise comparison with Bonferroni adjustment to compare the number of likes between bin types.

Table 1. Bin categories definitions

Bin Category	Definition
First party (FP)	Highlight information about NYMAC team members
Outside content (OC)	Content from websites other than NYMACgenetics.org
Site content (SC)	Content pulled from NYMACgenetics.org
Events (E)	Highlight upcoming events or webinars
Awareness (A)	Highlight certain conditions to bring awareness
Uncategorized (U)	Posts that did not fit into any of the other bin categories
Spanish (SP)	Posts made in Spanish

3.2 Reading Level

Each post was assigned a reading level using the Flesch-Kincaid Grade Level tool from TextCompare.org. The Flesch Kincaid Grade Level formula assigns a number ranging from zero to 18 (Kincaid, 1975). Flesch Kincaid Grade Levels correspond to United States grade levels in education. The formula considers total words, total sentences, and total syllables (Kincaid 1975). A linear regression examining the relationship between the Flesch Kincaid Grade Level and number of likes a post receives was done to examine the relationship between engagement and reading level. This regression was followed by creating a scatter plot of this relationship.

3.3 Media Richness

The posts were categorized based on media richness, indicating whether the posts were photos, videos, links, or statuses. An ANOVA of media types was done to examine the effect of media richness on the number of likes a post receives. Another ANOVA was done to examine the effect media richness has on the reach of a post. This ANOVA was followed by a pairwise comparison with a Bonferroni adjustment to compare the amount of engagement between media types.

4.0 Results

There was a total of 137 posts in the data set. Across all posts in the data set, the mean number of likes and reactions was 3.91 likes per post. The mean reach of posts as measured by the number of users that viewed the post was 54.11 users per post.

4.1 Bin Type

The Awareness bin had the largest number of posts, followed by Site Content and Events (**Figure 1**). First Party posts had the highest average of number of likes with a mean of 24.5 likes per post (**Table 2**). Each of the other bin categories has a mean number of likes that was less than 4 likes per post (**Table 2**).

Table 2. Mean number of likes in each bin category

Bin	Mean Number of Likes
First Party	24.5
Site Content	3.9
Event	2.17
Awareness	3.64
Outside Content	1.64
Spanish	1.2
Uncategorized	1.67

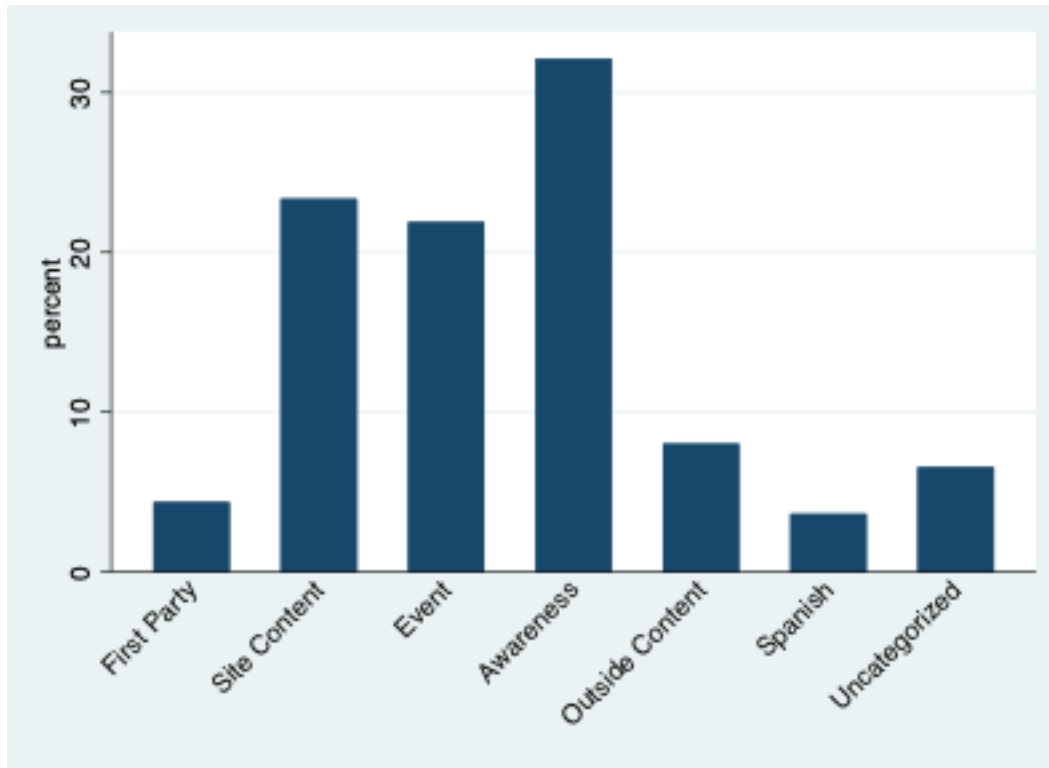


Figure 1. Bar graph representing the percentages of each bin category among the NYMAC Facebook posts in 2021.

An ANOVA analysis was run to determine whether there was a difference in the mean number of likes of posts in the different bin categories. The ANOVA resulted in a p-value of 0.0002 and indicated that there was a statistically significant difference between at least two bin categories ($F(6, 130) = [4.69]$, $p = 0.0002$) (**Table 3**). Due to these results, a pairwise comparison with Bonferroni adjustment was done to determine which groups are statistically different from one another. The pairwise comparison resulted in p-values ranging from 0 to 0.004 indicating there was a significant difference between first party content posts and each of the other bin categories (**Table 4**). First party posts have a much higher mean number of likes per post than each of the other bin categories. All other pairwise comparisons between groups did not yield a significant difference (**Table 4**).

Table 3. ANOVA results of mean number of likes by bin category

Source	F	Prob>F
Model	4.69	0.0002
Bin	4.69	0.0002

Table 4. Stata output of pairwise comparisons of mean number of likes between bin types*

Bin	Contrast	Std. Err.	t	P> t
SC vs FP	-20.59375	4.421306	-4.66	< 0.0001
E vs FP	-22.33333	4.444515	-5.02	< 0.0001
A vs FP	-20.86364	4.325063	-4.82	< 0.0001
OC vs FP	-22.86364	5.043846	-4.53	< 0.0001
SP vs FP	-23.3	6.017901	-3.87	0.004

* Abbreviations for bin types are as follows: Site Content (SC), First Party (FP), Event (E), Awareness (A), Outside Content (OC), Spanish (SP), Unspecified (U)

4.2 Reading Level

The Flesh Kincaid Reading Levels of the posts in the data set had a range of 3.24 to 19.8. The mode of Flesch Kincaid Grade Levels of NYMAC's Facebook posts is over 10 (**Figure 2**) and the mean was 11.39.

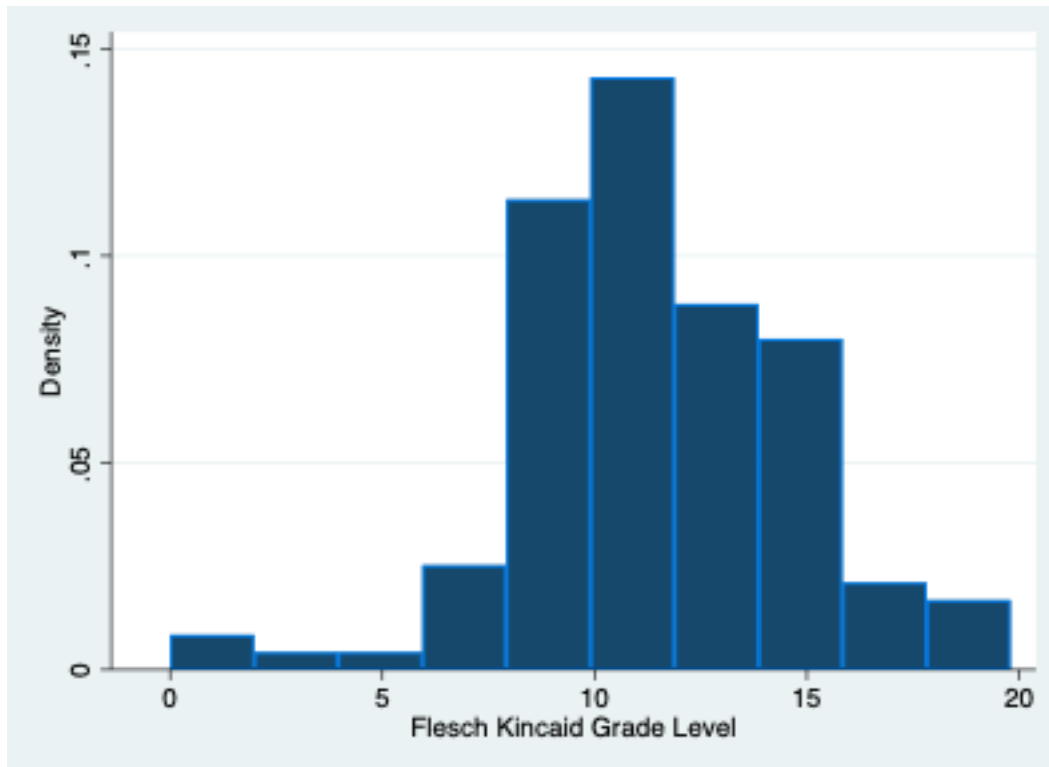


Figure 2. Histogram representing the distribution of Flesch Kincaid Grade Level scores for NYMAC's Facebook posts in 2021.

The linear regression results indicated that there was not a significant relationship between Flesch Kincaid Grade Level and number of likes a post receives ($F(1, 115) = [0.39], p = 0.5333$). The scatter plot of the relationship resulted in a slope of -0.0779 , indicating a negative correlation (**Figure 3**).

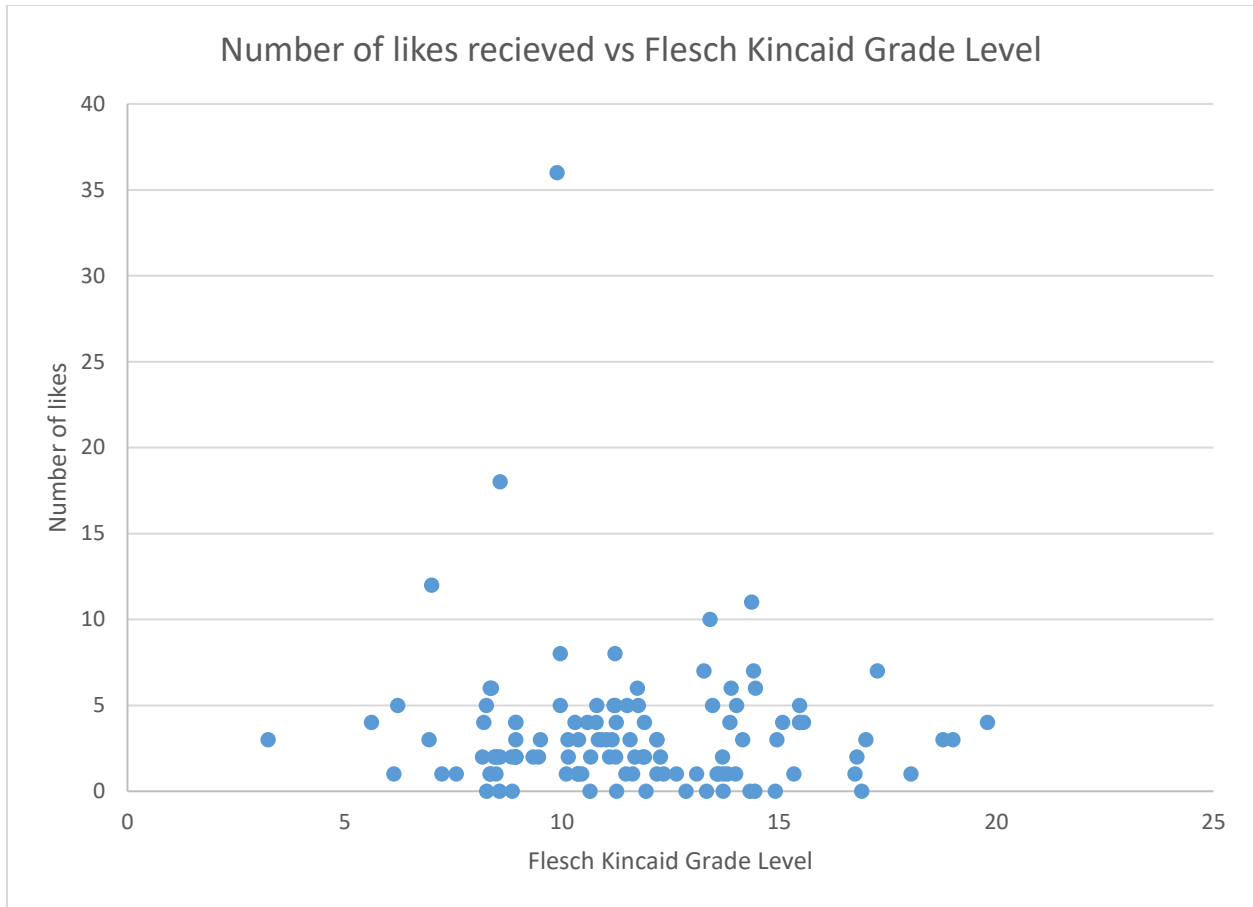


Figure 3. Linear regression of likes recieved vs Flesch Kincaid Reading Level.

4.3 Media Richness

The data set included mostly posts including photos and links (**Figure 4**). Less than 10 percent of the posts were videos and statuses (**Figure 4**). Photos received the largest number of average likes with a mean of 5.62 likes per post (**Table 5**). The ANOVA resulted in a p-value of 0.4713 and indicated that there was not a statistically significant difference between media types ($F(3, 133) = [0.85], p = 0.4713$) (**Table 5**).

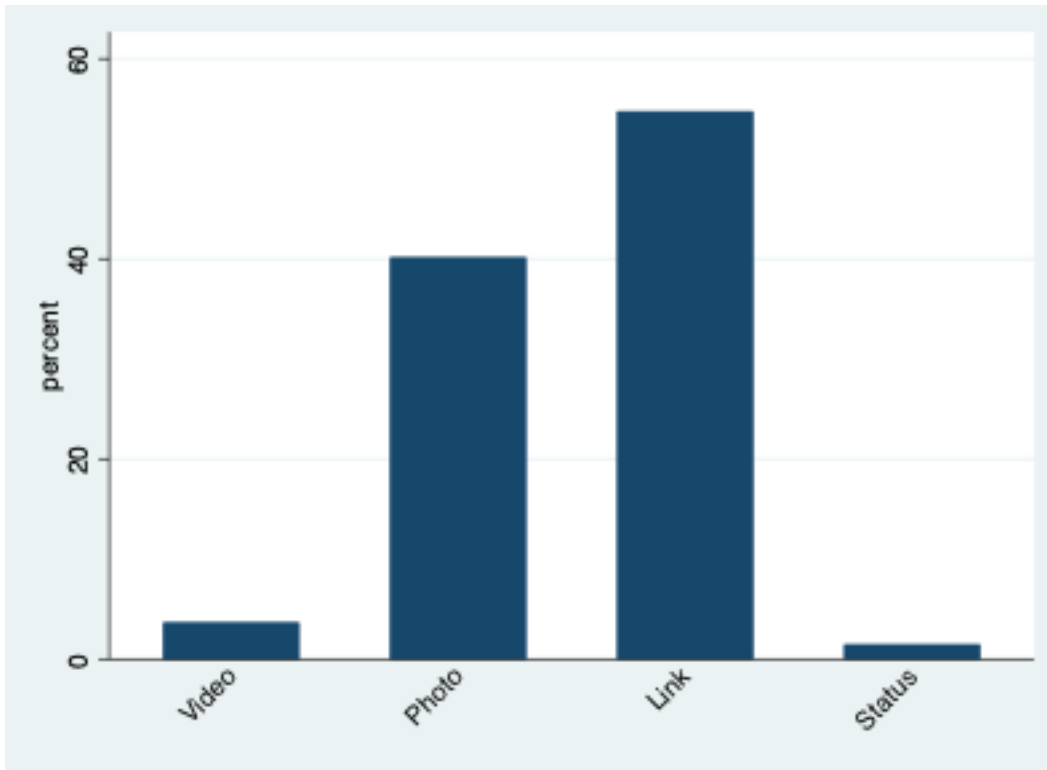


Figure 4. Bar graph representing the percentages of each media type for NYMAC's Facebook posts in 2021.

Table 5. Mean number of likes per post according to media type

Media Type	Mean
Video	4.6
Photo	5.6
Link	2.6
Status	4.5

The ANOVA resulted in a p-value of 0.003 that indicated that there was a statistically significant difference between mean reach as measured by the number of users that viewed the post and media types ($F(3, 133) = [4.88]$, $p = 0.0030$) (**Table 6**). This result leads us to reject the null hypothesis that there is no difference in mean reach between media types. Due to these results, a pairwise comparison with Bonferroni adjustment was done to determine which groups are statistically different from one another. The pairwise comparison resulted in a p-value of 0.005,

meaning there was a statistically significant difference between the mean engagement for photos and links, indicating that photos receive more engagement than links (**Table 7**). All other pairwise comparisons did not result in significant p-values.

Table 6. Stata output of ANOVA for media richness and reach

Source	F	Prob>F
Model	4.88	0.003
Media	4.88	0.003

Table 7. Stata output of pairwise comparisons of reach between media types

	Contrast	Std. Err.	t	P> t
Media				
Video vs photo	2.763636	20.21119	-0.14	1
link vs video	-29.16	19.98536	-1.46	0.881
status vs video	26.2	36.20192	0.72	1
link vs photo	26.39636	7.681434	-3.44	0.005
status vs photo	28.96364	31.14753	0.93	1
status vs link	55.36	31.00147	1.79	0.459

5.0 Discussion

The data analysis of bin categories determined that posts containing first party content performed the best in terms of engagement compared to all other bin types. First party posts typically contained information about individuals that work for NYMAC. These posts are used to introduce the NYMAC team and allow team members to share what they do at NYMAC. These posts typically are accompanied by a photo of the team member and a quote from them about their experience with NYMAC. These posts introduce team members while communicating NYMAC's mission and promoting their services in a personable way. Effective social media marketing should be personable while exerting professional credibility (Martin, 2017). The data analysis in this project supports that personable posts, such as posts that fall into the first party bin category, perform better than less personable posts. Personable posts allow organizations, such as NYMAC, to connect with their audience (Martin, 2017). This focus on personability can be applied to other bin categories in the future. Using a less formal tone and relating the content of the post back to NYMAC's core values and mission across all bin categories could encourage engagement from users.

Analyzing data pertaining to the reading level of NYMAC's posts has led to insights about how NYMAC can better communicate with their audience. Although the regression analyzing the relationship between Flesch Kincaid Grade Level and the number of likes a post receives was not determined to be significant, it still led to conclusions about how reading level can impact engagement with posts. The negative slope of the relationship between likes and reading level could indicate that posts with a higher reading level may trend towards receiving less engagement than posts with lower reading levels. However, since the relationship was not statistically

significant, we do not have solid evidence that reading level of post impacts engagement. Other studies have determined that posts with above average reading levels receive less engagement (Pancer et al., 2019). It was found that most posts made by NYMAC have a Flesch Kincaid Grade Level that is over 10. It is advised to write at an 5th or 6th grade level to effectively reach most individuals in the United States (Weiss, 2003). Since most of NYMAC's posts are written at a higher reading level, they may not be effectively communicating with their audience, which could be resulting in lower levels of engagement. In order to communicate more effectively, NYMAC should aim to regularly assess and work to lower the reading level of their posts to an 8th grade reading level or lower when possible. NYMAC often uses medical terminology, which may result in a higher reading level. This is often unavoidable when making posts about medical conditions or research studies. NYMAC can simplify terms and shorten their sentences in posts to lower the average reading level of their posts while still delivering complex medical information. Writing at a lower reading level could result in higher rates of engagement with NYMAC's posts and better understanding from their audience.

This study found that media type does not significantly impact engagement, but it does significantly impact reach of a post. Engagement is measured by the number of likes and reactions that a post receives and reach is measured by the number of users that see the post. The pairwise comparison between the reach of posts including photos versus links was considered significant. This led to the conclusion that posts that include photos are more likely to be seen by users than posts with only links. This result could be impacted by the algorithm Facebook uses to determine which posts are shown in a user's feed. Since photos have a significantly higher reach than posts with links, NYMAC should include a photo with posts that contain a link. This should lead to a larger number of users seeing these posts and will presumably lead to more users utilizing the

resources linked in these posts. Other studies have indicated that videos and more media rich posts should have a higher rate of engagement than posts with less media richness. The data analysis in this project did not support these findings. The sample used in this project had a limited number of video posts included, which could have impacted the results of the data analysis. In the year 2022, NYMAC has started utilizing videos in their Facebook posts at a higher rate than in 2021 when samples for this analysis were collected. Future studies and data analysis about NYMAC's Facebook page should be done to determine if this increased use in videos has an impact on user engagement.

5.1 Limitations

This project was limited to a short time span with a limited number of posts. This small sample size may not be entirely representative of the typical trends in engagement with NYMAC's Facebook posts. A larger sample size over a longer time period would be beneficial in having a more representative analysis of each factor that impacts social media post engagement.

The assessment of the reading level of text posts has some limitations. Many posts from NYMAC include medical and genetics terms that may be considered by the software to be at a higher reading level. Using a different tool for assessing reading level and accounting for these terms could result in a more accurate depiction of the reading levels of NYMAC's posts. Also, we are not aware of the average reading level of NYMAC's audience on Facebook. The assumption that the average reader can read at an 8th grade level could be a limitation in the data analysis and interpretation of results.

The limited number of videos and media rich posts could have an impact on the results pertaining to the relationship between media richness and engagement. A larger sample size would be needed to better analyze this relationship. As the number of posts containing photos and videos increase, the results of the data analysis will be more representative of the true relationship between media richness and engagement.

5.2 Future Directions

The outcomes of this study can be applied to social media strategies for public health entities. When used correctly, social media can be a great tool in education and outreach. Continued research in this field will lead to a better understanding of how social media can be effectively utilized in public health. With continued research and application of this study's findings, social media can be used to reach larger and more diverse populations and can be utilized as a tool to engage communities in public health. Future studies can be conducted by NYMAC to better understand patterns of engagement from users. The research outlined in this paper can be replicated with a larger sample size as NYMAC continues to utilize their Facebook page and create more posts. Another study that would help gain insight into user engagement would be a survey of stakeholders. This survey could ask stakeholders about what information they would like to see from NYMAC and other public health entities as well as what stakeholders would like to see posted by these pages. This study would provide insight into how to effectively communicate with the target audience and optimize engagement.

5.3 Conclusions and Recommendations

A plan to increase NYMAC’s Facebook engagement can be devised from the findings of this project. To increase engagement with posts, NYMAC should make posts more personable and decrease the reading level of text in their posts (**Table 8**). To ensure their posts reach the largest number of their users, NYMAC should include photos in all or most of their posts (**Table 8**). These actions should lead to a more user-friendly experience and will encourage engagement from the community. By effectively reaching a larger audience, NYMAC will be able to communicate their mission and provide helpful resources through social media. Through establishing a stronger social media presence, NYMAC and other public health entities can educate the community in an informal setting and promote their services directly to the public.

Table 8. Findings and recommendations

Findings	Recommendation
Posts including photos result in higher reach	Include photos in all posts
First party content has the highest level of engagement	Create content that is personable
NYMAC’s Facebook posts have a reading level that is higher than the average adult reading level	Write posts at a 5 th to 6 th grade reading level

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