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Exploring Tensions in Holocaust Museums' Modes of Commemoration and Interaction on Social Media

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Abstract

Digital technologies and social media platforms have been used in museum communication for over a decade now, and Holocaust museums have increasingly adopted them in their modes of commemoration and provision of educational content. Nevertheless, very limited research has been conducted into the potential of social media as new memory ecologies. In this exploratory study, we conceive social media platforms as socio-technical-ecological systems whereby users develop and engage with memory practices of the Holocaust. We adopt a networked socio-ecological approach to analyse how a sample of Holocaust museums (N=69) develop practices of digital Holocaust memory in social media. The institutions are analysed in terms of "size" (small, medium, or large), how they differ in their attitudes towards these practices, and to what extent they circulate Holocaust memory on social media. The study adopts multiple quantitative approaches and combines the results of a survey with a set of social media metrics analysing how museums engage on Facebook, Twitter, Instagram, and YouTube in terms of generated content, interactivity, popularity, and type of content. Results show that museums have an overall positive attitude towards social media although some concerns were expressed, mostly by smaller institutions; they tend to use mostly Facebook, Instagram and YouTube, and to share educational content and information about the museum's activities. However, despite a tendency to aggregate a large number of fans and followers, especially in the case of larger institutions, interaction with users remains limited. Prospects for more interactive participation and its implications are also discussed.

Keywords: Holocaust museums, Social media, Cultural heritage, Digital Holocaust Memory, Social media analytics, Survey.

Introduction

With the progressive passing of the generation that witnessed and experienced the Holocaust (Wieviorka, 2006), new modes of Holocaust commemoration and representation have been emerging for some time now (Popescu & Schult, 2015). Holocaust memory has been increasingly relying on digital technologies to engage people in immersive, simulative, or counterfactual memories of the Jewish genocide and the atrocities committed against other groups of victims by Nazi Germany and its collaborators (Garde-Hansen, Hoskins, & Reading, 2009; Kansteiner, 2017). The idea of a "virtual Holocaust memory" has been advanced to embrace both digital and non-digital memory related to the Holocaust and to draw attention to the collaborative nature of current forms of memory (Walden, 2019), to the point that, according to some (Kansteiner, 2017), the memory of the Holocaust is regarded as entirely digital. Indeed, today digital Holocaust memory, education and research are increasingly entangled with history and developments in media (Walden, 2021b). If digital technologies are shaping new memory ecologies (Hoskins, 2016; 2018), social media and the participatory culture of which they are imbued (Jenkins, Ford & Green, 2013) are contributing to the emergence of new forms of Holocaust commemoration. In this sense, we are witnessing the transition from the "era of the witness" (Wieviorka, 2006) to the "era of the user" (Ebbrecht-Hartmann & Henig, 2021; Hogervorst, 2020), where users are encouraged to choose from a large number of testimonies and navigate the wide range of resources available. Besides, the new memory ecology generated by social media participation provides a form of "multidirectional memory" of the Holocaust (Rothberg, 2009), which opens up new communication modes. Projects such as Eva.Stories on Instagram (https://www.instagram.com/eva.stories/) and the Anne Frank video diary on YouTube (https://www.youtube.com/annefrank) mark a paradigm shift in social media memory. Although the former has raised numerous controversies for its insisted use of selfie aesthetics, hashtags and geo-tagging, it nonetheless offers new ways of translating previous forms of mediated Holocaust memory (Young, 2002) into social media patterns (Henig & Ebbrecht-Hartmann, 2020).

Holocaust museums, memorials, and remembrance centres are the most notable gatekeepers responsible for preserving the memory of the Holocaust, and key institutions in implementing Holocaust and global citizenship education. Museums and memorials play a significant role as "lieux de mémoire" (Nora, 1989) - whether physical or virtual - in establishing the presence of the past and specific experiential connections to the past (Ebbrecht-Hartmann, 2021). In this respect, they are located at the intersection between commemorative memory – as physical monuments – and mediated memory – as mediated and virtual spaces (O'Connor, 2019). In this regard, Holocaust museums can be considered particular "lieux de mémoire" for their epistemic or knowledge-creation function in mediating memory of the past (Morrow, 2016).

More recently, Holocaust museums have been subjected to the disruptions that the COVID-19 pandemic has brought in many ways to the day-to-day operation of museums and cultural institutions (Agostino, Arnaboldi, & Lampis, 2020; Samaroudi, Rodriguez Echavarria, & Perry, 2020). At the same time, the pandemic has accelerated the willingness of Holocaust memorials to experiment and engage with the use of social media, which has led to an intensification of the ongoing generational change and broader opportunities for experimenting with digital media (Ebbrecht-Hartmann, 2021; Walden, 2021c). Practical examples of this evolution became manifest in Spring 2020, when hashtags such as #RememberingFromHome, #ShoahNames - used in coincidence with YomHaShoah in Israel - #DigitalMemorials, #ClosedButOpen, and #Liberation1945, all became quite popular during the Holocaust commemoration ceremonies marking the end of the Holocaust and liberation from the camps.

However, despite the recent growth of digital technology in Holocaust memory and education, the extent to which Holocaust museums utilize social media as an integral part of communication and educational practices remains to be fully understood. While several studies have yielded interesting results on remarkable individual institutions (Dalziel, 2016; Lundrigan, 2020; Manikowska, 2020; Wight, 2020; Zalewska, 2017), little is known about the global situation, and specifically about the attitudes and practices of a large group of institutions engaged in developing practices of Holocaust memory in social media. In this study, we specifically focus on Holocaust museums as they are defined by the Encyclopaedia Britannica: "any of several educational institutions and research centres dedicated to preserving the experiences of people who were victimized by the Nazis and their collaborators during the Holocaust (1933–45)" (Parrott-Sheffer, 2019, n.a.). The museums sampled here cover a variety of commemorative entities involved in preserving the memory of the Holocaust and of the crimes committed during WWII.

The study deploys different theoretical lenses that consider social media for Holocaust memory as socio-technical-ecological systems (Manca, 2017; van Dijck, 2013) whereby users develop and engage with practices of Holocaust memory. The field of study is characterised by an increasing entanglement between diverse actants – material and non-material, human and non-human – which contribute to define Holocaust memory and education both in the living world and in the digital space (Walden, 2021b). Specifically, we focus on the microlevel of communication protocols and interface interaction between users and social media profiles. We seek to establish the extent of museums' social media engagement and interaction based on the most recurrent type of social media content and to determine how the size of a Holocaust museum affects its inclination to circulate Holocaust memory on social media.

Theoretical Background

Social Media as Socio-Technical-Ecological Systems

According to socio-technical approaches to the design and use of technologies (Bijker, Hughes, & Pinch, 1987; Williams & Edge, 1996), information technologies can be considered as systems which are shaped by both

social forces and technological features. They are the result of interactions and negotiations between technology, users and organizational contexts (Huysman & Wulf, 2006). In this light, digital scholarship practices that occur on academic social network sites, for instance, have been conceptualized as a complex techno-cultural system that includes technological innovations and dominant cultural values (Stewart, 2015). More generally, some scholars have proposed an approach that combines emergent user practices and content with the platform's organizational level to study social media and social network sites as microsystems (van Dijck, 2013). In this approach, social media are systems that encompass coevolving networks of people and technologies with economic infrastructure and legal-political governance, and blend techno-cultural and political economy views. This interconnection is illustrated in a two-layered approach that analyses social media platforms as socio-economic structures and techno-cultural constructs (van Dijck, 2013). Further derivations of this approach have resulted in conceptualising a third level that explicitly encompasses the individual use of social platforms and the ways in which single users exploit these sites for specific purposes (Manca, 2017). The interaction functionalities provided by social media include "following", posting comments, expressing a reaction through a "like" or an "emoji", and replying to comments by other users, in addition to those posted on the page or profile. Advanced features for network connectivity include the ability to share by commenting on content, to build a network of contacts and to boost reputation and identity in terms of visibility (Haythornthwaite, 2005).

An interrelation can be seen between sociality and digital platforms like social media, as well as between systemic and individual employment of these platforms. Similarly, digital technologies and social media can be considered interrelated to the digital memory of the Holocaust. Some scholars have drawn attention to the need to consider Digital Holocaust Memory as a field of studies where digital humanities, computer science and media and cultural studies converge (Walden, 2021b). In this inter- and multidisciplinary perspective, issues arise such as "how might surveillance capitalism affect online Holocaust memory projects?" or "to what extent do social media enable potential visitors to become ethical and active co-producers of memory within participatory cultures?" (Walden, 2021b, p. 4). In digital Holocaust memory, the different actants working at different levels in the "digital" environment – computation, interface, institution, user experience, and cultural contexts – are all entangled and interact with other actants on the same or distinct levels. However, while traditional approaches tend to distinguish between different types of interactivity - human-computer interface and participatory culture (Jenkins, Ford & Green, 2013) – recent developments call for the adoption of the notion of "intra-action" instead of interactivity (Calleja, 2011). As already stressed in early studies about digital interactivity in memory culture, there is a conflation of interactivity with agency (Reading, 2003), which is especially advocated today to highlight the creative dimension of ethical and educational encounters with the past (Walden, 2021a). In this sense, participation is more about granting users agency and less about considering them already as actants of memory and social change (Jenkins, Ford & Green, 2013; Walden, 2021a). According to this perspective, Holocaust memory may

be considered as a digital phenomenon or intra-action between a multitude of actants, which "emerges through the meeting of operations, processes, sites, materials, and people, some of which with a direct relationship" to the complexity of the Holocaust memoryscape (Walden, 2021a, p. 291).

The idea that digital Holocaust memory is not fixed but constantly evolving and emerging has been investigated in several studies. Among these, for instance, one study has analysed how filtering and ranking algorithms and search engines shape individual perception of the visual historical content of the Holocaust (Makhortykh, Urman, & Ulloa, 2021), another study has investigated how content creators on YouTube document their visits to the Auschwitz-Birkenau State Museum in vlog form (Łysak, 2021), and another has focused on the use of Virtual Interactive Holocaust Survivor Testimony (VIHST) in place of live survivor testimony (Marcus et al., 2021). Less emphasis has been placed on building ecological memory in social systems and, specifically, on understanding widespread use of social media for Holocaust memory. By "ecological memory" (Bruce, 1985), we mean the study of memory as it operates in digital platforms through which users develop practices of Holocaust memory.

In this study, we will focus on the social media presence of cultural heritage institutions such as Holocaust museums, which deploy historical content and remembrance practice of the Holocaust, and how users engage in these platforms. The participatory culture imbued in social media (Jenkins, Ford & Green, 2013) is reflected in the ways in which museums act as intermediaries of historical knowledge and cultural heritage through the exploitation of social media as socio-technical systems and through leveraging their affordances ecologically.

In the next section, we provide an overview of social media use by cultural institutions with particular regard to the problems and tensions emerging in the participatory turn of Holocaust museums.

The Connected Museum and The Tensions that Arise

For over a decade now, social media have been at the forefront of museums' communication spaces (Russo, Watkins, Kelly, & Chan, 2008). They are supposed to challenge and change museum practice because of their participatory nature and their social activism and democratizing practices (Janes & Sandell, 2019; Reynolds, 2020; Wong, 2012). Social media are also challenging the traditional flow of museum-based information and exposing tensions and synergies when the museums relinquish direct control over their media content (Gonzales, 2017; Wong, 2011). The "participative turn" and the democratisation process, which have been accelerated exponentially by social media (Arnaboldi & Diaz Lema, 2021; Bonet & Négrier, 2018), are resulting in pressure on museum leaders and their internal organization for greater readiness to change (Booth, Ogundipe, & Røyseng, 2020).

In the social media era, the "connected museum" is taking shape as a new hybrid place in which physical and virtual exhibition spaces are evolving into digital ones, and conversations taking place on social media are reconfiguring traditional forms of visitor engagement and learning, outreach, and inclusion (Drotner &

Schrøder, 2014). The focus of recent studies has shifted to the extent to which museums and audiences are co-constructing one another while using particular modes of communication and discursive genres that serve to generate mutual online positionings (Gronemann, Kristiansen, & Drotner, 2015). The idea of museums as cultural intermediaries is also connected with the concept of online value creation, which is manifest in the diverse organizational forms in which museums may engage: marketing, which promotes the image of the institution; inclusivity, which nurtures a real online community; and collaboration, which goes beyond communication and promotes constructive interaction with the audience (Kidd, 2011; Padilla-Meléndez & del Águila-Obra, 2013).

At all these different levels, Holocaust museums are using social media ecologically as instruments of promotion, education, and global scale outreach (Manikowska, 2020). A notable example is provided by the Auschwitz-Birkenau Memorial and Museum, which is one of the pioneers in the use of social media among Holocaust memory institutions. Identified as the "most recognizable symbol and place of genocide in the world" (Manikowska, 2020, p. 235), the Museum uses social media to reinforce educational programmes and commemoration events by informing the online community about the everyday history of the camp and involving followers and fans in celebrations, events and anniversaries. In line with the common approach to teaching and learning about the Holocaust, based on humanizing Holocaust statistics (Foster, Pearce, & Pettigrew, 2020; Gray, 2014), the framework of a Twitter project includes the publication of a short note about an Auschwitz prisoner who was born or died on that given day.

However, despite the increasing role of digital technologies and social media in converting museums to hybrid spaces that go beyond the "physical" boundaries of the physical/virtual museum, there are many challenges the "connected museum" is still facing. Recent studies have shown, for instance, that lack of technical and digital competencies among museum staff prevents the museum from offering real-time data for visitor entertainment and interaction, and dialogue between the museum and its online visitors (Agostino & Arnaboldi, 2021). A number of museum leaders perceive social media as conflicting with museum functions and values; this attitude is mainly found among those with the fewest available resources for social media activities, who are also less likely to commit to social media engagement (Booth, Ogundipe, & Røyseng, 2020). In other cases, a significant social media presence does not automatically ensure high levels of interaction with the museum's online followers, unless features that allow online reactions from the public are provided (Arnaboldi & Diaz Lema, 2021). Getting involved in users' conversations, instead of merely providing interaction, is at the core of user engagement (Camarero, Garrido, & San Jose, 2018). Analysis of social media posts tend to show museums' social media communication as still unilateral and promotional in all cases, including the case of anchor museums (Ruggiero, Lombardi, & Russo, 2021).

More tensions behind limited interactivity have also been reported in the case of Holocaust museums. Previous studies have shown that Holocaust memorials perform limited activity via Facebook and Twitter and the levels of engagement of their public are diverse in terms of generated content, interactivity, and

popularity (Manca, 2019). When investigating three major Holocaust organisations - Yad Vashem, the United States Holocaust Memorial Museum, and the Auschwitz–Birkenau Memorial and Museum – it was found that only the United States Holocaust Memorial Museum exhibits some interactivity with its Facebook fan community, while there is an overall tendency to use social media as a one-way broadcast mode of communication (Manca, 2021b).

One of the factors for limiting interaction with users may be ascribed to the phenomena of Holocaust denial, distortion and misinformation which are found to be increasingly pervasive on Internet sites and social media. Institutions such as the Auschwitz-Birkenau Memorial and Museum, which have made it their mission to "battle against Holocaust denial, misinformation, glorification, and other forms of human rights violations referring to Auschwitz which are eagerly spread via social media" (Manikowska, 2020, p. 241), has launched a Twitter campaign against Holocaust denial and antisemitism which has attracted notable response from social media users, for instance in the recent campaign against #POVholocaust memes by young users who pretended to be Holocaust victims as part of a TikTok challenge (Fink, 2020). However, although Holocaust museums are rightly concerned about the rising visualisation of Holocaust distortion and denial, and antisemitism online, resulting in tensions between institutional and amateur online memory in social media (Walden, 2021c), according to some authors (Walden, 2021b), the "produser" culture of social media should not be undermined and users should be encouraged to feel empowered to contribute to political, social and memory discourses.

In this study, we explore how patterns of content distribution and institutional practices of Holocaust memory by Holocaust museums may collide with users' need to be actively engaged in the development of grass-roots memory practices. In this light, specific engagement and interaction metrics are used to investigate the level reached by users' interaction and participation in memory practice (Jacobsen & Beer, 2021).

Rationale and Research Questions

In this study we adopt a socio-ecological perspective to analyse the complex interactions between users and social media environments (Steinberg, 2001). This ecological perspective offers a lens to simultaneously analyse individual and contextual systems and their interdependent relationships through multiple interrelated systems that influence each other (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1998). A networked approach has been conceptualised to emphasise how ecological systems are an overlapping arrangement of structures in which the direct and indirect social interactions of participants are connected to each other (Neal & Neal, 2013). In this light, a networked socio-ecological approach to social media focuses on the relationships between individuals and the socio-technical systems implemented by social media platforms conceived as ecological environments, where diverse structures overlap directly or indirectly by the social interactions of the participants.

Working on this conceptual approach, we examine how a comprehensive sample of Holocaust museums engage on social media platforms intended as ecological systems. Specific focus is on analysing how they produce patterns of Holocaust memory in terms of interactivity, generated content and popularity. Banking on the results of a survey and a set of social media metrics and data-driven methods, the study also seeks to analyse the relationship between the museums' attitudes towards social media and users' engagement. A further aim is to observe possible differences between three groups of museums in terms of their size (small, medium, large). Specific research questions are:

1) What attitudes and communication patterns do Holocaust museums have regarding their social media channels?
2) What are the levels of activity, interaction and popularity in the social media profiles of the various museums?

Methods

Sampling and Procedures

A list of 227 museums and memorials was derived from the International Directory of Holocaust Organizations of the Holocaust Remembrance Alliance (IHRA) (https://www.holocaustremembrance.com/resources/overview-holocaust-related-organizations), an intergovernmental organization founded in 1998 which unites governments and experts to strengthen, advance and promote Holocaust education, research and remembrance worldwide. With over 40 member countries, the IHRA is considered the most important transnational organisation in this field. As of 4 February 2021, the directory list, which includes survivor organizations, educational and research institutions and historical sites from 44 countries, comprised 896 organisations. The list was further inspected and only organisations labelled as "museums" or "memorials" were selected. A functioning email address was identified for 203 of the 227 institutions, and an email invitation to participate in a survey was addressed to these institutions.

The survey was implemented online through LimeSurvey (http://www.limesurvey.org/), an open-source platform, and invitations to fill in the questionnaire were sent out via email by the software. Data were collected in the period 12th February-22nd April 2021. After one month, a first reminder was sent to help increase response rate and a second reminder was sent after three weeks. Although no incentive was offered for participation, respondents were, however, told that they would be informed of the results. The full results are available at Manca (2021c).

The final sample of respondents is composed of 69 institutions, which correspond to 34.0% of the invited recipients. The 69 museums/memorials were subsequently classified into small (SM), medium (MM) or large (LM) institutions mostly according to their international, national or local reach. Unlike previous studies (Morrow, 2016) which have proposed a Holocaust museum taxonomy in terms of national, regional and local

standing, we considered that many Holocaust institutions qualify as international for their prominence in the field and for attracting thousands of international visitors every year (Wight, 2020). In this sense, Holocaust memorials such as the Gedenkstätte Bergen-Belsen in Germany or the Dallas Holocaust and Human Rights Museum in the USA, for instance, are considered "large" museums, along with notable institutions like the Auschwitz-Birkenau State Museum, Yad Vashem or the United States Holocaust Memorial Museum (USHMM). Two coders independently classified the 69 respondent institutions into the three categories on the basis of their standing at international/national/local level and the physical size of each museum/memorial. Initial coding resulted in Cohen's k = .84 (Capozzoli, McSweeney, & Sinha, 1999), while disagreements were resolved through discussion until a total consensus was reached.

The coding process resulted in the following classification: 34 (49.3%) museums were classified as SM (e.g., Beit Theresienstadt; Muzeum-Miejsce Pamięci KL Plaszow w Krakowie; Mahn-und Gedenkstätten Wöbbelin; KZ-Gedenk- und Begegnungsstätte Ladelund); 20 (29.0%) as MM (e.g., Jasenovac Memorial Site; Shoah Memorial of Milan; The Florida Holocaust Museum; Herinneringscentrum Kamp Westerbork); and 15 (21.7%) as LM (e.g., The Auschwitz-Birkenau State Museum; United States Holocaust Memorial Museum; Yad Vashem; Gedenkstätte Bergen-Belsen). With regard to their geographical distribution, 25 (36.2%) are located in Germany, 9 (13.0%) in the United States, 7 (10.1%) in Italy, while the others are distributed across a wide variety of countries in South America, Western and Eastern Europe, the Middle-East and South Africa. The 69 organisations have the same geographical distribution as the full list of invited institutions (p = .945 for Fisher's exact test for count data), which means that the sample comprises a high proportion of institutions based in Germany, USA, and Italy (N=25, 9, and 6, respectively).

The museums that declared they do not use social media (N=8; 11.6%) are all SM located in Germany or Austria. The remaining 61 (88.4%) museums reported using at least one social media profile between Facebook, Twitter, Instagram, and YouTube, with an average of 2.9 channels (SD=1.4), and with 36 (59.0%) institutions having used them for over three years. Facebook is the most frequently used platform (N=53; 86.9% use it daily or weekly), followed by Instagram (N=38; 62.3%, weekly and daily use), Twitter (N=28; 45.9%, weekly and daily use) and YouTube (N=23; 37.7% of monthly use). Blogs are used only by 10 institutions (16.4% of monthly use), while platforms such as LinkedIn (N=15; 24.6%), Pinterest (N=5; 8.2%), Flickr (N=5; 8.2%) and Snapchat/TikTok (N=1; 1.6%) are only used in a small number of cases.

We then searched the Facebook, Twitter, Instagram and YouTube profiles of the 61 museums using social media and analysed them according to a set of metrics offered by FanPage Karma (https://www.fanpagekarma.com/), a service platform which provides valuable insights into posting metrics, strategies, and profile performance on various social media platforms. Unfortunately, FanPage Karma only analyses business or professional social media profiles, therefore not all selected profiles were analysed. Our analysis was thus focused on the profiles in Table 1.

Table 1. Number of institutions investigated through FanPage Karma.

	SM	MM	LM	Total
Facebook	20 (76.9%)	20 (100.0%)	15 (100.0%)	55 (90.2%) Fisher exact test, *p*=.007
Twitter	9 (34.6%)	13 (65.0%)	12 (80.0%)	34 (55.7%) Fisher exact test, *p*=.009
Instagram	7 (26.9%)	14 (70.0%)	12 (80.0%)	33 (54.1%) Fisher exact test, *p*=.001
YouTube	11 (42.3%)	16 (80.0%)	13 (86.7%)	40 (65.6%) Fisher exact test, *p*=.004

For each social platform examined, we observed that almost all LM institutions had an active page, while several of the SM institutions had no active page on some of the platforms (especially Instagram and Twitter). This analysis considered social media activity in the timespan 1 February-30 April 2021.

Instruments and Analysis

In the light of the research stance outlined in section "Rationale and Research Questions", we adopt a mixed method approach that relies on "the primary importance of the question asked rather than the methods, and […] the use of multiple methods of data collection to inform the problems under study" (Creswell & Plano Clark, 2017, p. 41). Accordingly, we adopted a variety of different quantitative tools given that, in a mixed method approach, researchers combine diverse "elements of research approaches [...] for the broad purposes of breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). Specifically, we combined the results of a survey directed at institutions' managers with metrics derived from social media analytics, allowing us to explore attitudes, modes of commemoration, and social media engagement.

The questionnaire was developed from previous studies and based on indications available on the social media profiles and websites of the institutions involved. In particular, two studies (Booth, Ogundipe, & Røyseng, 2020; Samaroudi, Rodriguez Echavarria, & Perry, 2020) provided the basis for exploring attitudes to the organisational change required by the use of social media.

The questionnaire consists of 22 items of various nature (multiple choice questions, Likert-type questions, short open-ended questions), grouped into three main sections. The first section collects background information about the museum/memorial and its communication channels; the second section investigates the museum/memorial's experience in social media use; the third section is dedicated to the impact that the COVID-19 pandemic has had on the museum/memorial's activities. Only the Museums/Memorials that declared they use social media were asked to answer the questions in the second and third sections. However, participants were encouraged to engage at least in the first part of the survey in order to collect information on the possible reasons why social media are not currently used.

For the purposes of this study, we used data collected through the questions regarding attitudes and the type of content that museums tend to distribute on social media. Specifically, attitudes were measured through 14 items using a five-point agree-disagree response scale. The items all broadly refer to attitudes towards social media, and their Cronbach's alpha (.78) could be considered satisfactory for a unidimensional scale (Cortina, 1993). However, the set of items was not validated as a single measure of attitudes towards social media since we opted for considering each item separately as a single item indicator of the narrow facet of the construct described by the item itself.

Content type was assessed through a number of subcategories - Educational contents; Educational events; Museum/Memorial activities and service communications; Material intended to counter Holocaust distortion; Hashtag campaigns; and Fundraising campaigns - and respondents were asked about frequency of publication of this type of content across all platforms (1=Never; 2=Rarely; 3=Sometimes; 4=Often; 5=Very often).

In social media research, analytics are considered a powerful means not only for providing information about social media activity, but also for transforming "existing practices in politics, marketing, investing, product development, entertainment, and news media" (Lassen, la Cour, L., & Vatrapu, 2018, p. 328). In particular, the use of voluminous and structured social media data is able to generate actionable insights of strategic value for incremental value co-creation (Adikari, Burnett, Sedera, de Silva, & Alahakoon, 2021).

In studies focusing on museums' use of social media, social media analytics have been used to evaluate the impact of museums' events and extract inspiring pronouncements (Gerrard, Sykora, & Jackson, 2017). In this study, social media analytics are also used to solve some of the biases the study can have when administering a survey-based research methodology (Kar & Dwivedi, 2020).

Recent approaches have suggested that measuring museums' social media presence involves gauging social media effectiveness by considering both content and relational communication strategies (Camarero, Garrido, & San Jose, 2018). According to this approach, engagement may be expressed in terms of three consumer dimensions: popularity (e.g., the number of followers and likes); generated content (e.g., the number of posts and comments); and virality (e.g., the number of reposts/shares).

In this study, social media metrics analysed on FanPage Karma were derived from a set of metrics developed in previous studies (Manca, 2021b), which are arranged into three macro-categories: content, interactivity and popularity (for a complete list of definitions of the diverse metrics, see https://academy.fanpagekarma.com/en/metrics/). For the purposes of this study, we used a simplified set of categories mostly focusing on user interactivity, content shares and popularity (Table 2). We also decided to investigate English language use as an indicator of internationalisation (Bartolini, 2015).

Table 2. List of metrics per platform.

	Facebook page	Twitter profile	Instagram profile	YouTube channel

Content	• Number of posts • Posts per day	• Number of tweets • Tweets per day • Number of new content-tweet • Tweets per day (new content)	• Number of posts • Posts per day	• Number of videos
Interactivity	• Comments per post • Reactions per posts • Post interaction (%) • Engagement (%) • Posts per fan • Comments on posts by fans • Fans' posts with reaction by page • Page's comments on posts by fans	• Number of likes • Number of likes per tweet • Tweet interaction (%) • Engagement (%) • Conversations	• Number of comments • Number of comments per post • Post interaction (%) • Engagement (%)	• Number of views • Number of views per video • Number of likes • Number of likes per video • Number of dislikes • Number of dislikes per video • Number of comments • Number of comments per video • Post interaction (%)
Popularity	• Shares per post • Number of fans	• Average number of retweets per tweet • Number of followers	• Number of fans	• Number of subscribers

We primarily used descriptive statistics to summarize the characteristics of the sample and inferential statistics to elaborate data in order to provide answers to the research questions. The IBM Statistical Package for Social Sciences (SPSS 23.0) and the software statistics package R 4.0.2 were used. Differences across institution size categories between the three groups were analysed using ANOVA, and multiple comparisons were corrected using Tukey's HSD method for comparing a family of 3 estimates (Abdi & Williams, 2010).

As social media metrics are frequently distributed according to a power-law distribution (Gadepally & Kepner, 2015), distribution is decidedly non-normal, as reflected by the magnitude of the differences between means and medians. However, a simple logarithmic transformation can normalize these distributions (Baeza-Yates & Saez-Trumper, 2015; Mascaro, Little, Hughes, Uowolo, & Schnitzer, 2013; Raban & Rabin, 2009), which allowed us to use Tukey's HSD-corrected ANOVAs for data analysis.

Finally, in order to investigate the languages used by the various Holocaust museums, all collected data were imported into the software statistics package R 4.0.2 and subsequently analysed using the cld3 library, published and maintained by Jeroen Ooms at the University of California, Berkeley. The underlying algorithm

relies on a neural network, based on Google's Compact Language Detector, and automatically identifies the language in designated pieces of textual data.

Results

In this section, we present the results obtained in response to the two research questions and focus specifically on analyses carried out to identify possible differences between the three size-based groups (LM, MM, and SM).

Attitudes and Patterns of Use

Table 3 shows that museums value social media as a very important innovation. In particular, they consider social media: beneficial for the future of museums (M=4.5±0.8) - with MM tending to greater agreement than SM (p=.045); as important means for outreach (M=4.5±0.8); and a welcome change (M=4.3±0.8). Social media also provide museums with the freedom to try new things (M=4.2±0.8) - with MM tending to agree more than SM (p=.018) - and are considered a worthwhile investment (M=4.1±0.8) - with greater agreement found in MM over SM (p=.046) - and should be used to counter Holocaust distortion (M=4.1±0.9). However, these considerations are accompanied by a number of concerns, such as awareness of the need for a well-defined social media policy (M=4.4±0.7), that dedicated resources for social media need to be set aside (M=3.8±1.1), and that social media requires more resources than the museum can currently afford (M=3.5±1.2). On the other hand, very few believe that social media divert museum resources from their primary function (M=1.9±1.0) - with greater agreement found in SM over MM (p=.005) and LM (p=.028) - or that they have usurped the role of museums (M=1.8±0.9) - with SM that tend to agree more than MM (p=.022) and LM (p=.015). The item "Time spent by the museum's communication department on social media would be better used elsewhere" (M=1.8±1.0) raised greater agreement in SM than in LM (p=.021). Finally, respondents are eager to support innovative social media projects (M=3.8±1.1) and to have the best social media presence if compared to all other museums (M=3.2±1.2).

Table 3. Attitudes towards social media (mean ± SD (median)).

	Small (N=34)	**Medium** (N=20)	**Large** (N=15)	**Total** N=(69)	**F(2,66)**	**p-value**	**Post-hoc analysis**
If the museum uses social media, the museum will benefit in the future	4.2±1.0 (4.0)	4.8±.4 (5.0)	4.7±.5 (5.0)	4.5±.8 (5.0)	3.99	.023	Medium > small (p = .045)
Social media is a welcome change for the museum	4.2±.9 (4.0)	4.6±.6 (5.0)	4.1±1.0 (4.0)	4.3±.8 (4.0)	1.69	.293	---
Social media is an important means for museum outreach	4.3±.9 (4.5)	4.7±.6 (5.0)	4.7±.6 (5.0)	4.5±.8 (5.0)	2.51	.089	---
Museums need to have a defined social media policy	4.3±.9 (4.5)	4.8±.4 (5.0)	4.4±.6 (4.0)	4.4±.7 (5.0)	2.90	.062	---
Social media distracts museum's resources from its primary function	2.3±1.1 (2.0)	1.5±.7 (1.0)	1.6±.6 (2.0)	1.9±1.0 (2.0)	6.72	.002	Small > medium (p = .005), small > large (p = .028)
Digital media has usurped the role of museums	2.1±1.0 (2.0)	1.5±.6 (1.0)	1.4±.6 (1.0)	1.8±.9 (2.0)	5.84	.005	Small > medium (p = .022), small > large (p = .015)
The museum has to set aside dedicated resources for social media	3.6±1.0 (4.0)	3.8±1.4 (4.0)	4.4±.6 (4.0)	3.8±1.1 (4.0)	2.69	.076	---
Social media provide museums with the freedom to try new things	4.0±.8 (4.0)	4.6±.6 (5.0)	4.3±.8 (5.0)	4.2±.8 (4.0)	4.05	.022	Medium > small (p = .018)
Social media requires more resources than the museum can currently employ on them	3.4±1.2 (4.0)	3.6±1.1 (3.5)	3.6±1.3 (4.0)	3.5±1.2 (4.0)	.17	.846	---
We want our museum to have the best social media presence, compared to all other museums	2.8±1.2 (3.0)	3.6±1.2 (4.0)	3.3±.9 (3.0)	3.2±1.2 (3.0)	2.96	.059	---
We are eager to support innovative social media projects at our museum	3.7±1.1 (4.0)	3.9±1.2 (4.0)	4.0±1.1 (4.0)	3.8±1.1 (4.0)	.28	.755	---
Expending resources on social media communication is a worthwhile investment	3.9±.8 (4.0)	4.5±.8 (5.0)	4.3±.6 (4.0)	4.1±.8 (4.0)	3.20	.047	Medium > small (p = .046)

Any time spent by the museum's communication department on social media would be better used elsewhere	2.1±1.1 (2.0)	1.6±1.0 (1.0)	1.3±.5 (1.0)	1.8±1.0 (1.0)	4.45	.015	Small > large (p = .021)
Museums should use social media to counter Holocaust distortion	4.1±1.0 (4.0)	4.2±0.8 (4.0)	4.0±0.8 (4.0)	4.1±0.9 (4.0)	.12	.884	---

In terms of communication patterns, results reported in Table 4 show that the sampled institutions mainly tend to publish educational contents (e.g., historical content, moral education content, personal stories of victims/survivors) (M=4.2±1.0), information about museum/memorial activities and service communications (M=4.0±1.0), and information about educational events (e.g., workshops, conferences, podcasts, webinars, virtual/audio tours) (M=3.9±1.1). In terms of size, LM tend to publish more educational content than SM (p=.025), while for all other content types differences are not statistically significant. When comparing content types via repeated-measures ANOVA and Tukey's HSD method for multiple comparison adjustment, we observed that type of content tends to cluster into three categories. The most commonly posted types are educational content, educational events, and information about activities ($p < .001$ when compared with other types, non-significant differences when compared to each other). Less commonly posted content includes hashtag campaigns and materials intended to counter Holocaust distortion ($p < .001$ when compared with other types, non-significant differences when compared to each other). At the very bottom, the least frequently published type of content are fundraising campaigns ($p < .001$ for all comparisons).

Table 4. Types of content (mean ± SD (median)).

	Small (N=26)	**Medium** (N=20)	**Large** (N=15)	**Total** (N=61)	**F(2,58)**	**p-value**	**Post-hoc analysis**
Educational contents (e.g., historical content, moral education content, personal stories of victims/survivors)	3.8±1.0 (4.0)	4.3±.9 (5.0)	4.6±.6 (5.0)	4.2±1.0 (4.0)	3.95	.025	Large > small (p = .025)
Educational events (e.g., workshops, conferences, podcasts, webinars, virtual/audio tours)	3.7±1.0 (4.0)	4.3±1.0 (4.0)	3.8±1.2 (4.0)	3.9±1.1 (4.0)	1.52	.226	---
Museum/memorial activities and service communications (e.g., information about Museum operation)	3.9±.9 (4.0)	4.3±.9 (4.5)	3.7±1.1 (4.0)	4.0±1.0 (4.0)	1.65	.202	---
Material intended to counter Holocaust distortion	2.7±1.2 (3.0)	2.9±1.0 (3.0)	2.9±1.1 (3.0)	2.8±1.1 (3.0)	.23	.799	---
Hashtags campaigns	2.5±1.2 (2.5)	2.5±1.4 (2.0)	2.7±1.0 (3.0)	2.5±1.2 (2.0)	.11	.901	---
Fundraising campaigns	1.7±1.0 (1.0)	2.2±1.2 (2.0)	1.9±1.2 (1.0)	1.9±1.1 (1.0)	1.41	.254	---

Content Published, Interaction and Popularity

Analysis of social media metrics has revealed that most museums mainly focus on Facebook (N=55) and YouTube (N=40) rather than Twitter (N=34) and Instagram (N=33), although with various levels of content sharing, interaction and popularity.

These analyses show that, on Facebook (Table 5), LM (p=.008) and MM (p=.030) tend to publish more content than SM, while no significant difference was found for the proportion of content in English. The number of comments and reactions per post was found to be higher in LM than in MM (p=.033 and p=.008, respectively) and SM (p<.001, p<.001). In terms of metrics of interaction, while post interaction was not significantly different between the three groups, engagement was found to be higher in LM than in MM (p=.006) and SM (p<.001). Moreover, the number of users' posts published is higher in LM than in MM (p=.019) and SM (p=.036). However, posts by fans with reactions by page and with comments by page were found to be not significantly different in the three groups. Finally, as for popularity, LM's posts tend to be shared more than those by MM (p=.002) and SM (p<.001), while LM are those with the highest number of fans from the three groups (p=.039, p<.001), with MM having a higher number than SM (p=.002).

Table 5. Content, interactivity and popularity of museums' Facebook pages (mean ± SD (median)).

		Small (N=20)	**Medium** (N=20)	**Large** (N=15)	**Total** (N=55)	**F(df), p-value**	**Post-hoc analysis**
Content	Number of posts	30.6±24.2 (28.0)	60.6±53.9 (46.5)	73.1±55.0 (52.0)	53.1±48.3 (36.0)	F(2,52) = 5.75, *p* = .006	Medium > small (*p* = .030), large > small (*p* = .008)
	Content in English (%)	9.97±27.36 (0)	31.63±43.35 (0)	34.19±46.81 (0)	25.29±40.67 (0)	F(2,49) = 1.85, *p* = .168	---
Interactivity	Comments per post	.6±.6 (.5)	2.8±2.9 (1.7)	56.3±130.1 (1.8)	16.6±70.7 (1.1)	F(2,52) = 9.20, *p* < .001	Large > small (*p* < .001), large > medium (*p* = .033)
	Reactions per posts	13.4±10.6 (12.4)	43.1±37.8 (38.0)	1254.0±2658.2 (35.9)	362.5±1461.6 (27.3)	F(2,52) = 14.06, *p* < .001	Large > small (*p* < .001), large > medium (*p* = .008)
	Post interaction	.02±.03 (.02)	.01±.01 (.01)	.01±.01 (.01)	.01±.02 (.01)	F(2,52) = 3.34, *p* = .043	---
	Engagement (%)	.13±.12 (.08)	.27±.38 (.08)	.62±.39 (.47)	.31±.37 (.21)	F(2,52) = 10.62, *p* < .001	Large > small (*p* < .001), large > medium (*p* = .006)
	Posts by fans	.5±.8 (.0)	1.6±3.0 (.0)	17.7±50.0 (.0)	5.6±26.6 (.0)	F(2,52) = 4.23, *p* = .020	Large > small (*p* = .017)
	Comments on posts by fans	1.0±3.1 (.0)	.6±1.6 (.0)	9.9±18.9 (.0)	3.3±10.7 (.0)	F(2,52) = 4.59, *p* = .015	Large > small (*p* = .036), large > medium (*p* = .019)
	Fans' posts with reaction by page	.0±.0 (.0)	.0±.0 (.0)	2.3±8.8 (.0)	.6±4.6 (.0)	F(2,52) = 1.91, *p* = .158	---
	Page's comments on posts by fans	.0±.0 (.0)	.0±.0 (.0)	.0±.0 (.0)	.0±.0 (.0)	---	---

	Shares per post	2.9±2.4 (2.4)	9.0±8.9 (6.4)	258.8±544.4 (14.0)	74.9±299.6 (5.3)	F(2,52) = 14.35, p < .001	Large > small (p < .001), large > medium (p = .002)
Popularity	Number of fans	1911.3±3097.5 (798.5)	8497.9±6676.1 (8045.0)	192276.2±349974.1 (7843.0)	56224.1±21804 2.6 (3671.0)	F(2,52) = 17.94, p < .001	Medium > small (p = .002), large > small (p < .001), large > medium (p = .039)

Looking at Twitter (Table 6), LM tend to tweet more than SM (p=.017), and to publish more new content-tweet than MM (p=.037) and SM (p=.010). However, no significant difference was found for English language use. As for interactivity, LM tend to receive more likes than MM (p=.008) and SM (p=.002), as well as more likes per tweet (p=.020, p=.005). However, when analysing metrics such as Twitter interaction, Engagement and Conversations, no difference was found between the three groups. Finally, in terms of popularity, LM tend to receive an average number of retweets per tweet which is higher than in MM (p=.008) or SM (p=.002), while MM (p=.014) and LM (p<.001) have a higher number of followers than SM.

Table 6. Content, interactivity and popularity of museums' Twitter profiles (mean ± SD (median)).

		Small (N=9)	**Medium** (N=13)	**Large** (N=12)	**Total** (N=34)	**F(df), p-value**	**Post-hoc analysis**
Content	Number of tweets	76.3±126.2 (10.0)	56.2±53.8 (54.0)	683.0±1235.8 (213.0)	282.8±777.2 (66.5)	F(2,31) = 5.72, p = .008	Large > small (p = .017)
	Number of new content-tweet	48.2±73.2 (9.0)	46.6±44.0 (39.0)	452.5±1043.8 (163.5)	190.3±1043.8 (42.5)	F(2,31) = 4.80, p = .015	Large > small (p = .010), large > medium (p = .037)
	Content in English (%)	1.59±2.75 (.00)	43.90±46.56 (40.00)	51.60±39.40 (35.59)	42.52±42.15 (31.58)	F(2,22) = 2.59, p = .098	---
Interactivity	Number of likes	384.4±605.7 (22.0)	613.3±869.1 (99.0)	609112.6±2058727.4 (5237.0)	215317.2±1224718.7 (503.0)	F(2,31) = 8.69, p = .001	Large > small (p = .002), large > medium (p = .008)
	Number of likes per tweet	3.6±5.5 (2.0)	8.1±8.9 (3.7)	314.3±603.1 (17.8)	115.0±379.0 (6.3)	F(2,31) = 6.90, p = .003	Large > small (p = .005), large > medium (p = .020)
	Tweet interaction (%)	.27±.45 (.00)	.20±.21 (.16)	.82±.99 (.47)	.44±.69 (.18)	F(2,31) = 3.27, p = .051	---
	Engagement (%)	.16±.29 (.00)	.02±.02 (.01)	1.24±.2.34 (.49)	.49±1.47 (.04)	F(2,31) = 2.78, p = .078	---

	Conversations	.3±.3 (.2)	.2±.3 (.0)	.3±.3 (.3)	.3±.3 (.2)	F(2,31) = .58, *p* = .563	---
Popularity	Average number of retweets per tweet	1.0±1.5 (.3)	2.2±2.5 (1.0)	70.5±122.6 (7.1)	26.0±78.3 (1.7)	F(2,31) = 8.22, *p* = .001	Large > small (*p* = .002), large > medium (*p* = .008)
	Number of followers	640.6±944.4 (299.0)	3353.3±2355.8 (2821.0)	138684.5±311100.6 (5661.0)	50399.2±202302.3 (2687.5)	F(2,31) = 12.56, *p* < .001	Medium > small (*p* = .014), large > small (*p* < .001)

As far as Instagram profiles (Table 7) are concerned, while no difference was found in terms of number of posts, LM tend to use English language more than SM (*p*=.014). In terms of interactivity, no significant difference was found for number of comments, number of comments per post, post interaction and engagement. Finally, LM were found to be the most popular, with the highest number of fans compared to the MM (*p*=.018) and SM (*p*=.001).

Table 7. Content. interactivity and popularity of museums' Instagram profiles (mean ± SD (median)).

		Small (N=7)	**Medium** (N=14)	**Large** (N=12)	**Total** (N=33)	**F(df), p-value**	**Post-hoc analysis**
Content	Number of posts	17.4±16.2 (10.0)	38.8±30.1 (25.5)	41.2±44.3 (28.0)	35.1±34.4 (24.0)	F(2,30) = 1.57, *p* = .224	---
	Content in English (%)	.38±1.00 (.00)	34.78±46.60 (3.33)	58.02±45.33 (76.67)	35.51±44.87 (.00)	F(2,28) = 4.61, *p* = .019	Large > small (*p* = .014)
Interactivity	Number of comments	13.3±17.4 (4.0)	52.6±93.2 (14.0)	1507.2±3485.3 (50.5)	573.2±2166.4 (20.0)	F(2,30) = 2.42, *p* = .106	---
	Number of comments per post	.9±.6 (.6)	1.8±2.6 (.6)	22.0±40.3 (2.1)	8.9±25.7 (.8)	F(2,30) = 3.78, *p* = .078	---
	Post interaction (%)	4.04±3.33 (4.17)	2.90±1.83 (2.48)	3.04±1.87 (3.66)	3.19±2.20 (3.45)	F(2,30) = .62, *p* = .547	---
	Engagement (%)	.40±.69 (.04)	.31±.38 (.24)	.99±1.24 (.47)	.58±.88 (.28)	F(2, 30) = 2.64, *p* = .121	---
Popularity	Number of fans	954.0±1274.5 (556.0)	2546.0±2691.7 (1844.0)	43756.1±60931.3 (3349.0)	17193.8±41177.7 (1875.0)	F(2,30) = 8.68, *p* = .001	Large > small (*p* = .001), large > medium (*p* = .018)

Finally, as for YouTube (Table 8), LM tend to publish more videos than SM (p=.038), although no difference was found for English language use. In terms of interactivity, while no difference was found for number of views and number of views per video, videos posted by LM tend to receive more likes (p=.028), and a higher number of dislikes (p=.010) and comments (p=.043) than those by SM. No difference was found for number of likes, dislikes and comments per video, as well as for video interaction. Finally, LM tend to have a higher number of subscribers than MM (p=.047) and SM (p<.001).

Table 8. Content. interactivity and popularity of museums' YouTube channels (mean ± SD (median)).

		Small (N=11)	**Medium** (N=16)	**Large** (N=13)	**Total** (N=40)	**F(df), p-value**	**Post-hoc analysis**
Content	Number of videos	2.9±3.9 (2.0)	5.0±5.6 (3.5)	17.4±18.8 (14.0)	8.5±12.8 (3.0)	F(2,37) = 3.52, p = .040	Large > small, p = .038
	Content in English (%)	7.64±17.55 (.00)	33.44±41.09 (.00)	13.15±22.14 (.00)	20.02±31.83 (.00)	F(2,29) = .96, p = .397	---
Interactivity	Number of views	294.8±327.5 (131.0)	1396.9±1865.3 (684.0)	26402.1±59151.8 (1433.0)	9220.5±34984.9 (500.5)	F(2,37) = 2.38, p = .107	---
	Number of views per video	89.1±82.8 (83.0)	396.4±736.7 (142.4)	764.9±1325.6 (148.3)	431.7±906.5 (121.3)	F(2,37) = 1.24, p = .302	---
	Number of likes	7.5±7.2 (5.0)	55.4±101.2 (16.5)	649.5±1396.6 (41.0)	235.4±830.2 (14.0)	F(2,37) = 3.87, p = .030	Large > small (p = .028)
	Number of likes per video	2.8±3.2 (1.6)	16.6±44.9 (2.2)	19.1±32.5 (6.0)	13.6±33.9 (3.0)	F(2,37) = 1.77, p = .184	---
	Number of dislikes	.3±.6 (.0)	3.2±7.1 (,0)	28.6±58.0 (3.0)	10.7±34.8 (.0)	F(2,37) = 5.14, p = .011	Large > small (p = .010)
	Number of dislikes per video	.0±.1 (.0)	1.1±3.5 (,0)	.9±1.6 (.3)	.7±2.4 (.0)	F(2,37) = 1.85, p = .171	---
	Number of comments	1.0±2.4 (.0)	3.0±7.5 (.0)	39.9±109.2 (4.0)	14.5±63.3 (.0)	F(2,37) = 3.97, p = .028	Large > small (p = .043)
	Number of comments per video	0.2±0.4 (.0)	0.4±0.9 (.0)	1.6±4.1 (.2)	.7±2.3 (.0)	F(2,37) = 1.03, p = .368	---
	Post interaction (%)	.09±0.20 (.00)	.04±0.14 (.00)	.01±.02 (.00)	.04±0.14 (.00)	F(2,37) = 1.18, p = .318	---

Popularity	Number of subscribers	164.2±345.2 (33.0)	320.7±151.3 (332.0)	26927.1±54547.7 (538.0)	8907.5±32701.6 (280.0)	$F(2,34) = 10.27$, $p < .001$	Large > small ($p < .001$), large > medium ($p = .047$)

In order to further investigate museums and memorials' usage patterns and effectiveness on social media, we examined Spearman's correlations between several key social media metrics. Specifically, within each social media channel we analysed the associations between number of fans, number of posts (or videos, in the case of YouTube) and number of comments per post (or, in the case of Twitter, number of likes). These metrics can be considered indicators of popularity, interactivity, and amount of content provided, respectively. The associations are reported in Table 9.

Table 9. Spearman's correlations between key social media metrics for each social media channel. Correlations in bold are statistically significant for α = .05.

		Number of fans	Number of posts*
Facebook	Number of posts	**0.48**	-
	Comments per post	**0.86**	0.22
Twitter	Number of posts	**0.45**	-
	Likes per tweet	**0.68**	.40
Instagram	Number of posts	0.19	-
	Comments per post	**0.73**	**0.49**
YouTube	Number of videos	0.06	-
	Comments per video	0.22	**0.81**

*In the case of YouTube, 'posts' refers to 'videos'.

These results suggest that the number of posts (i.e., the amount of page activity) is associated with a higher number of fans for Facebook and Twitter, while no association is present for Instagram and YouTube.

The number of fans and the number of comments per post are highly correlated for Facebook, Twitter, and Instagram, as expected, while no correlation is present for YouTube. This is probably due to the fact that the average number of comments per video in the sample is very low (see Table 8).

Lastly, the number of posts is associated with the number of comments per post for Instagram and YouTube, but not for Facebook and Twitter (although, in the case of Twitter, the correlation is moderate and bordering significance).

We subsequently correlated the number of fans, the number of posts, and the number of comments per post across social media. Results are reported in Table 10.

Table 10. Spearman's correlations between key social media metrics across social media channels. Correlations in bold are statistically significant for α = .05.

	Number of fans	Number of posts/videos	Number of comments/likes per post/tweet

	Facebook	Twitter	Instagram	Facebook	Twitter	Instagram	Facebook	Twitter	Instagram
Twitter	**0.69**	-	-	0.09	-	-	**0.66**	-	-
Instagram	**0.68**	**0.86**	-	**0.59**	0.22	-	**0.53**	**0.48**	-
YouTube	**0.75**	**0.65**	**0.59**	0.35	0.03	0.32	0.27	0.09	**0.46**

These results show that popularity is highly associated between all social media channels: institutions that are popular on a social media platform are very likely to be popular on all social media. The amount of institutional activity conducted through social media platforms, however, is not associated. This suggests that institutions tend to concentrate their efforts on a limited number of platforms, rather than trying to be active on all of them. The only exceptions seem to be Facebook and Instagram, possibly due to the ease of porting content across these two platforms (which are run by the same company). Finally, as for user activity, we observe moderate correlations between all platforms except for YouTube.

Discussion

This study has sought to contribute to expanding knowledge of the use of social media by Holocaust museums through the investigation of attitudes, patterns of communication and user engagement in a large cohort of cultural institutions. In contrast to previous studies, which examined a smaller number of Holocaust museums (Dalziel, 2016; Lundrigan, 2020; Manca, 2021b; Manikowska, 2020; Wight, 2020, Zalewska, 2017) or in a limited geographical domain (Manca, 2019), the sample examined in this research study allows broader and more general considerations, as well as conclusions.

Through a triangulation of methodological tools based on quantitative data, social media for Holocaust memory explored in this study have been regarded as socio-technical-ecological systems in which digital memory practices are entangled with living world memory practices (Walden, 2021b). The adoption of a networked socio-ecological approach has made it possible to explore the micro-level dimensions of both museum and user engagement in the co-construction of intra-actions related to the development of digital Holocaust memories (Drotner & Schrøder, 2014; Reading, 2003; Walden, 2021a).

Regarding the first research question, which investigated attitudes and communication patterns, Holocaust museums seem to have embraced social media as one of the most important tools available for communicating with the public. It appears that Facebook and Instagram are the predominately used social media platforms, while YouTube is found quite useful. Unlike other studies that have investigated users' propensity to interact with museums in social media (Ruggiero, Lombardi, & Russo, 2021), here we have primarily focused on museums' attitudes and intentions. We found that overall attitude towards social media, despite noticeable differences between the museums, is overwhelmingly favourable. Results from survey items investigating attitudes paint a consistent picture in which large and medium-sized institutions tend to view social media more favourably than smaller museums, but even small institutions demonstrate overall favourable attitudes. Still, the concerns expressed by the latter - such as conflicting roles and lack of

resources - need careful consideration. Previous studies show that museums with the fewest available resources for social media activities are also less likely to commit to social media engagement (Booth, Ogundipe, & Røyseng, 2020). In our sample, this is also evidenced by the fact that the only institutions that reported not using social media are all small museums. These institutions have limited staff, a highly localized audience and possibly low technological and digital skills, which are required for social media communication. As stressed in previous studies (Agostino & Arnaboldi, 2021), lack of social media competencies prevents museums from offering real-time data for visitor entertainment and interaction, as well as dialogue between the museum and its online visitors. Future studies should examine in greater detail the obstacles that prevent smaller Holocaust institutions from embracing social media as part of an ongoing generational change accelerated by the pandemic (Ebbrecht-Hartmann, 2021). They should also investigate the factors that keep larger ones from expanding their plethora of platforms and diversifying their communication strategies according to the perceived key target audiences of each platform. However, as reported in recent studies (Barrutia & Echebarria, 2021), the COVID-19 pandemic is accelerating the digital transformation of many sectors and a progressive ability to use ICT can be expected also in those museums that so far have had fewer resources at their disposal. In this light, future studies should also consider how functional and emotional values, which underpin the marketing strategies of cultural institutions as well, drive the choice of which social platforms to invest in most (Kato, 2021). In this sense, as social media use and social media validation positively influence public entities' brand value (Nguyen, Tran, & Baker, 2021), museums are likely to invest more in the use and monitoring of these platforms. As highlighted recently, even though the central core of these memory institutions remains their educational mission and their function in mediating memory of the past (Morrow, 2016), it is important to stress that professionalization and commercialization of museums and memorials of genocide and crimes against humanity have become requirements for "making the past present" and "the local global" (Björkdahl & Kappler, 2019).

As for the type of content being published, respondents report that educational content, information regarding educational events, and information regarding institutional activities are the most frequently posted types of content, consistently with museums' role as providers of education and awareness regarding the Holocaust. Hashtag campaigns, which are commonly used on Twitter and Instagram but not so much on Facebook, are not very frequent in postings by these museums, probably for the very reason that their prevalent platform is Facebook. However, it is expected that this mode of communication may increase in the future, as underlined by other initiatives in the field of cultural heritage (Uimonen, 2020) and in recent initiatives by Holocaust organisations (Walden, 2021b). Materials countering Holocaust distortion are also infrequently posted, which is in contrast with museums' shared commitment to counter Holocaust distortion, and may be related to the concerns about politicization and political attacks (Manikowska, 2020). However, future investigation is needed to understand how marketing strategies combine with the educational mission in general and specifically with the purpose of countering distortion in social media. In addition, we found

that fundraising campaigns are rarely posted on social media, although they are expected to grow in the near future as they can also be seen as a powerful mode of outreach (Barnes, 2019). Finally, institutions of all sizes seem to post all types of content with the same frequency, with the exception of educational content, which is more frequently shared by larger institutions, possibly because its production requires resources and effort (Booth, Ogundipe, & Røyseng, 2020).

In terms of the second research question, which analysed levels of activity, user interaction and popularity, a number of social media metrics were used to extract patterns of shared content, interactivity and popularity, and to counter possible biases while administering a survey-based research methodology (Kar & Dwivedi, 2020). Although there may be concerns about using metrics to derive meaningful information about memory of the past on social media, social media spaces have facilitated the counting of memories and have moved into the domain of remembrance (Jacobsen & Beer, 2021). This has become particularly significant in the field of memory studies and specifically in Holocaust memory (Garde-Hansen, Hoskins, & Reading, 2009; Hoskins, 2018), in which digital and non-digital memory related to the Holocaust are increasingly intertwined, with one shaping the other (Kansteiner, 2017; Walden, 2019). In this perspective, if Holocaust memory may be considered as a digital phenomenon or intra-action between a multitude of actants (Walden, 2021a), where communication protocols and interface interaction between users and social media profiles are all entangled and contribute to the development of digital Holocaust memory in specific cultural contexts (Walden, 2021b), it is important to investigate what happens at the micro-level of user experience.

If we look at content metrics for the various platforms examined, it emerges that the amount of content published on the three most interactive platforms (Facebook, Twitter and Instagram) shows similar trends, except for activity on Twitter, which is more intense for larger institutions. This discrepancy can be explained not only by the more dynamic nature of Twitter, which acts as a quick way to disseminate information (Ahn, Son, & Chung, 2021), but also by the greater 'political' and civic engagement that large institutions tend to have on this platform (Meier, Bazo, & Elsweiler, 2022; Waeterloos, Walrave, & Ponnet, 2021). In line with previous studies (Manca, 2021b), the case of the Auschwitz-Birkenau museum is emblematic for the preponderance of tweets it attracts compared to the other two large institutions analysed (Yad Vashem and the United States Holocaust Memorial Museum), testifying to the intense activity of the Polish museum in conducting Twitter campaigns against Holocaust denial and antisemitism (Manikowska, 2020).

Interestingly, when considering the languages being used by the different museums, no significant differences by institution size were found in terms of English being used as the main language for communication. For example, the Facebook page of the Buchenwald Memorial, despite its size, publishes close to none of its content in English, relying on Facebooks' built-in automatic translation. Yet, English continues to be a dominant language in the context of the investigated social media channels. Consequently, in order to further contribute to the "virtual Holocaust memory" (Walden, 2019), one might expect that museums - and especially large institutions with an international audience - would decide to post at least

part of their information and materials in English, so as to enable a wider audience to read and understand their contributions (Bartolini, 2015).

Regarding Interaction metrics, Facebook posts tend to receive more reactions than Twitter posts, although great diversity in terms of reactions/likes was observed across the three groups. Post interaction was found to be higher on Instagram than on the other three platforms. This is also in line with the metrics of Engagement, which is found to be greater on Instagram. One explanation might be that, on Instagram, user experience is enhanced by widespread use of pictures, short videos and stories, contributing to a higher rate of engagement than on Facebook and Twitter and more average interactions per post, as also reported in previous studies (Manca, 2021b) and in other research areas (Casaló, Flavián, & Ibáñez-Sánchez, 2017; Gruzd, Lannigan, & Quigley, 2018). However, further research is still needed to investigate how the format of a post, its language and its content all affect the level and nature of user engagement with the content (Laor & Steinfeld, 2018), as well as how high accessibility influences remoted people across the diverse countries (Laor, 2019).

If we look at popularity metrics, large museums are a "high card" that tends to aggregate most of the interest. With the exception of the Auschwitz-Birkenau museum's Twitter profile, which accounts for more than one million followers, most of the following is on Facebook. However, we also found that the popularity of an institution's Instagram page or YouTube channel is more likely to be led by the institution's offline fame than by its level of activity. For example, the three most outstanding institutions in terms of fans/posts ratio on Instagram are the Auschwitz-Birkenau State Museum, the concentration camp memorial site of Dachau, and Anne Frank's house – all widely known institutions, whose fame alone may lead to attracting a larger number of fans even with relatively little online activity. The level of activity, however, is associated to the number of fans for Facebook and Twitter, which means that these social media dynamics could probably reward a bit more those institutions that show an active involvement in managing their institutional page. This is also highlighted by the fact that for Instagram and YouTube the amount of content does not promote page popularity, but it does increase the amount of interactivity (although, as noted, for YouTube interactivity is usually very low). In the case of Facebook, this association does not occur, perhaps suggesting that Facebook's readership is relatively more passive: easier to engage on a superficial level (subscribing to the page), but harder to engage on a deeper level (having post conversations). Although this tendency has been analysed as a general phenomenon (Ellison, Triệu, Schoenebeck, Brewer, & Israni, 2020), future studies should investigate what is the main target group interested in following these types of pages and profiles, and their socio-demographic characteristics.

Despite considerable numbers of fans and followers, overall engagement and interaction remain low on all analysed platforms, and the percentage of comments and reactions from Facebook pages with respect to user comments is equally low. Comments and interactions were found to be particularly scarse on YouTube, where comments are often disabled, and users are overall far less likely to leave comments (Liao & Mak,

2019). If interaction with users remains limited, as reported in previous studies (Manca, 2019; 2021b) and in the cultural heritage sector (Arnaboldi & Diaz Lema, 2021; Capriotti, Carretón, & Castillo, 2016), the management of contentious contents is still a complex and delicate issue for this type of museum, mainly preoccupied with limiting cases of denial, distortion, misuse, and superficial representations. Some scholars have emphasised the "passivity" of Holocaust institutions, resulting from fear of trivialization or distortion, and the risk of harbouring conflicting memories (de Smale, 2020; Katz, 2016), which might in turn have brought about an over-cautious attitude by Holocaust agencies in soliciting users' interaction. These institutions would prefer one-directional communication and the broadcasting of a "carefully shaped, widely acceptable message via social media" (Kansteiner, 2017, p. 324).

However, new memory ecologies developed in digital technologies are starting to question this cautiousness concerning the interactive and participatory potentials of social media use (Maben & Gearhart, 2018). Memory ecologies heavily rely on the participation of users, by implicating them in the process (Hoskins, 2016; 2018). While Holocaust museums act as gatekeepers of Holocaust memory or as "Holocaust police" (Dalziel, 2021), they are also expected to overcome their hesitancy about the "produser" culture of social media (Jenkins, Ford & Green, 2013) and enable potential visitors to become ethical and active co-producers of memory within participatory cultures (Walden, 2021b). As recently stated, it has become a priority "to find constructive ways to negotiate between necessary security measures and still encouraging critical thinking and networking within and beyond these events" (Walden, 2021c, p. 12).

Increasing digitalization will probably result in a "paradigm shift" (Zalewska, 2017) and new forms of Holocaust memory will be observed in the future (Ebbrecht-Hartmann, 2021). Further studies should monitor these transformations, which were already apparent in recent Instagram projects (Henig & Ebbrecht-Hartmann, 2020). As stressed by Ebbrecht-Hartmann and Divon (2020), in their provocative title "Let TikTok Creators Pretend to Be Victims of the Nazis. It Strengthens Holocaust Memory", however, "a new, creative and necessary kind of testimony is emerging" (p. n.a.). There is much we need to understand even about these "provocative" forms of Holocaust remembrance, especially created by younger generations.

Limitations and Conclusions

Along with the positive insights outlined above, a number of limitations need to be highlighted. The difficulty in obtaining a higher number of answers might have been caused by using the institutions' general email address (e.g. info@), which in times of lockdown and prolonged museum closure may not have been checked regularly. Furthermore, the study sample generated for this review was self-selected and hence possibly biased in terms of (either positive or negative) interest and perceived importance of the topic. Another limitation of the study is strictly derived from the research method, based on self-reporting and quantitative analyses. Although we have highlighted the growing importance of metrics usage in assessing the engagement and reconstruction of the digital past in multiple ways (Jacobsen & Beer, 2021), future studies

should also adopt mixed-method research approaches that combine computational and data-driven methods with narrative approaches based on ethnographic and auto-ethnographic observations, content analysis and other qualitative research methods (Kozinets, 2020). In this light, interviews with museums' social media staff and heads of communication, along with investigation of the views of users through targeted surveys, may help to obtain a broader and more complete picture of digital memory practices and learning benefits on issues concerning memory of the past and its relevance for the present. Content analysis may contribute to exploring the content of social media engagement and the nature of online interaction in greater detail, by investigating the most frequent kinds of debate that occur in social media and how social media content is framed within each museum.

Another line of research that deserves greater attention is that of learning. The IHRA (2019), for example, recommends deploying social media in Holocaust education, which may pave the way for engaging forms of teaching and learning about the subject. As stressed in recent reviews, although Holocaust remembrance is a well-established research field, very few studies or theoretical works are available about social media use for Holocaust teaching and learning (Manca, 2021a). This is of paramount importance if we consider that museums are playing an increasingly important role in out-of-school and informal learning (Ennes, 2021) and that education, whether in formal or informal learning settings, remains at the heart of Holocaust museums' mission.

Credit author statement

Stefania Manca: Conceptualisation, Methodology, Formal analysis, Funding acquisition, Project administration, Resources, Data curation, Supervision, Writing – original draft, Writing – review & editing, Marcello Passarelli: Conceptualisation, Methodology, Formal analysis, Data curation, Software, Writing – review & editing, Martin Rehm: Conceptualisation, Methodology, Formal analysis, Data curation, Software, Writing – review & editing

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