

2º CICLO
MESTRADO EM MEDICINA LEGAL

Discurso público sobre o voluntariado nas prisões: um estudo infodemiológico de dados do Twitter

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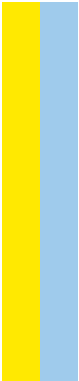


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Abstract

Background: Worldwide volunteering plays a key role in helping people face different challenges. Volunteering in prisons contributes to the rehabilitation and reintegration of prisoners during their time in jail and in society when they are released. However, little is known about the general population's attitudes towards volunteering in prison.

Methods: We conducted a content analysis of publicly available data on the social network Twitter during the period from 1st January 2017 to 31st October 2022. A pre-trained network called BERTWEET has been utilised to classify tweets related to volunteering in prisons into different categories. The codebook used for this study consisted of classifying tweets according to the type of content (Volunteering opportunities, Volunteering experiences, Prisoners as providers of volunteering, Prisoners as recipients of volunteering, Volunteering as an alternative to jail time or to reduce sentenced time, and Volunteering impact); and type of user (Prisoners who provide volunteering support to others, Volunteers who provide support to prisoners or unidentified users). An emotion analysis and type of content by continent were also conducted. The number of retweets and likes generated by each tweet was analysed as an indicator of user interest.

Results: A total of 101,349 tweets in English and 5,001 tweets in Portuguese were considered classifiable. Regarding the type of content, 'Volunteering as an alternative to jail time or reduced sentence time' was the topic that generated the most tweets and 'Volunteering impact' was the topic that generated the least in both English as well as Portuguese tweets. Concerning emotion analysis, angry emotions were the most expressed by the users. America was the continent with more tweets; in both English and Portuguese tweets, the average number of likes per tweet is higher than the average number of retweets.

Conclusions: This study is the first application of social media research to investigate the public discourse about volunteering in prisons. Overall, public attitudes towards volunteering in prisons are negative. Continued efforts are required to raise awareness about volunteering in prisons.

Keywords: Volunteering; Prisons; Social Media; Twitter; Attitudes

Resumo

Contexto: O voluntariado mundial desempenha um papel fulcral ao ajudar pessoas que enfrentam diferentes desafios. O voluntariado nas prisões contribui para a reabilitação e reintegração dos inclusos durante a sua permanência na prisão como também quando voltam a estar inseridos na sociedade. No entanto, pouco se sabe sobre as atitudes da população em geral relativamente ao voluntário nas prisões.

Métodos: Nós realizámos uma análise de conteúdo de dados publicamente disponíveis da rede social Twitter durante o período de 1 de Janeiro de 2017 a 31 de Outubro de 2022. Uma rede pré-treinada chamada BERTWEET foi utilizada para classificar tweets relacionados com o voluntário nas prisões em diferentes categorias. O livro de códigos utilizado para este estudo consistiu na classificação dos tweets de acordo com o tipo de conteúdo (Oportunidades de voluntariado, Experiências de voluntariado, Prisioneiros como provedores de voluntariado, Prisioneiros como destinatários de voluntariado, Voluntariado como alternativa à prisão ou para reduzir o tempo de sentença e Impacto do voluntariado); e tipo de usuário (Reclusos que prestam apoio voluntário a outros, Voluntários que prestam apoio a reclusos e usuários não identificados). Também foram realizadas uma análise de emoção e uma análise do tipo de conteúdo por continente. O número de retweets e gostos gerados por cada tweet foi analisado como indicador de interesse do usuário.

Resultados: Um total de 101.349 tweets em inglês e 5.001 tweets em português foram considerados como classificáveis. Em relação ao tipo de conteúdo, 'Voluntariado como alternativa à prisão ou para reduzir o tempo de sentença' foi o tópico que gerou mais tweets e o 'Impacto do voluntariado' foi o tópico que gerou menos tweets em inglês e português. No que diz respeito à análise das emoções, a raiva foi a que foi mais expressa pelos usuários. A América foi o continente que originou mais tweets. Tanto nos tweets em inglês como nos portugueses, o número médio de gostos por tweet é superior ao número médio de retweets.

Conclusões: Este estudo é a primeira aplicação de pesquisa numa rede social para investigar o discurso público sobre o voluntariado nas prisões. No geral, as atitudes públicas em relação ao voluntariado nas prisões são negativas. Esforços contínuos são necessários para aumentar a conscientização sobre o voluntariado nas prisões.

Keywords: Voluntariado; Prisões; Rede Social; Twitter; Atitudes

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Introduction

Worldwide volunteering plays a key role in society by providing support to people in need. Different volunteering organisations have distinct approaches and support different groups and communities, including people in prison (Chui & Cheng, 2012; Kort-Butler & Malone, 2014; Wu et al., 2023). Volunteering contributes to the rehabilitation and reintegration of prisoners into the prison community and the wider society (Volpris, 2020), and supports prisoners, ex-offenders, their families, and victims of crime (Justice Involving Volunteers in Europe, 2016).

A recent systematic review has identified that research on volunteering in prisons is limited (Wu et al., 2023). Whilst previous research has investigated the motivations, experiences, satisfaction, and attitudes of volunteers in prison (Chui & Cheng, 2012; Salselas & Pinto da Costa, 2021), much of this research has focused on religiously oriented volunteering and examined the value of faith-based programs in prison (Chui & Cheng, 2013; Kort-Butler & Malone, 2014).

Research has shown that feelings of prejudice and discrimination compromise prisoners' rehabilitation and reintegration and increase their chance of recidivism (Henry & Jacobs, 2007; Maxwell & Mallon, 1997; Potuto, 1980; Uggen et al., 2013). Previous studies show volunteers' positive impact on inmates' attitudes during their time in prison and in their rehabilitation and reintegration into society; this positive impact can also be seen in volunteers (Chui & Cheng, 2012; Kort-Butler & Malone, 2014; Schuhmann et al., 2018; Tewksbury & Dabney, 2004).

Therefore, it is paramount to investigate the attitudes of the general population and their public discourse towards volunteering in prisons. Online social networks play an important role in how people communicate and connect with others, and how they spread awareness, opinions, and knowledge (de Anta et al., 2023). On Twitter, users can retweet and like a tweet to reach a wider audience, add hashtags to identify a certain theme or allow others to see related tweets, thus providing open and easy access to its public content. This study aimed to identify the public discourse of Twitter users towards Volunteering in prisons.

Methods

Research strategy

The search for tweets was done by combining keywords from two groups. The first group was related to 'volunteering': volunteerism, voluntary, volunteer, volunteering, volunteer caregiver, community service, community involvement, volunteer training, citizen volunteer; and the second group was related to 'prisons': jail, prison, inmates, prisoners, sentenced, imprisonment, imprisoned, incarcerated, incarceration, sex offenders, sexual assault, manslaughter, robbery, drug dealers, drugs, larceny, felony, homicide, criminals, convicted, convict, arson, child abuse, cybercrime, online fraud, theft, domestic abuse, burglary, fraud, violent crime, DUI (driving under the influence), correctional facilities, correctional institution, offender, criminal convict, felon, criminal offender, terrorism, hate crime.

The inclusion criteria for tweets were: (i) being public, (ii) using any of the previously mentioned keywords, (iii) being posted from 1st January 2017 to 31st October 2022, and (iv) being posted in English or Portuguese. The exclusion criteria were (i) being posted in another language that is not English or Portuguese, (ii) having limited information, and (iii) including unrelated content. The date and time of each tweet were collected as well as the permanent link to the tweet and the number of likes and retweets each tweet generated, and each user's profile description.

To identify and collect tweets based on the selected keywords, we used Tweet Binder, a search engine that has access to 100% of public tweets that match the intended query (Morstatter et al., 2013).

Content analysis process

All retrieved tweets were included in two datasets separated by language. We manually analysed 900 tweets in English and 600 in Portuguese using a content analysis procedure involving the creation of codes and categories. To characterize each tweet a codebook was developed, and afterwards, each tweet was analysed according to the inclusion and exclusion criteria. The included categories were: i) type of content (Volunteering opportunities, Volunteering experiences, Prisoners as providers of volunteering, Prisoners as recipients of volunteering, Volunteering as an alternative to jail time or to reduce sentenced time, and Volunteering impact), although a tweet could fit into more than one category; and ii) type of user (Prisoners who provide volunteering support to others, Volunteers who provide support

to prisoners and unidentified user). Table 1 provides a detailed description of the categories and examples of tweets.

Table 1. Category, definitions and examples of classification. Usernames and personal names were removed.

CATEGORY	DEFINITION	EXAMPLES OF TWEETS
<i>Unclassifiable</i>	Tweets not related to the inclusion criteria of the research strategy	@fiq_skyrover Bukan kata nak "backup" ada yang diorang buat tapi kita kena ada cara untuk membantu mereka juga kan? Itulah apa yang disebut "alternative sentence" — drug rehab community service etc.Kalau tidak lepas penjara dia akan terus salahguna dadah lagi..."
<i>Volunteering opportunities</i>	Tweets about voluntary opportunities and activities such as conferences, programs, courses, and educational information related to volunteering in prison	"Interested in volunteering your time to tutor people currently incarcerated? Check out this opportunity for next fall with @PeteyGreeneProg! https://t.co/3BxBbSqHkv "
<i>Volunteering experiences</i>	Tweets from volunteers, prisoners, or families/friends where they share experiences about volunteering in prisons	"Volunteering with @NonameBooks & mailing out 1000+ books to our incarcerated comrades today ✨"
<i>Prisoners as providers of volunteering</i>	Tweets related to prisoners doing or incentivizing prisoners to do volunteering/community service	"#WhenIwas18 and in prison I had no idea I would discover volunteering - that would lead me towards employment & a fulfilling and happy life. I was told I'd come to nothing as I grew up but I've travelled the world and made a positive impact for others in the system & as a Carer https://t.co/dphpwhJuGz "
<i>Prisoners as recipients of volunteering</i>	Tweets related to prisoners receiving volunteering	"@StanleyRoberts For over 15 years I've had the privilege of volunteering w/formerly incarcerated women/recovering addicts. I've learned from them until an addict is ready...hits 'their' rock bottom...no one and nothing can make them stop (perhaps temporarily). #lostlives #womeninrecovery"
<i>Volunteering as jail time alternative or to reduce sentenced time</i>	Tweets that mention volunteering/community service as an alternative to jail time or to reduce the sentence time	"Probably 90% of the people in jail could just be released back to their family today without any negative effect on society. Small time drug charges or theft...fuck it...not worth locking someone in a cage for. Make em do community service instead. https://t.co/se5FDHf4cc "
<i>Volunteering impact</i>	Tweets that express the impact of volunteering on volunteers, prisoners and others	"@WhiteHouse Volunteering with the formerly incarcerated in a program to help them develop job interview skills in NYC was one of best things I've done with my life. I highly recommend such experiences."

From all the retrieved tweets (i.e. 183,071 in English and 25,079 in Portuguese), a total of 101,349 in English and 5,001 in Portuguese were considered classifiable. From the classifiable tweets in English, 62,773 had geolocation available and from the classifiable tweets in Portuguese, 2,948 had geolocation. Figure 1 shows a flowchart illustrating the process followed for the analysis of the tweets, and the number of tweets included and excluded for each language.

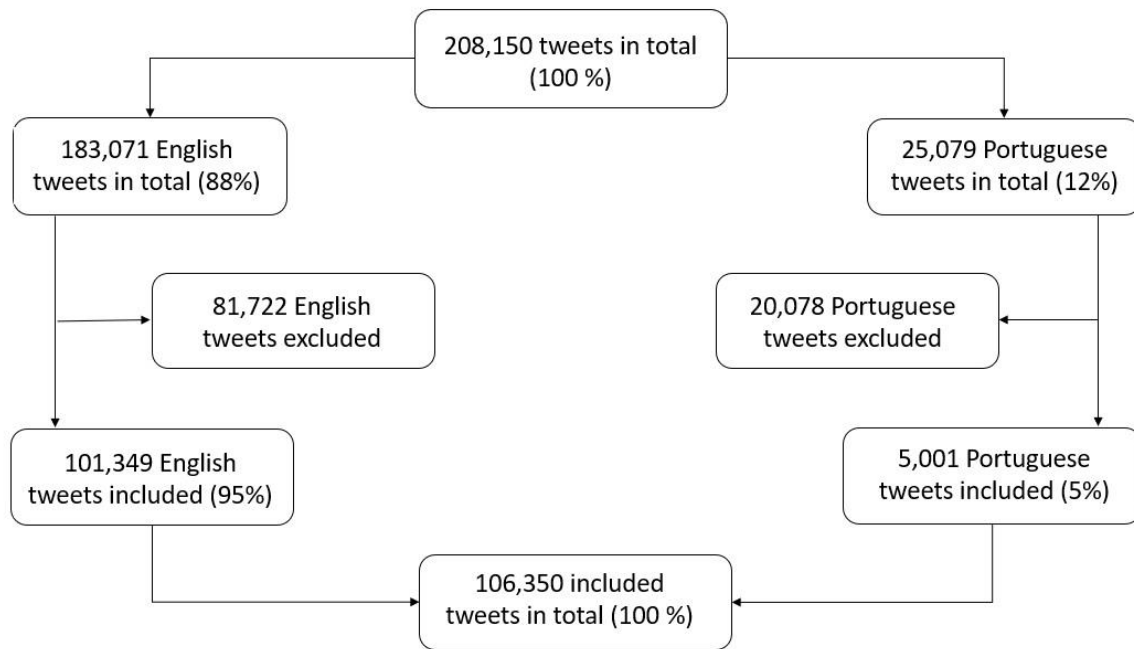


Figure 1. Flowchart

Use of artificial intelligence to evaluate tweets

In this study, a pre-trained network called BERTWEET, trained on 850 million English tweets, has been utilised to classify tweets related to volunteering in prisons into different categories (Nguyen et al., 2020).

Before implementing the BERTWEET network, the database underwent preprocessing. Non-English tweets were translated to English using Google Translator since the network is exclusively trained on English tweets. The tweets were then normalized by removing special characters, splitting negative contractions, and eliminating repeated characters. As the BERTWEET network is not originally trained for the specific categories required, a process called fine-tuning was necessary. The manually classified tweets were randomly divided into two subsets: an 80% training subset and a 20% testing subset. The training subset was used to fine-tune the network, while the testing subset validated the performance of the fine-tuned

BERTWEET model on our database. This methodology has been previously employed with positive outcomes (de Anta et al., 2023). The fine-tuned BERTWEET model was then used to categorise the tweets that were yet to be classified. Additionally, we analysed the emotions expressed in the tweets using a pre-trained neural network called emotion-english-distilroberta-base (Hartmann, 2022). This neural network, previously trained for the same purpose, does not require a fine-tuning phase. The emotion-english-distilroberta-base network is capable of detecting Ekman's seven emotions, that is six basic emotions (Ekman, 1999), besides the neutral. This network has been utilised in prior research studies (Butt et al., 2022; Rozado et al., 2022). The emotion-english-distilroberta-base model was applied to the classifiable tweets.

Statistical analysis

The frequency distribution of tweets, and the number of retweets and likes generated by each tweet (as an indicator of user interest) across various categories based on tweet characteristics were analysed. The results showed the average number of likes and retweets in each category. To compare the proportion of tweets between categories, Pearson's chi-square test was utilised, yielding a p-value indicating statistical significance.

All p values presented were two-tailed; <0.05 was considered statistically significant. Analyses were performed using STATA version 16.0 (Stata Corp, College Station, TX).

Ethical considerations

This study was approved by the Ethics Committee of the Institute of Biomedical Sciences Abel Salazar of University of Porto with the reference 2023/CE/P01(P399/CETI/ICBAS).

Results

Type of content by user type

Concerning the tweets in English, the most frequent content discussed by prisoners was about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=3,775/4,546, 83%), followed by 'Prisoners as providers of volunteering' (N=785/4,546, 17.3%) and 'Volunteering experiences' (N=292/4,546, 6.42%). The volunteers posted the most

about 'Prisoners as recipients of volunteering' (N=2,273/3,004, 75.7%), followed by 'Volunteering experiences' (N=2,176/3,004, 72.4%) and then 'Volunteering opportunities' (N=1,628/3,004, 54.1%). The unidentified users most frequently covered content on 'Volunteering as an alternative to jail time or reduced sentence time' (N=84,867/93,799, 90.5%), 'Prisoners as providers of volunteering' (N=12,321/93,799, 13.1%), and 'Volunteering opportunities' (N=1,974/93,799, 2.1%). The type of content with the highest total in tweets is 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=88,654/101,349, 87.5%) and the one with the lowest total in tweets is 'Volunteering impact' (N=1,386/101,349, 1.37%). Table 1 provides the full details.

Table 1. Results of the type of content according to the type of user (English tweets).

Type of user	Type of content											
	Volunteering opportunities N (%)		Volunteering experiences N (%)		Prisoners as providers of volunteering N (%)		Prisoners as recipients of volunteering N (%)		Volunteering as an alternative to jail time or to reduce sentenced time N (%)		Volunteering impact N (%)	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Prisoners	4,500 (4.61%)	46 (1.26%)	4,254 (4.4%)	292 (7.59%)	3,761 (4.3%)	785 (5.7%)	4,431 (4.51%)	115 (3.8%)	771 (6.07%)	3,775 (4.3%)	4,496 (4.5%)	50 (3.6%)
Volunteers	1,376 (1.41%)	1,628 (44.6%)	828 (0.8%)	2,176 (56.6%)	2,391 (2.7%)	613 (4.47%)	731 (0.74%)	2,273 (75.4%)	2,992 (23.6%)	12 (0.0%)	2,193 (2.2%)	811 (58.5%)
Unidentified	91,825 (93.9%)	1,974 (54.1%)	92,422 (94.8%)	1,377 (35.8%)	81,478 (92.9%)	12,321 (89.8%)	93,174 (94.8%)	625 (20.7%)	8,932 (70.4%)	84,867 (95.7%)	93,274 (93.3%)	525 (37.9%)
Total	97,701 (100%)	3,648 (100%)	97,504 (100%)	3,845 (100%)	87,630 (100%)	13,719 (100%)	98,336 (100%)	3,013 (100%)	12,695 (100%)	88,654 (100%)	99,963 (100%)	1,386 (100%)
P value		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001

Regarding the tweets in Portuguese, the content most covered by prisoners was 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=191/404, 47.3%%), followed by 'Prisoners as providers of volunteering' (N=149/404, 36.9%) and 'Volunteering experiences' (N=117/404, 29%). The volunteers discussed most about 'Prisoners as recipients of volunteering' (N=144/280, 51.4%), followed by 'Volunteering experiences' (N=142/280, 50.7%) and 'Prisoners as providers of volunteering' (N=97/280, 34.6%). The unidentified users discussed the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=2,719/4,317, 63%), 'Prisoners as providers of volunteering' (N=1,335/4,317, 30.9%), 'Volunteering experiences' (N=345/4,317, 8%). The type of content with the most tweets is 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=2,913/5,001, 58.3%) and the one with the least tweets is 'Volunteering impact' (N=114/5,001, 2.3%). Table 2 provides the full details.

Table 2. Results of the type of content according to the type of user (Portuguese tweets).

Type of user	Type of content											
	Volunteering opportunities N (%)		Volunteering experiences N (%)		Prisoners as providers of volunteering N (%)		Prisoners as recipients of volunteering N (%)		Volunteering as an alternative to jail time or to reduce sentenced time N (%)		Volunteering impact N (%)	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Prisoners	398 (8.3%)	6 (2.82%)	287 (6.5%)	117 (19.4%)	255 (7.5%)	149 (9.4%)	322 (7.1%)	82 (17.1%)	213 (10.2%)	191 (6.6)	360 (7.4)	44 (38.6)
Volunteers	247 (5.2%)	33 (15.5%)	138 (3.1%)	142 (23.5%)	183 (5.4%)	97 (6.1%)	136 (3%)	144 (29.9)	277 (13.3%)	3 (0.1%)	245 (5%)	35 (30.7%)
Unidentified	4,143 (86.5%)	174 (81.7%)	3,972 (90.33%)	345 (57.1%)	2,982 (87.2%)	1,335 (84.4%)	4,062 (89.9%)	255 (53%)	1,598 (76.5%)	2,719 (93.3%)	4,282 (87.6%)	35 (30.7%)
Total	4,788 (100%)	213 (100%)	4,937 (100%)	604 (100%)	3,420 (100%)	1,581 (100%)	4,520 (100%)	481 (100%)	2,088 (100%)	2,913 (100%)	4,887 (100%)	114 (100%)
P value		<0.001		<0.001		0.026		<0.001		<0.001		<0.001

There are statistically significant differences in the proportion of users involved in each topic in the English and Portuguese tweets.

Emotion analysis based on user type

Concerning the Tweets in English, the most frequent emotion reported by prisoners was sadness (N=1,498/4,546, 33%), followed by anger (N=925/4,546, 20.4%) and neutral (N=836/4,546, 18.4%); for volunteers, the most frequent emotion was joy (N=961/3,004, 32.0%), followed by neutral (N=801/3,004, 26.7%) and fear (N=643/3,004, 21.4%); for the unidentified users the most frequent emotion was anger (N=32,135/93,799, 34.3%), followed by sadness (N=25,598/93,799, 27.3%) and neutral (N=18,247/93,799, 19.5%). Overall, the most frequent emotion was 'anger' (N=33,225/101,349, 32.8%). Table 3 provides full details of the emotion distribution in English Tweets based on user type.

Table 3. Results of the emotion analysis; English tweets.

Type of user	Emotions							
	Anger N (%)	Disgust N (%)	Fear N (%)	Joy N (%)	Neutral N (%)	Sadness N (%)	Surprise N (%)	Total N (%)
Prisoners	925 (20.4%)	108 (2.4%)	325 (7.2%)	530 (11.7%)	836 (18.4%)	1,498 (33%)	324 (7.1%)	4,546 (100%)
Volunteers	165 (5.5%)	26 (0.8%)	643 (21.4%)	961 (32%)	801 (26.7%)	292 (9.7%)	116 (3.9%)	3,004 (100%)
Unidentified	32,135 (34.3%)	2,053 (2.2%)	7,782 (8.3%)	3,025 (3.2%)	18,247 (19.5%)	25,598 (27.3%)	4,959 (5.3%)	93,799 (100%)
Total	33,225 (32.8)	2,187 (2.2%)	8,750 (8.6%)	4,516 (4.5%)	19,884 (19.6%)	27,388 (27%)	5,399 (5.3%)	101,349 (100%)
P value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Regarding the Tweets in Portuguese, the most frequent emotion for prisoners was sadness (N=107/404, 26.5%), followed by joy (N=79/404, 19.6%) and neutral (N=77/404, 19.1%); for the volunteers the tweets were most frequently neutral (N=77/208, 27.5%), followed by emotions of joy (N=59/208, 21.1%) and sadness (N=53/208, 18.9%); and for the unidentified users, the most frequent emotion was anger (N=1,586/4,317, 36.7%), followed by neutral (N=997/4,317, 23.1%) and sadness (N=890/4,317, 20.2%). Overall, the most frequent emotion was 'anger' (N=1,697/5,001, 33.9%). Table 4 provides full details of the emotion distribution in Portuguese Tweets based on user type.

Table 4. Results of the emotion analysis; Portuguese tweets.

Type of user	Emotions							
	Anger N (%)	Disgust N (%)	Fear N (%)	Joy N (%)	Neutral N (%)	Sadness N (%)	Surprise N (%)	Total N (%)
Prisoners	70 (17.3%)	16 (4%)	36 (8.9%)	79 (19.6%)	77 (19.1%)	107 (26.5%)	19 (4.7%)	404 (100%)
Volunteers	41 (14.6%)	9 (3.2%)	29 (10.4%)	59 (21.1%)	77 (27.5%)	53 (18.9%)	12 (4.3%)	208 (100%)
Unidentified	1,586 (36.7%)	202 (4.7%)	294 (6.8%)	172 (4%)	997 (23.1%)	890 (20.6%)	176 (4.1%)	4,317 (100%)
Total	1,697 (33.9%)	227 (4.5%)	359 (7.2%)	310 (6.2%)	1,151 (23%)	1,050 (21%)	207 (4.1%)	5,001 (100%)
P value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

There are statistically significant differences in the expression of emotions among different types of users in both English and Portuguese tweets.

Type of content by continent

Regarding the geolocation of tweets, with respect to tweets in English, users in Africa tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=4,697/5,155, 91.1%) and the least about 'Volunteering impact' (N=52/5,155, 1%); users in America tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=35,508/41,016, 86.6%) and the least about 'Volunteering impact' (N=621/41,016, 1.5%); users in Asia tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=2,715/3,172, 85.6%) and the least about 'Volunteering impact' (N=20/3,172, 0.6%); users in Europe tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=9,554/11,419, 83.7%) and the least about 'Volunteering impact' (N=355/11,419, 3.1%); and lastly, users in Oceania tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=1,781/2,011, 88.6%) and the least about 'Volunteering impact' (N=38/2,011, 1.9%). The type of content with the highest total in tweets is 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=54,255/62,773, 86.4%). Table 5 provides the full details.

Table 5. Results of the type of content by continent (English tweets)

Continents	Type of content											
	Volunteering opportunities N (%)		Volunteering experiences N (%)		Prisoners as providers of volunteering N (%)		Prisoners as recipients of volunteering N (%)		Volunteering as an alternative to jail time or to reduce sentenced time N (%)		Volunteering impact N (%)	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Africa	5,003 (97.1%)	152 (2.9%)	5,023 (97.5%)	132 (2.5%)	4,693 (91%)	462 (9%)	5,080 (98.5%)	75 (1.5%)	458 (8.9%)	4,697 (91.1%)	5,103 (99%)	52 (1%)
America	39,193 (95.6%)	1,823 (4.4%)	39,129 (95.4%)	1,887 (4.6%)	35,527 (86.6%)	5,489 (13.4%)	39,548 (96.4%)	1,468 (3.6%)	5,508 (13.4%)	35,508 (86.6%)	40,395 (98.5%)	621 (1.5%)
Asia	3,048 (96%)	124 (3.9%)	3,089 (97.4%)	83 (2.62%)	2,777 (87.6%)	395 (12.5%)	3,123 (98.5%)	49 (1.5%)	457 (14.4%)	2,715 (85.6%)	3,152 (99.4%)	20 (0.6%)
Europe	10,688 (93.6%)	731 (6.4%)	10,588 (92.7%)	831 (7.3%)	9,686 (84.8%)	1,733 (15.2%)	10,725 (93.9%)	694 (6.1%)	1,865 (16.3%)	9,554 (83.7%)	11,064 (96.9%)	355 (3.1%)
Oceania	1,939 (96.4%)	72 (3.6%)	1,938 (96.4%)	73 (3.6%)	1,787 (88.9%)	224 (11.1%)	1,954 (97.2%)	57 (2.8%)	230 (11.4%)	1,781 (88.6%)	1,973 (98.1%)	38 (1.9%)
Total	59,871 (95.38%)	2,902 (4.62%)	59,767 (95.2%)	3,006 (4.8%)	54,470 (86.8%)	8,303 (13.2%)	60,430 (96.3%)	2,343 (3.7%)	8,518 (13.57%)	54,255 (86.43%)	61,687 (98.3%)	1,086 (1.7%)
P value		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001

Concerning the geolocation of tweets, with respect to tweets in Portuguese, users in Africa tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=25/43, 58.1%) and the least about 'Volunteering impact' (N=1/43, 2.3%); users in America tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=1,431/2,354, 60.8%) and the least about 'Volunteering impact' (N=54/2,354, 2.3%); users in Asia tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=31/48, 64.6%) and nothing about 'Volunteering opportunities' (N=0/48, 0%) and 'Volunteering impact' (N=0/48, 0%); users in Europe tweeted the most about 'Prisoners as providers of volunteering' (N=208/491, 42.4%) and the least about 'Volunteering impact' (N=16/491, 3.3%); and lastly, users in Oceania tweeted the most about 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=8/12, 66.7%) and nothing about 'Volunteering opportunities' (N=0/12, 0%), 'Volunteering experiences' (N=0/12, 0%), 'Prisoners as recipients of volunteering' (N=0/12, 0%) and 'Volunteering impact' (N=0/12, 0%). The type of content with the highest total in tweets is 'Volunteering as an alternative to jail time or to reduce sentenced time' (N=1,664/2,948, 56.5%). Table 6 provides the full details.

Table 6. Results of the type of content by continent (Portuguese tweets)

Continents	Type of content											
	Volunteering opportunities N (%)		Volunteering experiences N (%)		Prisoners as providers of volunteering N (%)		Prisoners as recipients of volunteering N (%)		Volunteering as an alternative to jail time or to reduce sentenced time N (%)		Volunteering impact N (%)	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Africa	40 (93%)	3 (7%)	39 (90.7%)	4 (9.3%)	34 (79.1%)	9 (20.9%)	40 (93%)	3 (7%)	18 (41.8%)	25 (58.2%)	42 (97.7%)	1 (2.3%)
America	2,246 (95.4%)	108 (4.6%)	2,056 (97.3%)	298 (12.7%)	1,681 (71.4%)	673 (28.6%)	2,129 (90.4%)	225 (9.6%)	923 (39.2%)	1,431 (60.8%)	2,300 (97.7%)	54 (2.3%)
Asia	48 (100%)	0	45 (93.8%)	3 (6.3%)	34 (70.8%)	14 (29.2%)	47 (97.2%)	1 (2.1%)	17 (35.4%)	31 (64.6%)	48 (100%)	0
Europe	447 (91%)	44 (9%)	411 (83.7%)	80 (16.3%)	283 (57.6%)	208 (42.4%)	418 (85.1%)	73 (14.9%)	322 (65.6%)	169 (34.4%)	475 (96.7%)	16 (3.3%)
Oceania	12 (100%)	0	12 (100%)	0	7 (58.3%)	5 (41.6%)	12 (100%)	0	4 (33.3%)	8 (66.7%)	12 (100)	0
Total	2,793 (94.7%)	155 (5.26%)	2,563 (86.9%)	385 (13.1%)	2,039 (69.1%)	909 (30.8%)	2,646 (89.8%)	302 (10.2%)	1,284 (43.6%)	1,664 (56.5%)	2,877 (97.6%)	71 (2.4%)
P value		0.001		0.057		<0.001		0.001		<0.001		0.537

In English tweets, we found statistically significant differences in the distribution of the number of tweets among different topics across continents. Regarding Portuguese tweets, we observed statistically significant differences in the distribution of tweets across continents on the topics of ‘Volunteering opportunities’, ‘Prisoners as providers of volunteering’, ‘Prisoners as recipients of volunteering’, and ‘Volunteering as an alternative to jail time or to reduce’, but not in ‘Volunteering experiences’ or ‘Volunteering impact’.

Measuring engagement

Regarding the user type, each English tweet posted by prisoners is liked 23.5 times on average whereas those posted by unidentified users and volunteer users are liked 12.7 and 11.5 times on average, respectively. On the other hand, each tweet posted by unidentified users is retweeted 3.8 times on average and those posted by prisoners and volunteers are retweeted 3.0 and 1.9 times on average, respectively.

Concerning the type of content, the tweets being liked most are about 'Volunteering experiences' 22.4 times on average and the least are about 'Volunteering opportunities' reporting 8.4 times on average. In terms of retweets, the tweets with the most retweets are about 'Prisoners as providers of volunteering' and 'Volunteering as an alternative to jail time or to reduce sentenced time' both 3.8 times on average; those retweeted the least are about 'Prisoners as recipients of volunteering' with 2.1 times on average.

With respect to the continents, the tweets being liked the most are from Europe with 20.2 times on average and the tweets being liked the least are from Africa with 8.1 times on average. In terms of retweets, the tweets being retweeted most are from Asia and Europe with both reporting 5.7 times on average and being retweeted the least are from Africa 2.5 times on average. Table 7 provides the full details for the English tweets.

Table 7. The average number of retweets and likes received per tweet by user type, content type, or continent (English tweets)

	Likes (Number Likes/Number Tweets)	Retweets (Number Retweets/Number Tweets)
Type of user		
Prisoners	23.5 (106897/4546)	3.0 (13429/4546)
Volunteers	11.5 (34486/3004)	1.9 (5813/3004)
Unidentified	12.7 (1188170/93799)	3.8 (352305/93799)
Type of content		
Volunteering opportunities	8.4 (30510/3648)	2.7 (9969/3648)
Volunteering experiences	22.4 (86027/3845)	3.1 (12095/3845)
Prisoners as providers of volunteering	17.1 (234523/13719)	3.8 (51524/13719)
Prisoners as recipients of volunteering	10.0 (30233/3013)	2.1 (6445/3031)
Volunteering as an alternative to jail time or to reduce sentenced time	13.1 (1161614/88654)	3.8 (335272/88654)
Volunteering impact	14.2 (19613/1386)	2.7 (3791/1386)
Continents		
Africa	8.1 (41702/5155)	2.5 (12637/5155)
America	14.2 (581606/41016)	3.9 (160633/41016)
Asia	14.9 (47178/3172)	5.7 (18019/3172)
Europe	20.2 (230670/11419)	5.7 (65121/11419)
Oceania	8.9 (17897/2011)	2.7 (5470/2011)

Focusing on user type, each Portuguese tweet posted by both prisoners and unidentified users are liked 17.3 times on average whereas volunteers' tweets are liked 14.9 times on average. On the other hand, tweets posted by volunteers are retweeted 4.6 times on average, those posted by unidentified users are retweeted 4.2 times on average and those by prisoners are retweeted 1.0 times on average.

Concerning the type of content, the most tweets being liked are about 'Prisoners as providers of volunteering' reporting 21.0 times on average and the least is about 'Volunteering opportunities' with 2.4 times on average. Similarly, the tweets being retweeted most are about 'Prisoners as providers of volunteering' with 5.9 times on average and the least retweeted tweets are about 'Volunteering opportunities' with 1.3 times on average.

With respect to the continents, the tweets with the most likes are from Europe with 22.9 times on average and the least being liked are from Oceania reporting 2.7 times on average. This is the same for retweets with the most tweets being retweeted are from Europe averaging 6.6 times and the least being retweeted are from Oceania averaging 0.2 times. Table 8 provides the full details.

Table 8. The average number of retweets and likes received per tweet by user type, content type, or continent (Portuguese tweets)

	Likes (Number of likes/Number of Tweets)	Retweets (Number Retweets/Number Tweets)
Type of user		
Prisoners	17.3 (6996/404)	1.0 (422/404)
Volunteers	14.9 (4184/280)	4.6 (1294/280)
Unidentified	17.3 (74772/4317)	4.2 (18331/4317)
Type of content		
Volunteering opportunities	2.4 (521/213)	1.3 (281/213)
Volunteering experiences	20.2 (12193/604)	5.4 (3251/604)
Prisoners as providers of volunteering	21.0 (33219/1581)	5.9 (9315/1581)
Prisoners as recipients of volunteering	10.2 (4913/481)	3.0 (1451/481)
Volunteering as an alternative to jail time or to reduce sentenced time	17.3 (50255/2913)	2.4 (7128/2913)
Volunteering impact	8.6 (977/114)	2.1 (241/114)
Continents		
Africa	2.9 (123/43)	0.3 (15/43)
America	15.5 (36458/2354)	2.9 (6927/2354)
Asia	4.7 (225/48)	0.6 (29/48)
Europe	22.9 (11255/491)	6.6 (3230/491)
Oceania	2.7 (32/12)	0.2 (2/12)

Discussion

Key findings

This study found a higher number of tweets in English than in Portuguese regarding volunteering in prisons. This could be attributed to the fact that English is used all around the globe. The most frequent emotion in the tweets was 'anger' and it was expressed mostly by unidentified users; the type of content that generated most tweets in both English and Portuguese was 'Volunteering as an alternative to jail time or to reduce sentenced time' and the type of content that generated the least tweets was 'Volunteering impact'. America was found to be the continent with more tweets about volunteering in prisons both in English and in Portuguese. This is likely as it is a continent with several English native speakers (in the USA and Canada) and Portuguese native speakers (in Brazil).

The number of likes and retweets reflect the engagement and interest regarding volunteering in prisons. In both English and Portuguese language, the average number of likes per tweet is higher than the average number of retweets which may suggest that although there is an interest in the field, the users may not personally relate to what is posted hence they do not retweet as much. Concerning the English tweets, the type of user that generated the most likes was prisoners and for the majority of retweets it was by unidentified users; the type of content that generated the most likes was 'Volunteering experiences' and most retweets were about 'Prisoners as providers of volunteering' and 'Volunteering as an alternative to jail time or to reduce sentenced time'; the continent that generated most likes was Europe and for retweets was both Asia and Europe. Regarding the tweets in Portuguese, the type of user that generated the most likes were by prisoners and unidentified users and the most retweets were by volunteers; the type of content that generated the most likes and retweets was 'Prisoners as providers of volunteering'; and the continent that generated most likes and retweets was Europe.

Strengths and limitations

This is the first study to analyse tweets about volunteering in prisons in any language, which is a main strength. Another strength is that since we used keywords and did not limit ourselves to hashtags, we retrieved any tweet that included such words.

This study has however some limitations. First, the codebook design and text analysis involved a degree of subjectivity. Nevertheless, this methodology is consistent with previous studies using Twitter (Alvarez-Mon et al., 2021; Ghaznavi & Taylor, 2015; Pereira-Sanchez et al., 2019). Second, we do not know the precise number of Twitter

users/accounts of the Tweets included in this study. Third, the inability to verify the precise identity of most Twitter users, as well as the missing geographical data, may constitute a limitation in our capacity to interpret these results. Lastly, we analysed the number of likes and retweets generated by each tweet as an indicator of user interest, however these engagement metrics can be influenced by other factors and thus may not truly match the user's interest.

Comparison with other literature

Our study focused on the analysis of a large number of public tweets about volunteering in prisons. Previous research regarding volunteering in prisons has mostly used qualitative interviews with only a few individuals (Chui & Cheng, 2012; Kort-Butler & Malone, 2014; Salselas & Pinto da Costa, 2021; Schuhmann et al., 2018).

A study in Hong Kong that explored the attitudes towards prisoners from prison volunteers, non-prison volunteers, and non-volunteers found that volunteers (prison and non-prisons) displayed more positive attitudes toward prisoners than non-volunteers (Chui & Cheng, 2012). In our study the attitudes of the users towards volunteering in prisons were negative since the most frequent emotion in English and Portuguese tweets is 'anger', particularly in unidentified users. Interestingly, volunteers are those who express less 'anger'.

In our study the 'Volunteering impact' category expressed the impact that volunteering has on the lives of volunteers, prisoners and unidentified users; and even though it was the category with the least tweets both in English and Portuguese, it was the third topic most liked and retweeted in English and the fifth topic in Portuguese. The impact of volunteering in prisons was also reported in a qualitative study conducted in Portugal that interviewed prison volunteers where volunteers perceived having a very positive attitude toward inmates, and that the experience could also have a positive impact on themselves (Salselas & Pinto da Costa, 2021). Similarly, in the Netherlands, a study that investigated the value of one-to-one visits to prisoners by volunteers reported that such visits had a correctional potential since the inmates acquired a more positive view of themselves and the future (Schuhmann et al., 2018). Likewise, research in the United States of America (USA) showed that volunteering changed the volunteers' views on inmates and the prison system by helping them to gain awareness and recognition of the issues associated with serving time and reintegration into society (Kort-Butler & Malone, 2014).

A study that investigated tweets in Portuguese on another topic – the Hikikomori phenomenon – found that most tweets posted were by users in Europe (Lopes et al.). In contrast, in our study, most users that tweeted about volunteering in prisons in Portuguese

were users in America. This suggests that Portuguese-speaking Twitter users, have different interests in different continents, and hence tweet mostly on different topics (volunteering in prisons vs hikikomori).

A recent systematic review on volunteering in prisons reported that the motivations to volunteer in prisons are related to altruistic or humanitarian values, as well as social reasons (Wu et al., 2023). Despite initially having a category named 'Volunteering motivations', there were very few tweets reporting motivations, so it was subsequently excluded.

Implication of the findings for future policies and research

Our findings help raise awareness about the public discourse people on Twitter have regarding volunteering in prisons. Future research could use this methodology to investigate public discourse towards volunteering in prisons in other languages and other social media networks (e.g. Facebook, Instagram).

Our findings show that public attitudes towards volunteering in prisons are negative, since 'anger' is the most frequent emotion among the emotions analysed. This calls for public campaigns to address stigma and change attitudes towards volunteering in prisons, to support the inclusion and rehabilitation in the community of people serving time in jail.

Our findings show that 'Volunteering as an alternative to jail time or to reduce sentenced time' is the most frequent topic in English and Portuguese which suggests that the users are agreeable for offenders and prisoners to volunteer, in the form of community service, instead of going to prison or to reduce their sentence time. It might also suggest that the public might not be aware that people can volunteer in prisons and support prisoners during their rehabilitation and reintegration into society. Therefore, is it imperative to invest in and develop volunteering programs and initiatives to improve the recruitment, training and retention of volunteers in prisons as well as to provide and spread information about volunteering opportunities.

As a topic 'Volunteering impact' generated the least tweets which suggests that users do not tend to often openly express the impact of volunteering in prisons, although it was the third topic most liked and retweeted in English and the fifth topic in Portuguese, which suggests there is acceptability and interest of the public once the impact of these experiences is shared. It has been demonstrated through several studies (Chui & Cheng, 2012; Kort-Butler & Malone, 2014; Salselas & Pinto da Costa, 2021; Schuhmann et al., 2018; Tewksbury & Dabney, 2004) that volunteering in prison brings benefits not only to volunteers and prisoners but also to the prison staff. Future research on volunteering in

prisons using social media could focus on analysing tweets with content related to volunteering impact and categorise them as positive or negative.

Research showed that volunteers self-reported high levels of satisfaction with their experience as volunteers (Tewksbury & Dabney, 2004). A systematic review on volunteering in prisons reports both positive and negative experiences (Wu et al., 2023). Future research on volunteering in prisons using social media could focus on analysing the tweets with content related to volunteering experiences and categorising them as positive or negative experiences.

Conclusions

This study is the first application of social media research to investigate the public discourse about volunteering in prisons. Overall, public attitudes are negative, as 'anger' is the most frequent emotion among the other emotions analysed. With this study, we shed light on the necessity of spreading awareness and information about volunteering in prisons such as addressing stigma and discrimination as well as promoting further volunteering programs and opportunities.

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Annex

Annex – Study's approval by CHUP/ICBAS Ethics Committee

Exma. Senhora
Dr^a Joana Margarida Ferrão Nunes
ICBAS-UP

v.referência	v.comunicação	n.referência	data
		GS/HCC/1	27.02.2023

Assunto
2023/CE/P01(P399/CETI/ICBAS)



Exma. Senhora Dr^a Joana Nunes,

Informa-se que o projeto de Investigação Fundamental com o título “Public Discourse Towards Volunteering in Prisons: Infodemiology Study of Twitter Data”, com a referência 2023/CE/P01(P399/CETI/ICBAS), submetido à Comissão de Ética conjunta CHUSA/ICBAS, foi apreciado em reunião plenária de 15 de fevereiro de 2023, tendo obtido parecer favorável nessa data.

Com os nossos cumprimentos,

O Diretor,

(Prof. Doutor Henrique Cyrne Carvalho)

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Appendix

Appendix – Presentations and publications linked with this study

1. Oral communication of this study's project to the students of the second year of the MSc in Legal Medicine on November 26th, 2022
2. Oral communication of the theme 'Public discourse towards volunteering in prisons: An infodemiology study of Twitter data' in the IJUP (Investigação Jovem da Universidade do Porto) congress on May 10th, 2022.
3. The article by Joana M. Ferrão Nunes, Miguel A. Álvarez-Mon, Francisco J. Lara-Abelenda, Carolina Donat-Vargas and Mariana Pinto da Costa with the title 'Public discourse towards volunteering in prisons: An infodemiology study of Twitter data' was submitted for publication (under review).