

Towards an Inclusive Society: Review of Google Trends Data of User Interest in the Deaf Comparing to the Blind and the Disabled

Agota Giedrė Raišienė

Klaipėda University, and Mykolas Romeris University, Lithuania
agotar@mruni.eu
<https://orcid.org/0000-0002-4641-7616>

Laura Gardziulevičienė

Mykolas Romeris University, Lithuania
laura.gardziuleviciene@gmail.com
<https://orcid.org/0000-0002-9514-0131>

Simonas Juozapas Raišys

UAB Bridge2Apex, Lithuania
simonas@bridge2apex.lt
<https://orcid.org/0000-0002-0560-4773>

Linas Selmistraitis

Mykolas Romeris University, Lithuania
selmistraitis@mruni.eu
<https://orcid.org/0000-0002-8612-3276>

Abstract. The COVID-19 pandemic has brought great difficulties for the deaf, the blind and people with disabilities in general, in addition to the difficulties of everyday life. This study aims to examine the public interest in the social integration of the deaf and hard of hearing community during the pandemic and the pre-pandemic period in the context of an inclusive society. The empirical study is based on the analysis of statistical data provided by Google Trends, which is a big data analysis, relative measurement and information visualisation tool that allowed to get insight on gaps and inconstancy of information seekers' interest within categories of science, people and society, law and government, and health. The study encourages researchers and social policy makers to pay extra attention to the social inclusion of the deaf, which, according to the research data, worsened during the pandemic more than other groups of the disabled.

Keywords: social inclusion; the deaf and hard-of-hearing; covid-19; the blind; the disabled.

Received: 2022-03-10. **Accepted:** 2022-05-17

Copyright © 2021 Agota Giedrė Raišienė, Laura Gardziulevičienė, Linas Selmistraitis, Simonas Juozapas Raišys. Published by Vilnius University Press. This is an Open Access article distributed under the terms of the [Creative Commons Attribution Licence](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Introduction

Studies on the social impact of pandemic constraints on people with disabilities are relatively limited. Nevertheless, the existing evidence is sufficient to make it prominent that the disabled experienced an exceptional shock. Literature highlights concerns on three main areas: medical care and access to health services, the cost of living, and the availability to get in communication (Kuper et al., 2020). Researchers note that in most cases, an initial available data on disability and COVID-19 was intended to address disease management issues or to deepen understanding in specific clinical outcomes depending on the characteristics of a disease. Later, gathered results encouraged to analyse what specific consequences are common for communities of people with disabilities (Ortiz, 2020; Epstein et al., 2022). Although there is still the lack in knowledge on pandemic consequences to particular communities, it is already evidenced that it is a big mistake to treat all people with disabilities as a general group. The changes in living conditions because pandemic restrictions affected people with disabilities differently (Holm et al., 2022). Some of the disabled had not sufficient access to full and timely information while being at home as they were unable to retrieve it due to their hearing or visual impairment and the technical inadequacy of the public information sources (Goggin and Ellis, 2020; Sabatello et al., 2020). Despite legislation prohibiting discrimination against people with disabilities in most countries, the disabled often lived as invisible citizens in time of the pandemic (Sabatello et al., 2020). As Goggin and Ellis (2020) claims, isolation cannot be an option to individuals who need the help of others in their daily lives. Without this help, these people fall into the trap of double “social exclusion”. According to studies, the deaf and visually impaired have been touched by the pandemic especially. As Hall (2022, p. 58) points out, “with the overuse of video broadcasting and online meetings, as well as the taboo-like sense around touch, COVID-19 has worsened the living experience for many individuals in these vulnerable groups”.

However, pandemic constraints have particularly affected the deaf and hard of hearing (Krishnan, et al., 2020; Goggin and Ellis (2020); Yuwono et al., 2021; Tofanelli et al., 2022; Poon and Jenstad, 2022).

The term ‘deaf’ can refer to a range of individuals from those who are profoundly deaf to those who consider themselves hard-of-hearing (Brice, Strauss, 2016, 67). The deaf and hard of hearing (herein further DHH) people are highly diverse by degree of hearing loss, age at onset of deafness or hearing loss, or by cultural and linguistic identity. When communicating, they rely on their residual hearing, hearing aids or cochlear implants, and on their vision for lipreading. The fight for deaf individuals’ equality has drastically improved over the last several decades. Use of technological advances has eased the way of overcoming communication barriers between the deaf and hearing worlds. However, deaf discrimination is still an up-hill battle that deaf individuals face on an almost daily basis. The deaf community is often stigmatized by the general population, and they face problems as customers and employees (Abney, et al, 2017).

During the pandemic, the deaf faced even greater problems than before. Following the announcement of the global COVID-19 pandemic, the public has been kept informed about the prevalence of COVID-19 in countries, the risk of infection and solutions to reduce the likelihood of infection. Politicians, epidemiologists, and other experts constantly shed light on the situation through public communication channels. However, at the beginning of the pandemic period, the deaf community in the countries was forgotten. During the pandemic, people with hearing impairments experienced extreme difficulties. The deaf fell into the trap of double stress: not only were they afraid of the virus, but they also could not get enough information about the situation. The exclusion of the deaf was further exacerbated by the isolation of information in medical institutions. In fact, all over the world, during periods when the prevalence of the COVID-19 virus in the country reached hard-to-control levels, hospitals banned relatives from visiting patients (including sign language interpreters), so deaf patients were left out of the world and could not fully express their needs and problems, get the necessary help, consultations, etc. Similarly, when school learning was transferred home, deaf children experienced greater exclusion than hearing children. Remote learning severely limited learning possibilities, as virtual products – educational movies, videos, etc. are often not adapted for the deaf, and it is usually not possible to translate the recording into sign language. In general, people with hearing impairments who find themselves in social exclusion have significantly reduced the number of social contacts, which results in their strengthening social isolation. That is, radically opposite direction of social integration development.

The formation of individual, family and societal attitudes towards disability is a powerful factor in creating a space of social inclusion (O'Donovan, 2021). Recent studies, however, show that the segregation of the deaf and hard of hearing during the COVID-19 pandemic has become extremely pronounced (Engelman et al., 2020; Al Majali & Alghazo, 2021; Madhesh, 2021; Paludnevičienė et al., 2021; Swanwick et al., 2020). How significant is this change in assessing public concern for the deaf and hard of hearing? Did various society groups (and professionals in health, law, public administration, and science especially) seek information about the deaf and their social inclusion more often before the pandemic, rather than during the pandemic? To answer these questions, in this article we used statistical analysis method of Google Trends data and revealed the public interest in the social integration of the deaf and hard of hearing community compared to those with visual impairments and the disabled in general. A better understanding of the situation of people with specific disabilities is needed in the development of more effective extraordinary and unforeseen events' management and more inclusive social policy in general.

The article reveals the context of an inclusive society, presents the challenges faced by the DHH and the blind people in the COVID-19 period, details the methodology of an empirical study, and discusses the results of the study. The conclusions of the research are presented at the end of the article.

1. Inclusive society: a context of the research

Increased stereotypes about gender, race, religion and, of course, disability increase social exclusion among members of society (Dukes & Berlingo, 2020). The processes of an inclusive society do not happen by themselves – it depends on the community processes, the attitude of the local population, the social climate of the living environment (O’Donovan, 2021). Social inclusion is a multifaceted process that requires the simultaneous involvement of policy makers and citizens. Public authorities who influence social policy and make responsible decisions can contribute to an inclusive society in their country (Blanck, 2020). Nevertheless, social problems are not attractive to politicians, as they require more financial and human resources, and this needs additional budgetary resources (Leisering, 2021). Countries with a stronger focus on social field (citizenship and social responsibility education) are significantly better off in the context of developing an inclusive society (Swanwick et al., 2020). In Ireland, for example, political change has shown that deinstitutionalisation can open different opportunities for inclusion and wider community activity, which contributes to reducing social exclusion (O’Donovan, 2021).

The United Nations Convention on the Rights of Persons with Disabilities commits them to ensuring the full participation of all persons with disabilities in public life. Disability covers a wide range of physical and mental disorders that limit access to public life. One in seven people around the world has a disability, which is already a significant problem (Vaughan et al., 2020). People with disabilities are still socially excluded and have limited opportunities to participate in everyday activities. Participation in the labour market, employment and education is a challenge for both the country and the person with disabilities. The social exclusion of people with disabilities remains unaddressed at the global level, which poses challenges for the guarantee of human rights (Hall et al., 2019). Research shows that disability and inclusion depend on the different ways in which politicians and society organize these processes (Swanwick et al., 2020). Social policy makers develop support options and tools for people with disabilities.

On the other hand, an inclusive society is created when every member of the community is accepted on an equal footing, when everyone has the opportunity to participate in the labor market and employment processes, access education, social services and fully function in everyday life (Dwyer et al., 2019; Moríña et al., 2020; Hall et al., 2019). Paradigms of policy and practice, characterized by both cultural and equal opportunities, shape the processes of reducing social exclusion through the satisfaction of individual needs (Blanck, 2020). Social protection, social benefits, access to social services depend on the country’s economy, the state’s financial situation, the order in which the state budget is distributed by activity area, as well as the experience and attitude of politicians to priorities, and several other factors related to public administration specifics (Leisering, 2020).

The employment of people with disabilities is becoming an acute problem. The state provides financial and social assistance to citizens who have difficulties due to disability,

race, gender, or family risks. However, incapacity benefits are not an appropriate means of reducing social exclusion, but require activities, paid employment, adaptability (Dwyer et al., 2019). In such countries, more and more companies are developing the idea of social responsibility and contributing to social inclusion, even as part of the strategic planning of companies (Miethlich & Oldenburg, 2019). On the other hand, the right to work sounds pointless if people who are deaf or hard of hearing, blind, visually impaired or those who have cognitive impairment cannot use the technology in the workplace (Blanck, 2020). However, in many cases, such as a person with deaf or hard of hearing, functioning is not as smooth as we imagine (Dwyer et al., 2019). Even when participating in employment programs, people with disabilities experience distinct marginalization in terms of employment sustainability and career development (Hardonk & Halldórsdóttir, 2021). These processes affect person's both physical and psychosocial factors.

Another important aspect is the education of people with disabilities. Inclusive education is still the subject of intense debate among stakeholders (Dukes & Berlingo, 2020). Inclusive education policies are the most improved situation in the context of social inclusion of people with disabilities (Zhao & Zhang, 2018). Over the past 30 years, inclusive education has emerged as a key goal of education policy worldwide (Buchner et al., 2021). The inclusive concept creates equal opportunities for all students (Dukes & Berlingo, 2020). For example, the inclusion of students with disabilities in mainstream education environments can create a whole new understanding, which can positively affect the general attitude towards people with disabilities, their acceptance, and potential future opportunities (Dukes & Berlingo, 2020). For a person with a disability, being a university student is an opportunity to develop their potential, gain a profession and ultimately feel that they are a full member of the community (O'Donovan, 2021). Even before the COVID-19 pandemic, there were barriers, and the onset of the coronavirus wave demanded additional technologies, such as computers, tablets, or smartphones, to improve the accessibility of education for students. The entire deaf community, not just those involved in the education system, has suffered the greatest exclusion due to lack of access to communication.

In terms of inclusion of people with disabilities, the focus is on developing education, labour market processes and individual support. Each type of disability requires specific adaptations, whether in the workplace, at school, at university or in the living environment. The social role plays an important role in influencing inclusion processes. Disability and inclusion paradigms emerge from more developed countries, which aim to accommodate the individual needs of people with disabilities, to promote notions of equality or rights and to foster community solidarity (Swanwick et al., 2020). Active communities representing people with disabilities argue that marginalization and oppression can be successfully overcome by focusing on inclusion, i.e., participation based on respect for human diversity and commonly accepted norms and expectations (Hardonk & Halldórsdóttir, 2021). Thus, inclusion is a guiding principle that should be an instrument for countries implementing social policy programs.

2. Challenges to the deaf and hard of hearing and the blind in the time of pandemics

Sensory limitations can cause deaf people to have several psychological traits that make them more vulnerable than hearing and speaking people (Al Majali & Alghazo, 2021). Picker, (2020) considers that more emphasis should be placed on organized assistance, accessibility and individual needs, and adaptation of the environment to increase social inclusion processes. For example, students with disabilities face significant barriers in their university trajectories, and especially students who are deaf or hard of hearing (Moriña et al., 2020). Deaf or hard of hearing students need special adaptations for their remote learning process. They communicate using sign language, which uses manual communication, body language and lip patterns to combine hand shapes, body gestures and movements, as well as facial vocabulary (Alsadoon & Turkestani, 2020). Studies have shown that it is more effective to present information to students who are deaf or hard of hearing using images and videos with subtitles linked to sign language than videoconferencing sessions without interpreters (Alsadoon & Turkestani, 2020). As evidenced by the extensive discussion on deaf inclusion, sign language interpreters are not a substitute for verbal instruction, and information is not conveyed accurately and clearly (Swanwick et al., 2020). The information conveyed by the sign language interpreter is also influential, as sign language requires more memory than spoken language, and the information conveyed needs to be highly focused and precise. The situation was more complicated for blind people, where newly created websites lack accessibility design and remain inaccessible to visually impaired communities (Dai & Hu, 2021).

It is important to note that deaf people and blind people have a lower literacy rate due to sensory impairments compared to hearing people, and therefore a significantly lower accessibility to information (Silva et al., 2020; Richardson et al., 2022). It is known that hearing and visual impairments can provoke cognitive, psychomotor and communication impairments that also lower self-esteem (Al Majali & Alghazo, 2021). People demonstrating low e-literacy often fall victim to misinformation because they are unable to verify the accuracy of the information (Paludnevičienė et al., 2021). On the other hand, research has shown that blind students can learn at a distance using the full potential of information technology only if a screen reader and accessibility need to be adapted for this purpose (Said et al., 2022).

The COVID-19 outbreak brought changes in many countries around the world and affected various aspects of life. The level of viral infection spread rapidly and led many countries to restrict or ban many activities where face-to-face contact was possible. People all over the world had to adapt to remote learning, work, and the pandemic situation. The COVID-19 pandemic closed traditional classrooms and more than 300 million students started to learn remotely (Alsadoon & Turkestani, 2020). In the US, for example, schools across the country were closed and quickly adopted remote learning. In Italy, universities offered sign language interpreters, but prolonged distance learning led to the withdrawal of these services, causing outrage in the deaf or hard of hearing

community (Tomasuolo et al., 2021). In Saudi Arabia, all students, teachers, and administrative staff have switched to remote working and learning (Madhesh, 2021). A similar situation occurred in other countries that experienced the COVID-19 outbreak. Recent studies have shown that deaf or hard of hearing suffer much more from the effects of the pandemic as they do not have access to services that require smart technology, knowledge, and application to continue quality learning process (Tomasuolo et al., 2021). People with visual impairment found themselves in a similar situation. For example, they could not drive due to their disability did not have access to COVID-19 tests (Epstein et al., 2022).

Studies in the USA show that during the COVID-19 pandemic, deaf people experienced severe concerns about food security (Engelman et al., 2020). Typically, the deaf community chooses public places to meet, interact and communicate important information through its members, rather than through officials or government channels. There is a reason for this, as sign language interpreters do not have signs for the terms used during the pandemic (Silva et al., 2020). Studies in the USA have shown that some deaf or hard of hearing people misunderstood instructions related to COVID-19 requirements due to inaccurate communication (Paludnevičienė et al., 2021). The blind people have limited opportunities to maintain physical activity, e.g., exercise as compared to the general population (Richardson et al., 2022). Pineda & Corburn (2020) believe that public health and wellness information should be communicated in audio, Braille, E-pub, and easy-to-understand formats for people with disabilities. An integrated application to WeChat has been developed to meet the needs of people with disabilities, but due to its complex design, blind people (as well as the deaf) could not use it (Dai & Hu, 2021). Silva et al. (2020) view that deaf and hard of hearing people should be provided with subtitling assistance, mainly in television programs and newspapers, or have direct access to written speech. This second option is almost non-existent today.

The term Universal Rights refers to rights that are available to all and is often used in a universal sense (Johnstone et al., 2020). Experience from previous pandemics has shown that changes in the human psyche are directly linked to situations of isolation (Al Majali & Alghazo, 2021). Restrictions on movement can also play a significant role in altering individuals' leisure patterns. For example, meeting points for deaf individuals are squares, shopping malls, bars, and other adapted places, which have become impossible to visit during the pandemic, leaving the deaf community in total exclusion (Silva et al., 2020). Engelman et al., (2020) point out that organizations serving the deaf community through intervention or government programs, social service providers and food banks should be fully accessible and available to deaf or hard of hearing people. Also, the deaf and hard of hearing people may experience anxiety specifically due awareness that they may lack critical information or when faced with information inaccessibility (Engelman et al., 2020). In Brazil, for example, during the pandemic, the government did not provide new channels of information distribution to reach the deaf community with up-to-date news related to the COVID-19 situation (Silva et al., 2020). Challenges for the visually impaired people depend on their level of vision loss, the blind rely on sticks

and human support, but the limitation of social contact during the pandemic increased the difficulties of this group (Dilkash et al., 2022).

Being locked in and staying at home for long periods of time has had a negative impact on people's mental health. Deaf and hard of hearing are often unable to communicate with a mental health professional due to the lack of sign language proficiency of the therapist and lack of translation services (Al Majali & Alghazo, 2021). Ciciurkaite et al. (2022) claims that the COVID-19 pandemic causes a secondary pandemic of mental illness in people with various disabilities. Silva et al., (2020) believe that deaf people should be represented as a priority group in receiving information through health centres about the situation of pandemic COVID-19 and the availability of assistance. In countries such as Italy, Spain and France, deaf associations have initiated collective mobilisation and social protest for sign language interpretation services (Tomasuolo et al., 2021). Al Majali & Alghazo, (2021) argue that COVID-19 may have the most detrimental effect on deaf and hard of hearing people. Expressions of fear by the deaf community were largely related to lack of access to information about the pandemic and failure to provide adapted information (Swanwick et al., 2020). Nevertheless, the situation was better for the blind people. The research conducted by Leporini et al. (2021) revealed that remote communication platforms can be suitable for the blind, and Zoom is the most customized platform compared to Google Meet and MS Teams.

In summary, examining pandemic experiences of the deaf community is important for the purpose of managing future crises. The last pandemic, known as the Spanish flu, occurred in 1919. Unfortunately, there is no record of how deaf communities coped at that time. In contrast, the COVID-19 pandemic should establish itself as a lesson that will continue to develop future assistance options for the deaf community beyond the pandemic (Tomasuolo et al., 2021). The global COVID-19 crisis has exposed and deepened societal exclusion of deaf adults, children and their families and provokes further questions about what social inclusion means and how it can be implemented in different contexts (Swanwick et al., 2020). The main challenges stem from a lack of specific individual support, insufficient funding, and inaccessibility of information for disabled communities and for deaf and hard of hearing individuals in particular.

3. Methodology

Empirical study is based on the analysis of statistical data provided by Google Trends. Information on search performance for specific keywords was obtained and a quantitative analysis of the results was performed.

Google Trends is widely applied in a market analysis and is also appropriate to scientific research for gather data on a public interest (e.g., Algan et al., 2019; Dehkordy et al., 2014). The Google Trends tool allows the researcher to quantitatively map selected terms and keywords and to determine the information-seeking behaviour of internet users on the web. Google Trends is a tool for statistical analysis and relative measurement.

It shows search results in terms of relative popularity, relative interest, and search trends for any keyword in any period since 2004. The maximum volume in the period of interest is 100% and the relative frequency in other periods is shown as a fraction of it. If the total volume of searches for a term is below the required threshold, which is assumed to be at least 1 000 searches in the relevant period of interest and/or geographic region, Google Trends shall report the search volume index as zero. Although the analysis carried out with Google Trends tool does not provide any systematic evidence, it is a reliable source revealing the general public views (Mellon, 2014).

Google Trends is used in different scientific areas, e.g., health (Fritsch et al., 2022; Whitsitt et al., 2015; Kamiński et al., 2020; Wu et al., 2019; Swerts et al., 2022; Zhao et al., 2022), science (Thompson et al., 2021; Behboudi et al., 2021), society (Simionescu & Cifuentes-Faura, 2021; Simionescu & Raišienė, 2021; Pullan & Dey, 2021), law (Kostakos, 2018), etc. Authors operate the data for further calculations with aim of modelling, etc., e.g., Brodeur et al. (2021), forecasting, e.g., Aaronson (2022), while other present data retrieved from Google Trends, e.g., Zitting et al., (2019). From a methodological point of view, it is recommended to analyse averages but not instantaneous data or individual values for data reliability (e.g., Rovetta, 2021). Still, the tool is seen as useful despite some authors arguing that the tool has flaws and there is no single good way to fix them (e.g., Eichenauer et al., 2022).

Hence, using this big data analysis and information visualisation tool, we found and refined the most popular keywords in DHH integration research field. Google Trends was used to determine the relevance of DHH research and DHH-related terms in global web searches over the last decade. Based on gathered big data from Google Trends and Microsoft Excel's trendline feature, trends of researched keywords were projected until the end of 2025, and this led us to get visual clearness of the situation based on statistical forecasting.

In more detailed, while comparing Google engine users' activity within the DHH topic, we observed trends in *science*, *people and society*, and *law and government* categories within period of 2010 to 2021. These three categories are closely related to ensuring social inclusion: the government proposes political and economic solutions, the society provides support and positive attitude towards integration of different social groups, and science produces research on social problems and restrictions. We also chose the fourth category - *health* as an important category in times of pandemic. Keywords "deaf and hard of hearing", "the deaf", "the deaf integration", "the deaf inclusion", and "the deaf work" were addressed in terms of popularity in the aforementioned categories. With an initial analysis, we observed gaps and inconstancy in interest in different categories of users. As a result, we chose to expand our search keywords and analyse how interest in "deaf people" is reflected in the context of interest in other special needs groups. Thus, we zeroed in on a wider content related to special need groups, and search for interest in terms "social inclusion", "social integration", "the disabled", "the disabled inclusion", "the disabled integration", "the blind", "the blind inclusion", and "the blind integration". The blinds were chosen for the logic of the study, i.e., to keep Google Trends search within the framework of physical perceptual impairments.

To sum up, keyword selection results indicated that Google users' interest in different social groups that are experiencing difficulties in social integration, significantly varies in number of queries. However, the blind people scored highest interest in all categories compared to the deaf ones. For this reason, in our study we compare interest in “the deaf”, “the blind”, and “the disabled” to realize if the deaf are in social isolation. Analysis in this context increases the relevance of our study on the social inclusion of the deaf and hard of hearing.

We identified different frequency of searches in different categories, established and compared the keywords with a search volume index higher than zero. On that basis, the comparison of some keywords had to be rejected due to insufficient information value. Also, the singular outliers that represent extreme deviations from the majority of the data point values were substituted with mean values, to avoid bias of statistical estimates (Kwak & Kim, 2017).

Our searches have been conducted in English, so it is possible that search results may be language-restricted as well as restricted to certain geographies where Internet users use English. In addition, it is recognized that search terms related to our selections may be used in other senses. This includes specific professional and spoken language. On the other hand, English is the leading language in the world as a professional language in various fields of intellectual activity (education, medicine, law, state management, etc.), and Google queries are often made in English by professionals regardless of the country. Thus, a generalized look at the public interest in the terms we are discussing in the paper can be highlighted.

4. Results

To find out how much attention deaf people get from Google users, we compared users' interest in the term “the deaf” in four categories. We chose from a list of categories defined by Google Trends (Figure 1).

Analysing the data, we can see that in the categories compared, the single category *Science* maintained a relatively even interest in the term deaf. Moreover, the interest in *Science* intensified during the pandemic and reached a peak during the whole period analysed. On the other hand, taking a broader context, until 2019, interest in deafness in the *Science* category was lower than in the *People and Society*, and *Health* categories. Meanwhile, the lowest level of interest in deafness is observed in the *Law and Government* category. Here it has been steadily declining with small upswings. The same downward trend is also observed during the pandemic period, although a breakthrough is not observed as in the other categories. In the *Health* category, the drop in interest in deafness was perhaps the strongest and did not stop at the start of the pandemic. The situation is almost symmetrical in the category *People and Society*. In mid-2019, it started to hit a period low. Thus, we can see that the interest in deaf people during the pandemic period in the category *Science* became higher compared to all other categories.

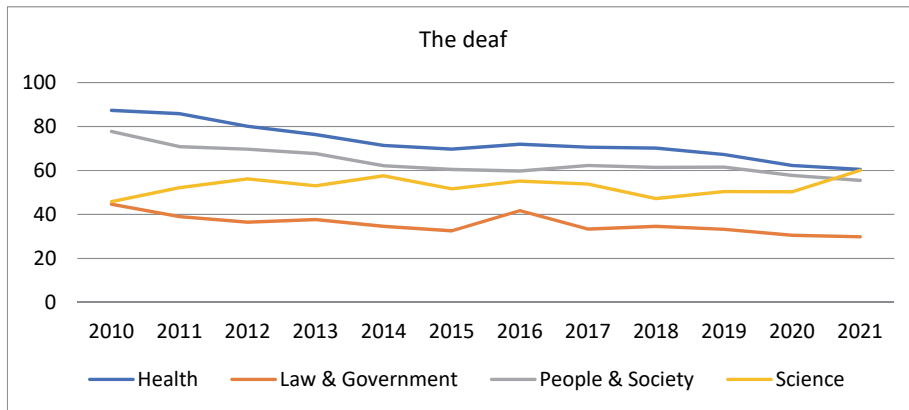


Figure 1. Google users' interest in the terms of the deaf in sections of Health, Law and Government, People and Society, and Science (2010-2021).

Source: the authors' compilation by using Google Trends.

Next, we examined users' interest in the term “the blind” and observed that in all categories, interest has dropped sharply since the pandemic was declared in 2020 (Figure 2). The smallest drop in interest is observed in the *Science* category, while in *Health*, *Law and Government*, and *People and Society* categories the downward shift is striking.

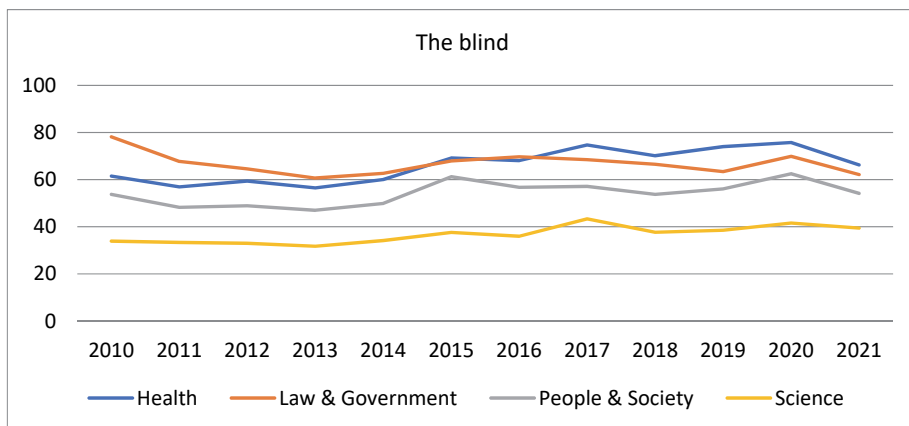


Figure 2. Google users' interest in the terms of the blind in sections of Health, Law and Government, People and Society, and Science (2010-2021).

Source: the authors' compilation by using Google Trends.

On the other hand, the latter fall does not reach the bottom in any of the categories mentioned above, on a period-wide basis. Moreover, in *Health* category, interest remains higher than it has ever been in the period between 2010 and 2014, while in *People and Society* category it remains similar to the typical fluctuations since the second half of

2014 and is also higher than in the period between 2010 and 2014. Overall, in terms of public interest in “the blind”, it is only in the *Law and Government* category that we can observe a consistent downward trend in interest.

Finally, we analysed data related to users’ interest in the term the disabled. The trend shows a steady decline in user interest in the disabled, in *Science* category since 2014 (Figure 3).

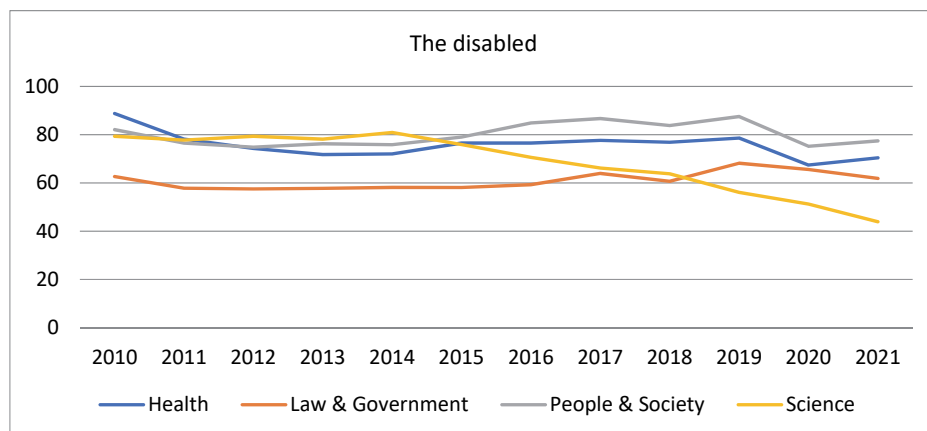


Figure 3. Google users’ interest in the terms of the disabled in sections of Health, Law and Government, People and Society, and Science (2010-2021).

Source: the authors’ compilation by using Google Trends.

Overall, the interest curve has fallen by 36 percentage since 2010. Since the beginning of the analysis period, there has been a drop of around 20 percentage of interest in the *Health* category. Meanwhile, *Law and Government*, and *People and Society* categories show a decline in the data compared to the 2015-2017 boom, but in general, fluctuations of more than 10 percentage points are not observed over the whole period analysed. Also, interest in the term “the disabled” is relatively high across all user categories compared to the other keywords analysed. It can be seen that in none of the categories does the interest in the term fall below the 40th percentile (although in *Science* category this could happen in the future if the downward trend continues), while the interest in “the deaf” and “the blind” falls below this level in some categories.

Keeping in mind the logic of how Google Trends displays statistical data in charts, we further analysed all three terms – “the deaf”, “the blind”, and “the disabled” – together in different user categories and found significant trends. Only in the category of *Health*, interest in “the deaf” fluctuated at the highest end of the curve, which unfortunately steadily declined, dropping downwards with the onset of the pandemic, and swapping positions with interest in the blind (Figure 4).

We can state that the search term “the disabled” was relatively unpopular in the *Health* category. This may be explained by the assumption that it is common to identify impairments with precision in the context of health, so the disabled may be too general

of a term for information seekers. On the other hand, it can be seen that the term “the disabled” has attracted a non-zero amount of interest in the *Health* category compared to other keywords of interest.

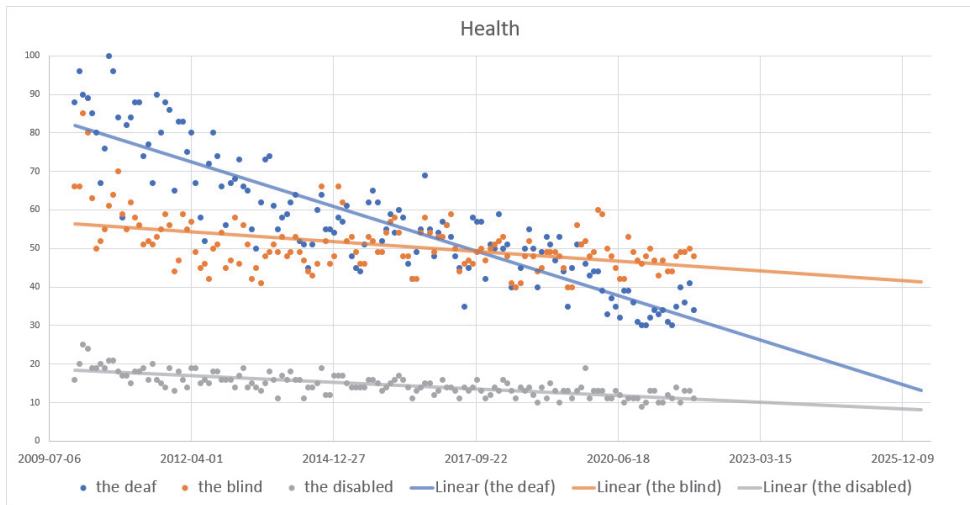


Figure 4. Google users’ interest in the terms of “the deaf”, “the blind”, and “the disabled”, *Health* section.

Source: the authors’ compilation by using Google Trends.

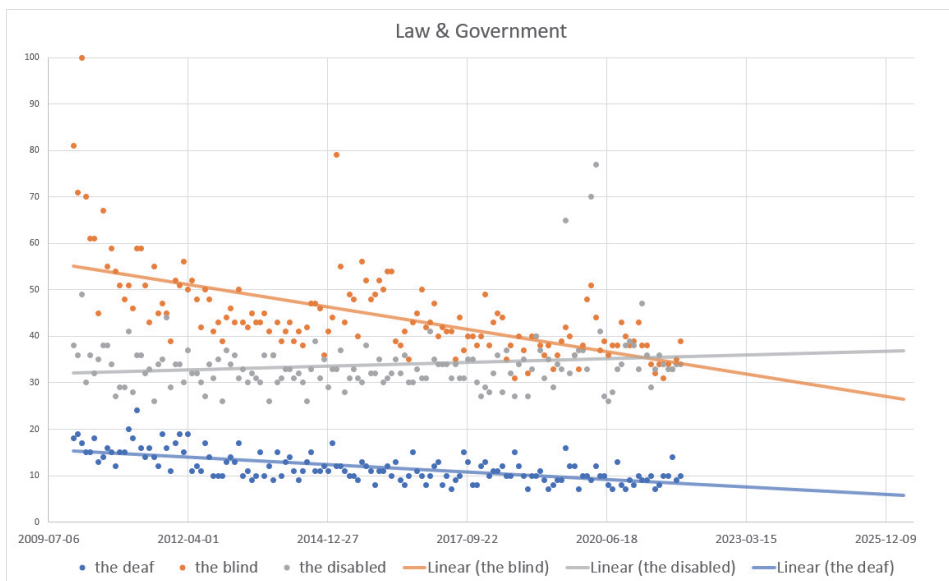


Figure 5. Google users’ interest in the terms “the deaf”, “the blind”, and “the disabled”, *Law and Government* section.

Source: the authors’ compilation by using Google Trends.

Other user audiences show that interest in “the deaf” receives the least attention, while interest in “the disabled” and “the blind” receive more attention from the users.

Analysis of the *Law and Government* category shows that, compared to other keywords, interest in “the blind” was the highest until 2020. Only at the beginning of the pandemic did fluctuations and overlaps with “the disabled” become particularly pronounced. Meanwhile, interest in “the deaf” declined slightly and has remained similar throughout the rest of the time period since 2013 (Figure 5).

An analysis of the frequency of searches for selected keywords in the *People and Society* category showed that there was a significantly higher interest in “the blind”. Meanwhile, “the deaf” was of least interest to users. In summary, however, it should be noted that both “the blind”, “the disabled” and “the deaf” experienced a slight but decreasing trend in interest (Figure 6).

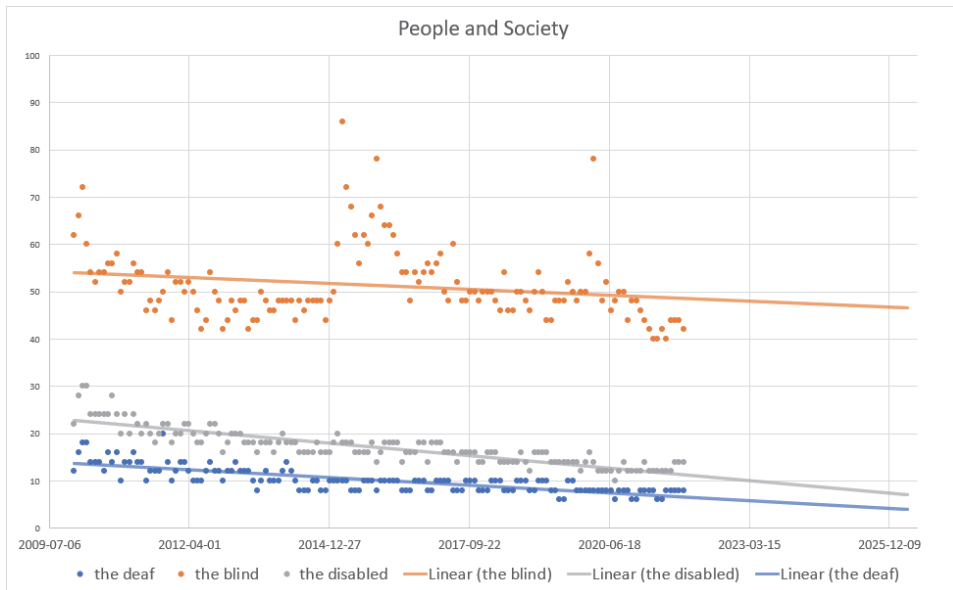


Figure 6. Google users’ interest in the terms “the deaf”, “the blind”, and “the disabled”, *People and Society* section.

Source: the authors’ compilation by using Google Trends.

Finally, an analysis of the frequency of users’ interest in the selected terms in *Science* revealed a particularly low level of attention to the deaf compared to the blind. Interest in the term “the deaf” has repeatedly dropped to less than one percent over the period of 2010-2021 (Figure 7). It was also found that Google search users in *Science* have sharp unevenness of interest in the blind.

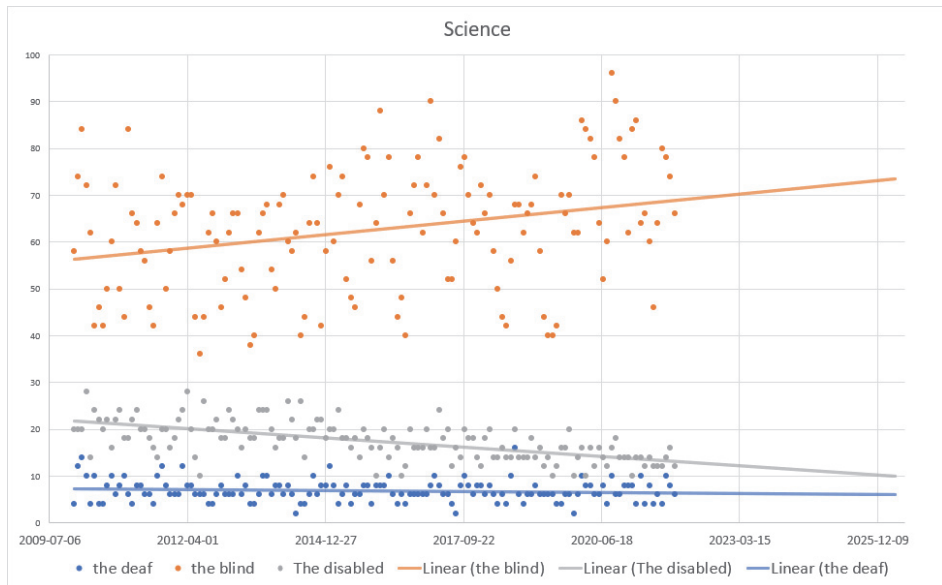


Figure 7. Google users' interest in the terms “the deaf”, “the blind”, and “the disabled”, *Science* section.

Source: the authors' compilation by using Google Trends.

Next, for comparative testing purposes, we analysed the level of users' interest in terms of “the deaf integration”, “the blind integration” and “the disabled integration” in categories of *Science*, *Health*, *Law and Government*, and *People and Society* within the period of Covid-19 pandemic restrictions (Figure 8).

The result demonstrated the out-of-focus position of DHH.

Finally, the social inclusion of disabled issue was further analysed by a comparison of the frequency of searches for the keywords in the wider extent. The addition of “social inclusion” to the keyword searches shows that the focus not only on the deaf and visually impaired people, but also on the disabled people in general, is inadequate (Figure 9).

As can be seen, on a scale of 0 to 100, interest in “social integration” fell below the fifty-percentage mark only three times. Meanwhile, the popularity of the other keywords was below three percentage in the overall search field.

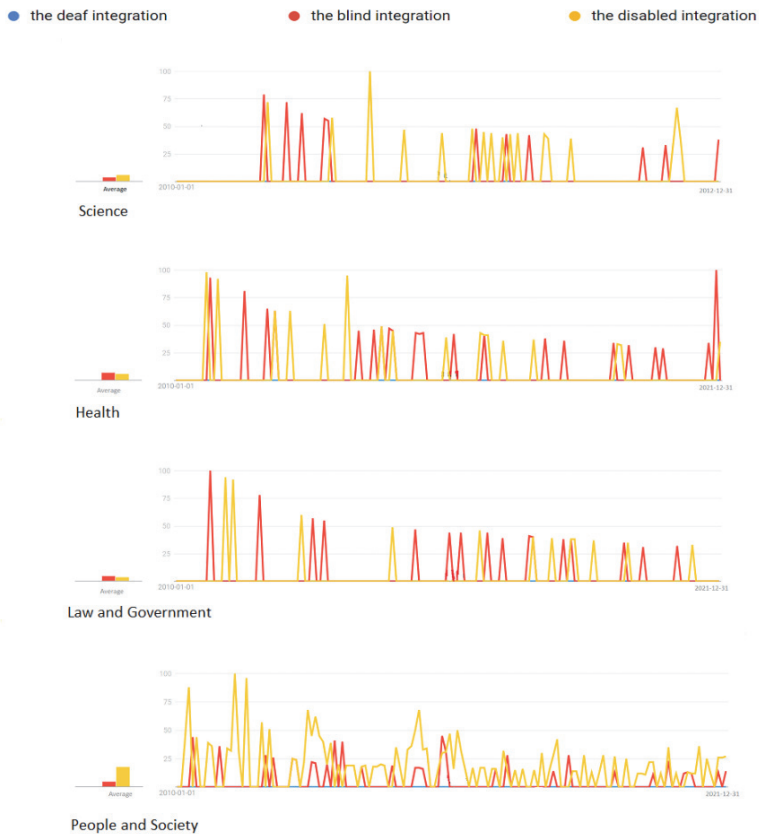


Figure 8. Google users' interest in the terms “the deaf integration”, “the blind integration”, and “the disabled integration”, categories of Science, Health, Law and government, and People and society, 2020/01/01 – 2021/12/31.

Source: the authors' compilation by using Google Trends.

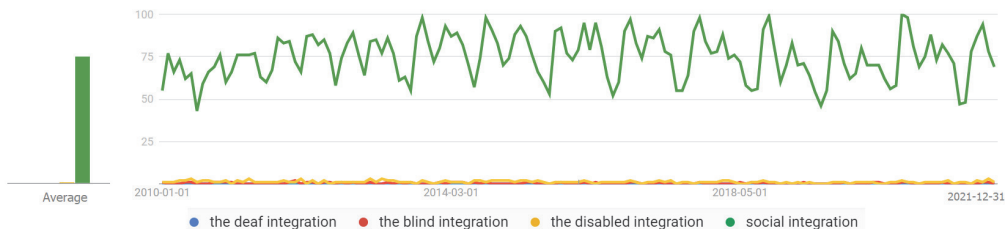


Figure 9. Google users' interest in the terms “the deaf integration”, “the blind integration”, and “the disabled integration”, and “social integration”, all the categories, 2010-2021.

Source: the authors' compilation by using Google Trends.

Conclusions

The analysis of users' relative interest in the term "the deaf" revealed that the situation varies from one sector to another with a tendency of asymmetry. The interest of the Law and government, People and society, and the Science develops at different volumes and speeds. In particular low interest in "the deaf" was observed in the Science sector, meanwhile, interest in the term "the blind" was significantly higher in all analysed Google users' groups. Nevertheless, while members of society with special needs are in relative gap of interest to researchers, health, and governmental institutions as well as to society, issues of the social inclusion by itself are receiving comparatively more attention.

The research results grounds the assumption that the urge to avoid unnecessary social contacts during the pandemic had a different impact on socially vulnerable groups. It has pushed disabled people, and the deaf people in particular, deeper into exclusion than they were before the pandemic, as the data of 2010-2021 shows. So, the study supports previous research (e.g., Engelman et al., 2020; Al Majali & Alghazo, 2021; Madhesh, 2021; Paludnevičienė et al., 2021; Swanwick et al., 2020) that asserts the existence of DHH's segregation.

Thanks to information technology, remote communication and telecommuting, the impact of hearing impairment on a fulfilling life and integration into society is not as important as it used to be. This gives some hope for the changes in social inclusion of DHH. To accelerate changes, it is necessary to focus on research into the assistance needed to manage a social inclusion of the disabled as well as to strengthen social policy focused to DHH social inclusion to achieve the better-balanced development of society.

References

1. Aaronson, D., Brave, S.A., Butters, R.A., Fogarty, M., Sacks, D.W., Seo, S. (2022). Forecasting unemployment insurance claims in realtime with Google Trends, *International Journal of Forecasting*, (38)2, 567-581. <https://doi.org/10.1016/j.ijforecast.2021.04.001>
2. Abney A.K., White A., Shanahan K.J., Locander W.B. (2017). In their shoes: co-creating value from deaf/ hearing perspectives. *Journal of Services Marketing*, 31(3), 313–325.
3. Al Majali, S.A., Alghazo, E.M. (2021). Mental health of individuals who are deaf during COVID-19: Depression, anxiety, aggression, and fear. *Journal of Community Psychology*, pp. 1–10, DOI: <https://doi.org/10.1002/jcop.22539>.
4. Algan Y., Murtin F., Beasley E., Higa K., Senik C. (2019) Correction: Well-being through the lens of the internet. *PLoS ONE* 14(1): e0211586. <https://doi.org/10.1371/journal.pone.0211586>
5. Alsadoon, E., Turkestani, M. (2020). Virtual Classrooms for Hearing impaired Students during the COVID19 Pandemic. *Romanian Journal for Multidimensional Education*, vol. 12, 1, pp. 1–8, DOI:10.18662/rrem/12.1sup2/240.
6. Behboudi, E., Shamsi, A. and Bueno de la Fuente, G. (2021), The black crow of science and its impact: analyzing Sci-Hub use with Google Trends, *Library Hi Tech*, Vol. 39 No. 4, pp. 970–983. <https://doi.org/10.1108/LHT-04-2020-0105>.
7. Blanck, P. (2020). Disability Inclusive Employment and the Accommodation Principle: Emerging Issues in Research, Policy, and Law. *Journal of Occupational Rehabilitation*, 7, 30, 505–510, <https://doi.org/10.1007/s10926-020-09940-9>.

8. Brice P.J., Strauss G. (2016). Deaf adolescents in a hearing world: a review of factors affecting psychosocial adaptation. *Adolescent Health, Medicine and Therapeutics* 2016;7 67–76.
9. Brodeur, A., Clark, A.E., Fleche, S., Powdthavee, N. (2021). COVID-19, lockdowns and well-being: Evidence from Google Trends, *Journal of Public Economics*, 193, 104346, 177–184. doi: 0.1016/j.jpubeco.2020.104346
10. Ciciurkaite, G., Marquez-Velarde, G., Brown, R. L. (2022). Stressors associated with the COVID-19 pandemic, disability, and mental health: Considerations from the Intermountain West, *Stress and Health*, pp. 1–14, DOI: 10.1002/smi.3091.
11. Dai, R., Hu, L. (2021). Inclusive communications in COVID-19: a virtual ethnographic study of disability support network in China, *Disability & Society*, DOI: 10.1080/09687599.2021.1933388.
12. Dehkordy S.F., Carlos R.C., Hall K.S., Dalton V.K. (2014) Novel Data Sources for Women’s Health Research: Mapping Breast Screening Online Information Seeking Through Google Trends. *Acad Radiol.* 21(9): 1172–1176. doi:10.1016/j.acra.2014.05.005
13. Dilkash, M., Susmita Banerjee, S., Dubey, G., Kumari, V., Kumari, R., Chandra, M., Tripathi, H., Shahid, Y. (2022). Challenges Faced by Patients with Low Vision during COVID-19. *International Journal of Health Sciences and Research*, Vol.11, Issue: 9, DOI: <https://doi.org/10.52403/ijhsr.20210910>.
14. Dukes, C., Berlingo, L. (2020). Fissuring Barriers to Inclusive Education for Students with Severe Disabilities. *Research and Practice for Persons with Severe Disabilities*, vol. 45 (1) 14–17, DOI: 10.1177/1540796919895968.
15. Dwyer, P., Scullion, L., Jones, K., McNeill, J., Stewart, A.B.R. (2019). Work, welfare, and wellbeing: The impacts of welfare conditionality on people with mental health impairments in the UK. *Social Policy & Administration*, vol. 54, 2, 311 – 326, DOI: 10.1111/spol.12560.
16. Eichenauer, V.Z., Indergand, R., Martínez, I.Z., Sax, C. (2022). Obtaining consistent time series from Google Trends, *Economic Inquiry*, 60(2), 694-705, <https://doi.org/10.1111/ecin.13049>
17. Engelman, A., Paludnevičienė, R., Wagner, K., Jacobs, K., Kushalnagar, P. (2020). Food Worry in the Deaf and Hard-of-Hearing Population During the COVID-19 Pandemic. *Public Health Reports*, vol. 136 (2), pp. 239-244, DOI: 10.1177/0033354920974666.
18. Epstein, S., Campanile, J., Cerilli, C., Gajwani, P., Varadaraj, V., Swenor, B. K. (2022). New obstacles and widening gaps: A qualitative study of the effects of the COVID-19 pandemic on U.S. adults with disabilities, *Disability and Health Journal*, 14, 101103, DOI:<https://doi.org/10.1016/j.dhjo.2021.101103>.
19. Fritsch, C. G., Duong, V., Chen, L., Hunter, D. J., McLachlan, A. J., Ferreira, P. H., & Ferreira, M. L. (2022). Use of Online Information in Musculoskeletal Conditions: An Analysis of Google Trends Data. *JCR: Journal of Clinical Rheumatology*, 28(3), 162–169.
20. Gerard Goggin & Katie Ellis (2020) Disability, communication, and life itself in the COVID-19 pandemic, *Health Sociology Review*, 29:2, 168-176, DOI: 10.1080/14461242.2020.1784020
21. Goggin, G., Ellis, K. (2020). Disability, communication, and life itself in the COVID-19 pandemic, *Health Sociology Review*, 29:2, 168–176, DOI: 10.1080/14461242.2020.1784020
22. Hall, T., Kakuma, R., Palmer, L., Minas, H., Martins, J. and Kermodé, M. (2019). Social inclusion and exclusion of people with mental illness in Timor-Leste: a qualitative investigation with multiple stakeholders. *BMC Public Health*, 19, 702, 1 – 13, <https://doi.org/10.1186/s12889-019-7042-4>.
23. Hardonk, S., Halldórsdóttir, S. (2021). Work Inclusion through Supported Employment? Perspectives of Job Counsellors in Iceland. *Scandinavian Journal of Disability Research*, 23 (1), pp. 39–49, DOI: <https://doi.org/10.16993/sjdr.767>.
24. Holm, M.E., Sainio, P., Parikka, S., Koskinen, S. (2022). The effects of the COVID-19 pan-

demic on the psychosocial well-being of people with disabilities, *Disability and Health Journal*, 15(2), 101224. <https://doi.org/10.1016/j.dhjo.2021.101224>

25. Johnstone, C.J., Matthew J. Schuelka, M.J., Swadek, G. (2020). Quality Education for All? The Promises and Limitations of the SDG Framework for Inclusive Education and Students with Disabilities. *Grading Goal Four*, 4, 96–115, DOI: 10.1163/9789004430365_004.

26. Kamiński, M., Łoniewski, I., & Marlicz, W. (2020). “Dr. Google, I am in Pain”—Global Internet Searches Associated with Pain: A Retrospective Analysis of Google Trends Data. *International journal of environmental research and public health*, 17(3), 954.

27. Kostakos, P. (2018). Public perceptions on organised crime, mafia, and terrorism: a big data analysis based on twitter and Google trends. *International Journal of Cyber Criminology*, 12(1), 282–299.

28. Krishnan, I., Mello, G., Kok, S., Sabapathy, S., Munian, S., Ching, H., Kandasamy, P., Ramalingam, S., Baskaran, S. and Kanan, V. (2020) “Challenges Faced by Hearing Impairment Students During COVID-19”, *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(8), pp. 106–116. doi: 10.47405/mjssh.v5i8.472.

29. Kuper, H., Bright, T., Davey, C., & Shakespeare, T. (2020, April 30). Disability-inclusive COVID-19 response: What it is, why it is important and what we can learn from the United Kingdom’s response. *Wellcome Open Research*, 5(79), 1–7.

30. Kwak, S. K., & Kim, J. H. (2017). Statistical data preparation: management of missing values and outliers. *Korean journal of anaesthesiology*, 70(4), 407.

31. Lawson, A., Beckett, A.E. (2021). The social and human rights models of disability: towards a complementarity thesis, *The International Journal of Human Rights*, 25:2, 348–379, DOI: 10.1080/13642987.2020.1783533.

32. Leisering L. (2021). One Hundred Years of Social Protection. The Changing Social Question in Brazil, India, China, and South Africa, <https://doi.org/10.1007/978-3-030-54959-6>.

33. Leporini, B., Buzzi, M., Hersh, M. (2021). Distance Meetings During the Covid-19 Pandemic: Are Video Conferencing Tools Accessible for Blind People? In *Proceedings of ACM 18th Int. Web for All Conference (W4A’21)*. ACM, New York, NY, USA, 11 pages, DOI:<https://doi.org/10.1145/3430263.3452433>.

34. Madhesh, A. (2021). Full exclusion during COVID-19: Saudi Deaf education is an example. *Heliyon*, vol. 7, 3, pp. 1 – 7, DOI: <https://doi.org/10.1016/j.heliyon.2021.e06536>.

35. Mellon J. (2014) Internet Search Data and Issue Salience: The Properties of Google Trends as a Measure of Issue Salience, *Journal of Elections, Public Opinion & Parties*, 24:1, 45–72, DOI:10.1080/017457289.2013.846346

36. Miethlich, B., Oldenburg, A.G. (2019). How Social Inclusion Promotes Sales: An Analysis of the Example of Employing People with Disabilities. *Journal of Marketing Research and Case Studies*, vol. 2019, article ID 463316, pp. 1–15, DOI: 10.5171/2019.463316.

37. Mira J.J., Carrillo I., Navarro I.M., Guilabert M., Vitaller J., Pérez-Jover V., Aguado H. (2018). Public participation in health. A review of reviews. *Anales del Sistema Sanitario de Navarra*, 41(1), 91–106. doi.org/10.23938/ASSN.0172

38. Moreland, Ch. J., Paludneviciene, R., Park, J. H., McKee, M., Kushalnagar, P. (2021). Deaf adults at higher risk for severe illness: COVID-19 information preference and perceived health consequences. *Patient Education and Counseling*, DOI: <https://doi.org/10.1016/j.pec.2021.03.020>.

39. Moriña, A., Perera, V.H., Carballo, R. (2020). Training Needs of Academics on Inclusive Education and Disability. *SAGE open*, vol. 10, 3, 1-10, DOI: 10.1177/2158244020962758.

40. O’Donovan, M.A. (2021). The Elusive Inclusive University: What Does This Look Like for

Students with Intellectual Disability? An Irish Perspective. *Journal of Policy and Practice in Intellectual Disabilities*, vol. 18, No. 1, 68–74, DOI: 10.1111/jppi.12375.

41. Ortiz, A. (2020). Lawsuit demands sign language at White House virus briefings. *The New York Times* <https://www.nytimes.com/2020/08/04/us/politics/asl-interpreter-lawsuit-coronavirus-trump.html> (August 4, 2020) Accessed October 18, 2020

42. Paludnevičienė, R., Knight, T., Firl, G., Luttrell, K., Takayama, K., Kushalnagar, P. (2021). Perception of COVID-19 Physical Distancing Effectiveness and Contagiousness of Asymptomatic Individuals: Cross sectional Survey of Deaf and Hard of Hearing Adults in the United States. *Journal of Medical Internet Research*, vol. 23, no. 2, pp. 1 – 21, DOI: <https://doi.org/10.2196/preprints.21103>.

43. Pineda, V. S., Corburn, J. (2020). Disability, Urban Health Equity, and the Coronavirus Pandemic: Promoting Cities for All. *Journal of Urban Health*, vol. 97, 336–341, <https://doi.org/10.1007/s11524-020-00437-7>.

44. Poon, B.T., Jenstad, L.M. Communication with face masks during the COVID-19 pandemic for adults with hearing loss. *Cogn. Research* 7, 24 (2022). <https://doi.org/10.1186/s41235-022-00376-8>

45. Pullan, S., Dey, M. (2021). Vaccine hesitancy and anti-vaccination in the time of COVID-19: A Google Trends analysis, *Vaccine*, (39)14, 1877–1881. <https://doi.org/10.1016/j.vaccine.2021.03.019>

46. Richardson, M., Petrini, K., Proulx, M. J. (2022). Access to exercise for people with visual impairments during the Coronavirus-19 pandemic. *British Journal of Visual Impairment* 1–16, DOI: 10.1177/02646196211067356.

47. Rovetta A. (2021). Reliability of Google Trends: Analysis of the Limits and Potential of Web Infoveillance During COVID-19 Pandemic and for Future Research, *Frontiers in Research Metrics and Analytics*, 6, DOI=10.3389/frma.2021.670226.

48. Sabatello, M., Landes, S. D., McDonald, K. E. (2020) People with Disabilities in COVID-19: Fixing Our Priorities, *The American Journal of Bioethics*, 20:7, 187–190, <https://doi.org/10.1080/15265161.2020.1779396>.

49. Said, M., Hn, W., Azizah, S., Darmawan, D., Anwar, C. R. (2022). Digital Skills of Blind College Students in the Educational Process during a Pandemic, *Journal of ICSAR*, ISSN (print): 2548-8619; ISSN (online): 2548-8600, Vol. 6, No 1, DOI: <http://dx.doi.org/10.17977/um005v6i12022p067>.

50. Silva, A.G., Batista, T., Giraud, F., Giraud, A., Pinto-Silva, F.E., Barral, J., Guimarães, J.N., Rumjanek, V. (2020). Science communication for the Deaf in the pandemic period: absences and pursuit of information. *Journal of Science Communication*, vol. 19, 05, DOI: <https://doi.org/10.22323/2.19050205>.

51. Simionescu, M., & Cifuentes-Faura, J. (2021). Can unemployment forecasts based on Google Trends help government design better policies? An investigation based on Spain and Portugal. *Journal of Policy Modelling*.

52. Simionescu, M., Raišienė, A.G. (2021). A bridge between sentiment indicators: What does Google Trends tell us about COVID-19 pandemic and employment expectations in the EU new member states? *Technological Forecasting and Social Change*, 173, 121170, <https://doi.org/10.1016/j.techfore.2021.121170>.

53. Swanwick, R., Oppong, A.M., Offei, Y.N., Fobi, D., Appau, O., Fobi, J., Mantey, F.F. (2020). The impact of the COVID-19 pandemic on deaf adults, children and their families in Ghana. *Journal of the British Academy*, 8, 141–165, DOI <https://doi.org/10.5871/jba/008.141>.

54. Swerts, D. B., Barbosa, G., & Peres, M. F. P. (2022). Headache and rhinitis: pattern search on Google Trends for 17 years. *einstein* (São Paulo), 20.

55. Thompson, J. J., Wilby, R. L., Matthews, T., & Murphy, C. (2021). The utility of Google Trends as a tool for evaluating flooding in data-scarce places. *Area*.

56. Tofanelli, M., Capriotti, V., Gatto, A., Boscolo-Rizzo, P., Rizzo, S., Tirelli, G. (2022). COVID-19 and Deafness: Impact of Face Masks on Speech Perception, *Journal of American Academy of Audiology*, DOI: 10.1055/s-0041-1736577
57. Tomasuolo, E., Gulli, T., Virginia Volterra, V., Fontana, S. (2021). The Italian Deaf Community at the Time of Coronavirus. *Frontiers in Sociology*, vol. 5, pp. 1–10, DOI: <https://doi.org/10.3389/fsoc.2020.612559>.
58. Vaughan, C., Gill-Atkinson, L., Devine, A., Zayas, J., Ignacio, R., Garcia, J., Bisda, K., Salgado, J., Marco, M.J. (2020). Enabling Action: Reflections upon Inclusive Participatory Research on Health with Women with Disabilities in the Philippines. *American Journal of Community Psychology*, vol. 66, No. 3–4, 370–380, DOI 10.1002/ajcp.12468.
59. Whitsitt, J., Karimkhani, C., Boyers, L. N., Lott, J. P., & Dellavalle, R. P. (2015). Comparing burden of dermatologic disease to search interest on google trends. *Dermatology Online Journal*, 21(1).
60. Wu, G. C., Tao, S. S., Zhao, C. N., Mao, Y. M., Wu, Q., Dan, Y. L., & Pan, H. F. (2019). Leveraging Google Trends to investigate the global public interest in rheumatoid arthritis. *Rheumatology international*, 39(8), 1439–1444.
61. Yuwono, I., Rapisa, D.R., Damastuti, E. (2021). Role of Information Channels for Information Accessibility to the Deaf during COVID-19 Pandemic in Indonesia. *Educational Sciences: Theory and Practice*, 21(2), 1–12. <http://dx.doi.org/10.12738/jestp.2021.2.001>
62. Zhao, X., Coxe, S.J., Timmons, A.C. et al. (2022). Mental Health Information Seeking Online: A Google Trends Analysis of ADHD. *Adm Policy Ment Health* 49, 357–373 <https://doi.org/10.1007/s10488-021-01168-w>.
63. Zhao, X., Zhang, C. (2018). From isolated fence to inclusive society: the transformational disability policy in China. *Disability & Society*, 33:1, 132-137, DOI:10.1080/09687599.2017.1375246.
64. Zitting, K.M., Lammers-van der Holst, H.M., Yuan, R.K., Wang, W., Quan, S.F., Duffy, J.F. (2019). Google Trends reveals increases in internet searches for insomnia during the 2019 coronavirus disease (COVID-19) global pandemic, *Journal of Clinical Sleep Medicine*, 17(2), <https://doi.org/10.5664/jcsm.8810>.