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LETTER TO THE EDITOR

The Internet's Interest in Autism Peaks in April: A Google Trends Analysis

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To the editor:

Health awareness events include interventional strategies that are intended to raise public interest and awareness regarding specialized topics. Influencing the placement of information in the environment and maximizing exposure are main goals of every awareness campaign. According to Randalph and Viswanath, interventions utilizing mass media campaigns are designed to alter the normal trend in distribution of information available on the topic of interest, aiming to change the placement of information in the environment both quantitatively and qualitatively (Randolph & Viswanath, 2004).

The number of health awareness initiatives is increasing. In 2020, there were more than 300 worldwide campaigns (Vernon et al., 2021). These initiatives report excessive cost and resource usage. However, there is only minimal evidence to support the efficacy of these efforts (Purtle & Roman, 2015). An analysis of the effect of health awareness events, such as breast cancer or alcohol awareness initiatives, yielded disillusioned results. Only 10 out of 46 selected events resulted in an increased search frequency on Google (Hao et al., 2019). If health awareness events have an effect, it seemingly tends to be short lived (Havelka et al., 2020).

Since 1972, the Autism Society of America organizes a nationwide awareness event in order to assure that "all affected by autism are able to achieve the highest quality of life possible", first as National Autistic Children's week, later as Autism Acceptance Month in April. On April 2nd, 2008, the first World Autism Awareness Day was held by the United Nations (UN). It is one of only seven official health-specific days observed by the UN. The aim was to "encourage Member States to take measures to raise awareness throughout society" (United Nations, 2007).

Over the years, several different autism campaigns have been introduced. World Autism Awareness Day, World Autism Awareness Week, and the World Autism Awareness Month are all observed in the month of April. The hypothesis of our study was that these efforts in raising public interest should be reflected by an increase in online traffic in April compared to other months of the year.

In this study, data was assessed from the holding company, Alphabet Inc., offering the Web service Google Trends the most popular search queries. For this study, queries on "autism" were examined from 2008 through 2021 without any regional limitations and without any translations into non-English languages. Google Trend results were provided as normalized so that the maximum is scaled to 100. Absolute figures on the number of searches are not provided. In order to compensate for the sampling errors introduced by daily subsampling of Google Trends instead of incorporating all search queries in its analysis, the data set to autism was acquired at nine varying times between January 27th and February 5th, 2022.

Based on this data, the monthly average values were determined for the period under review (2008 to 2021), as well as the sample standard deviation for statistical

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reliability. Next, the monthly values for all years under review were averaged to find a monthly value. The sample standard deviations were also determined from these values. Data were analysed by repeated measure ANOVA.

The results of the global searches on 'autism' are plotted in Fig. 1. The diagram shows the average values per month (red), statistical reliability, and the sample standard deviation (pink). These lines show an annually repeating pattern with a peak in April. This pattern becomes even clearer when the search queries for all years were considered per month (see Fig. 2, $p = 0.00001$). The corresponding average values of the monthly groupings are listed in Table 1.

The data shows a significant increase of Google Searches annually in April. This pattern was consistent for all years between 2008 and 2021, when the first World Autism Awareness Week was declared by the UN. Only a few health awareness events have been able to prove such a positive effect (Hao et al., 2019). However, after the month of Autism Awareness, public interest by way of google searches declined again. This shows the importance of annually

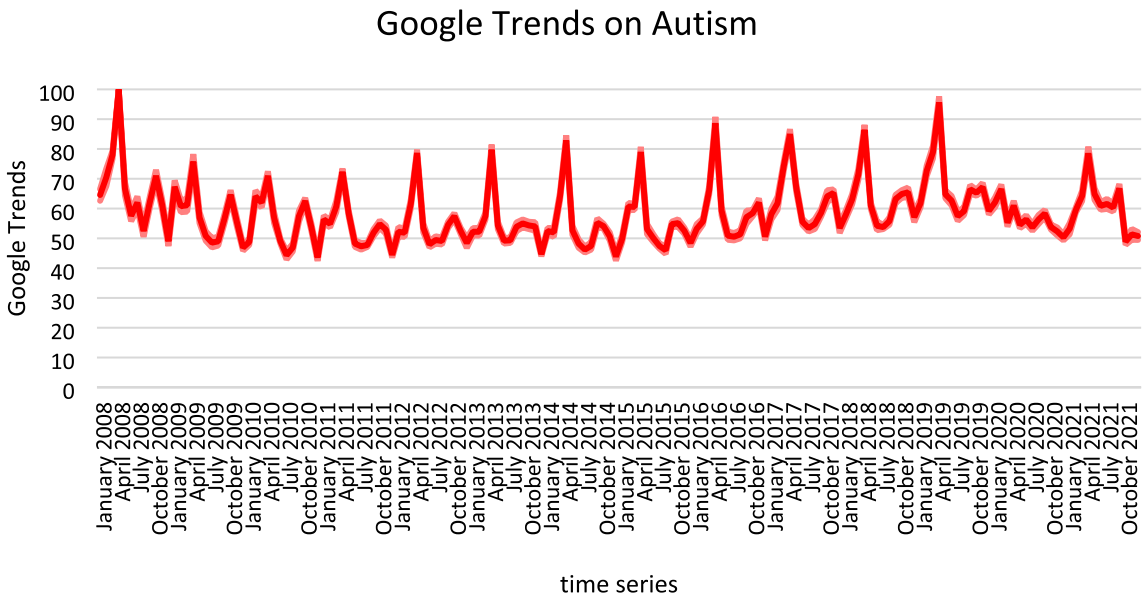

Fig. 1 Google Trends records an annually repeating pattern for the search term 'autism' between 2008 and 2021

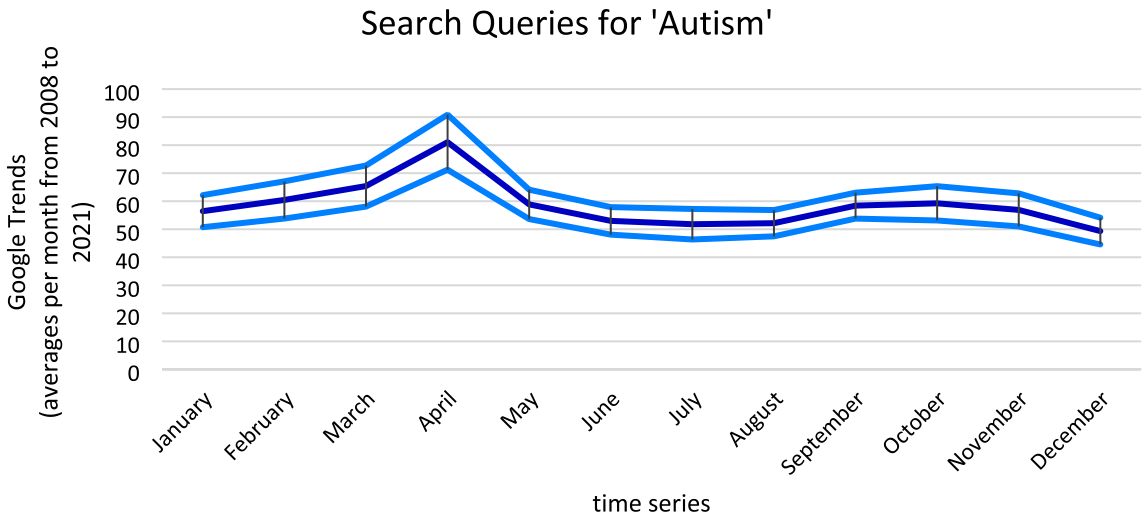

Fig. 2 Searches for 'Austism' increase every year in April (plotted in dark blue). To exclude sampling errors by Google Trends, the data were collected several times and the offset of the sampling standard deviation was included in the diagram (plotted in light blue)

Table 1 In the month of April, compared to the rest of the year, there is an increased interest in the topic of autism in Google Trends searches

Google trends data on autism												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average value	56,4	60,5	65,4	81,1	58,9	53,0	51,8	52,2	58,4	59,2	56,9	49,3
Sample standard deviation	7,5	7,8	8,1	9,0	7,7	7,3	7,2	7,2	7,6	7,7	7,5	7,0

recurring events to keep the topic constantly present and on the minds of the American population.

It is of importance to mention that this study focuses only on Google searches. However, Google has a constant worldwide search engine market share of over 90% (StatCounters, 2022). Thus, it is reasonable to assume that the data basis represents all internet searches. Furthermore, Google Trends data have been used scientifically for various applications, e.g. for assessment of different population measurement during COVID-19 (Brodeur et al., 2021; Díaz & Henríquez, 2021; Szilagyi et al., 2021). When planning the study, the inclusion of Twitter data was considered as a secondary source of data. The short-term effect of the World Autism Awareness Day on Twitter was evaluated by (Ahmed et al., 2018). It was shown that there was an increase in the volume and the rate of positive tweets after April 2nd, 2015. However, that study focussed on a one-time evaluation. As stated in the limitations, further studies should evaluate longevity. A relevant issue is that Twitter is a vehicle for social campaigning. For a proper analysis, tweets which are part of a campaign (i.e. published by governmental or non-governmental organisations or professionals working for them), have to be separated from tweets that represent public interest. (Nguyen et al., 2019) As the aim of this study was to show the long-term effects of Autism campaigns, Twitter data was not included, as the manual filtering of decades of world-wide data would not be reasonably accomplishable with the available resources. For the questions of this research study, Google usage was a more robust source of data, as it represents search activities and is not biased by the campaign itself.

Clearly, our study design is not designed to establish causality between the health awareness events and the changes in search queries, and certainly not to demonstrate any effectiveness of the events. Nevertheless, the various initiatives that are set on this topic in April suggest that the observed changes could be related to the campaigns in terms of time.

Our data should encourage and motivate everyone involved in health awareness campaigns, especially but not restricted to the field of autism. According to our interpretation, awareness campaigns provide information, which in turn leads to increased online searches. Consequently, in April there is a greater demand for information on autism. Thus, it can be concluded that public acceptance of clinical or scientific topics often occurs during particular awareness months.

In conclusion, Google searches for autism significantly increase in April, the autism awareness month. There is a temporal relationship between the awareness campaigns and an increased public interest for autism.

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Declarations

Conflict of interest All authors declare no conflict of interest.

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