

of news exposure. Incorporating user demographics into the exposure model is another area for future investigation.

Interestingly, though the time from publication to exposure takes many hours, the time from exposure to action is extremely short, typically only a few minutes. This has important implications for the topics in our study and more generally. First, there is little time to take mitigating actions once a person is exposed to a harmful news item. Therefore, news items should be evaluated for their effect prior to publication, as we describe below. Second, and more broadly, when for example, firms wishing to test the effectiveness of ads or news items about their company can expect that actions will follow almost immediately after exposure.

Our results show that NIAS values are predictable, based on the terms used in news articles. This implies that the appearance of AQs can be predicted for a given news item with relatively high accuracy (AUC greater than 0.84 in all cases). Therefore, it is possible to evaluate a news story prior to publication and predict its effect before it is shown to people. For news stories on suicides or other cases where news stories might have negative effects, our models to predict NIAS values offer journalists a useful tool for evaluating (and perhaps thereafter modifying) their publications to reduce the chance of negative effects. For public health officials, our tools offer the ability to evaluate news releases to maximize their effectiveness. Future work will investigate how specific demographic traits interact with terms to form even more accurate models.

6. REFERENCES

- [1] L. Backstrom, J. Kleinberg, R. Kumar, and J. Novak. Spatial variation in search engine queries. In *Proceedings of the 17th international conference on World Wide Web*, pages 357–366. ACM, 2008.
- [2] P. N. Bennett, R. W. White, W. Chu, S. T. Dumais, P. Bailey, F. Borisyuk, and X. Cui. Modeling the impact of short- and long-term behavior on search personalization. In *Proceedings of the 35th international ACM SIGIR conference on Research and development in information retrieval*, pages 185–194. ACM, 2012.
- [3] D. Carmel, E. Farchi, Y. Petruschka, and A. Soffer. Automatic query refinement using lexical affinities with maximal information gain. In *Proceedings of the 25th annual international ACM SIGIR conference on Research and development in information retrieval*, pages 283–290. ACM, 2002.
- [4] Q. Cheng, F. Chen, and P. S. Yip. The foxconn suicides and their media prominence: is the werther effect applicable in china? *BMC public health*, 11(1):841, 2011.
- [5] F. Diaz. Integration of news content into web results. In *Proceedings of the Second ACM International Conference on Web Search and Data Mining*, pages 182–191. ACM, 2009.
- [6] R. O. Duda, P. E. Hart, and D. G. Stork. *Pattern classification*. John Wiley & Sons, 2012.
- [7] A. Frei, T. Schenker, A. Finzen, V. Dittmann, K. Kraeuchi, and U. Hoffmann-Richter. The werther effect and assisted suicide. *Suicide and Life-Threatening Behavior*, 33(2):192–200, 2003.
- [8] Q. Gan, J. Attenberg, A. Markowetz, and T. Suel. Analysis of geographic queries in a search engine log. In *Proceedings of the first international workshop on Location and the web*, pages 49–56. ACM, 2008.
- [9] A. Hassan, Y. Song, and L.-w. He. A task level metric for measuring web search satisfaction and its application on improving relevance estimation. In *Proceedings of the 20th ACM international conference on Information and knowledge management*, pages 125–134. ACM, 2011.
- [10] K. Hawton, S. Simkin, J. J. Deeks, S. O’Connor, A. Keen, D. G. Altman, G. Philo, C. Bulstrode, et al. Effects of a drug overdose in a television drama on presentations to hospital for self poisoning: time series and questionnaire study. *Bmj*, 318(7189):972–977, 1999.
- [11] A. P. Institute. How americans get their news. <https://www.americanpressinstitute.org/publications/reports/survey-research/how-americans-get-news/>, 2014.
- [12] A. Kulkarni, J. Teevan, K. M. Svore, and S. T. Dumais. Understanding temporal query dynamics. In *Proceedings of the fourth ACM international conference on Web search and data mining*, pages 167–176. ACM, 2011.
- [13] J. Leskovec, L. Backstrom, and J. Kleinberg. Meme-tracking and the dynamics of the news cycle. In *Proceedings of the 15th ACM SIGKDD international conference on Knowledge discovery and data mining*, pages 497–506. ACM, 2009.
- [14] Q. Mei, C. Liu, H. Su, and C. Zhai. A probabilistic approach to spatiotemporal theme pattern mining on weblogs. In *Proceedings of the 15th international conference on World Wide Web*, pages 533–542. ACM, 2006.
- [15] T. Niederkrotenthaler, M. Voracek, A. Herberth, B. Till, M. Strauss, E. Etzersdorfer, B. Eisenwort, and G. Sonneck. Role of media reports in completed and prevented suicide: Werther v. papageno effects. *The British Journal of Psychiatry*, 197(3):234–243, 2010.
- [16] P. W. O’Carroll and L. B. Potter. Suicide contagion and the reporting of suicide: Recommendations from a national workshop. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, pages 9–18, 1994.
- [17] D. R. Olson, K. J. Konty, M. Paladini, C. Viboud, and L. Simonsen. Reassessing google flu trends data for detection of seasonal and pandemic influenza: a comparative epidemiological study at three geographic scales. *PLoS Comput Biol*, 9(10):e1003256, 2013.
- [18] D. P. Phillips. The influence of suggestion on suicide: Substantive and theoretical implications of the werther effect. *American Sociological Review*, pages 340–354, 1974.
- [19] M. Richardson. Learning about the world through long-term query logs. *ACM Transactions on the Web*, 2(4):21, 2008.
- [20] F. Richter. Americans use electronic media 11+ hours a day. <http://www.statista.com/chart/1971/electronic-media-use/>, 2015.
- [21] A. Schmidtke and H. Häfner. The werther effect after television films: new evidence for an old hypothesis. *Psychological medicine*, 18(03):665–676, 1988.
- [22] M. Sisask and A. Värnik. Media roles in suicide prevention: a systematic review. *International journal of environmental research and public health*, 9(1):123–138, 2012.
- [23] E. Yom-Tov and F. Diaz. Location and timeliness of information sources during news events. In *Proceedings of the 34th international ACM SIGIR conference on Research and development in Information Retrieval*, pages 1105–1106. ACM, 2011.
- [24] E. Yom-Tov and F. Diaz. Out of sight, not out of mind: on the effect of social and physical detachment on information need. In *Proceedings of the 34th international ACM SIGIR conference on Research and development in Information Retrieval*, pages 385–394. ACM, 2011.
- [25] E. Yom-Tov and F. Diaz. The effect of social and physical detachment on information need. *ACM Transactions on Information Systems (TOIS)*, 31(1):4, 2013.
- [26] E. Yom-Tov and L. Fernandez-Luque. Information is in the eye of the beholder: Seeking information on the mmr vaccine through an internet search engine. In *AMIA Annual Symposium Proceedings*, volume 2014, page 1238. American Medical Informatics Association, 2014.