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**数据可用性声明: 所有原始数据在补充文件的表格中提供。所有结果的 Excel 文件可以根据作者的要求提供。本文中包含的数据和支持信息文件构成了最小的基础数据集。**

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RESEARCH ARTICLE

研究文章

Just ask Siri? A pilot study comparing smartphone digital assistants and laptop Google searches for smoking cessation advice

一项比较智能手机数字助手和笔记本电脑的初步研究表明，谷歌在搜索戒烟建议时，会使用谷歌搜索引擎

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Abstract

摘要

**Objective**

**目的**

To compare voice-activated internet searches by smartphone (two digital assistants) with laptop ones for information and advice related to smoking cessation.

比较使用智能手机(两个数码助理)和笔记本电脑以声控方式上网搜寻与戒烟有关的资讯和建议。

**Design**

**设计**

Responses to 80 questions on a range of topics related to smoking cessation (including the FAQ from a NHS website), compared for quality.

对80个与戒烟有关的问题的回答(包括来自 NHS 网站的常见问题) ，对质量进行比较。

**Setting**

**设置**

Smartphone and internet searches as performed in New Zealand.

新西兰的智能手机和互联网搜索。

**Main outcome measures**

**主要成果指标**

Ranked responses to the questions.

对问题的回答排名。

**Results**

**结果**

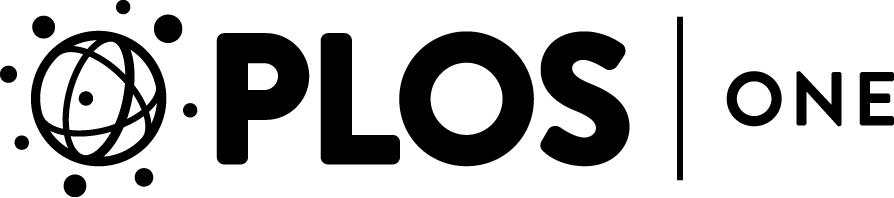
Google laptop internet searches came first (or first equal) for best quality smoking cessation advice for 83% (66/80) of the responses. Voiced questions to Google Assistant (“OK Goo-gle”) came first/first equal 76% of the time vs Siri (Apple) at 28%. Google and Google Assistant were statistically significantly better than Siri searches (odds ratio 12.4 and 8.5 respectively, p<0.0001 in each comparison). When asked FAQs from the National Health Service website, or to find information the Centers for Disease Control has made videos on, the best search results used expert sources 59% (31/52) of the time, “some expertise” (eg, Wikipedia) 18% of the time, but also magazines and other low quality sources 19% of the time. Using all three methods failed to find relevant information 8% (6/80) of the time, with Siri having the most failed responses (53% of the time).

在83% (66/80)的受访者中，谷歌笔记本电脑互联网搜索的最佳戒烟建议排在第一位(或第一位)。问谷歌助手(“ OK Goo-gle”)的浊音问题排在第一位/第一位的几率为76% ，而 Siri (苹果)的几率为28% 。谷歌和谷歌助手在统计学上明显优于 Siri 搜索(优势比分别为12.4和8.5，p < 0.0001)。当被问及国家卫生服务网站的常见问题，或者是疾病控制中心制作的视频时，最好的搜索结果有59% (31/52)使用专家来源，18% 的时候使用“一些专家”(例如维基百科) ，还有19% 的时候使用杂志和其他低质量的来源。使用这三种方法发现相关信息的失败率为8% (6/80) ，其中 Siri 的失败率最高(53%)。



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比较智能手机数字助手和笔记本电脑谷歌搜索戒烟建议

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**Conclusion**

**结论**

Google internet searches and Google Assistant were found to be significantly superior to the Siri digital assistant for smoking cessation information. While expert content was returned over half the time, there is still substantial room for improvement in how these soft-ware systems deliver smoking cessation advice.

研究发现，在提供戒烟信息方面，谷歌互联网搜索和谷歌助手明显优于 Siri 数字助手。虽然专家的内容被返回超过一半的时间，在这些软件系统如何提供戒烟建议方面仍有很大的改进空间。

**Introduction**

**引言**

The internet is widely used for obtaining health-related information and advice. For example, in the United Kingdom, 41% of internet users report going online to find information for health-related issues, with about half of these (22% of all users) having done so in the previous week [[1](#page6)]. But many people are also wary of the information they find online and value trusted sources [[2](#page6)]. Improving search engine functionality offers a potential solution. For example, Google is cooperating with Mayo Clinic physicians to curate and check health data that is added to the database it uses for instant search results [[3](#page6)]. Similarly, National Health Service (NHS) England is working with Microsoft and Google to increase the visibility of NHS content online [[4](#page6)].

互联网被广泛用于获取与健康有关的信息和建议。例如，在联合王国，41% 的互联网用户报告说，他们上网查找与健康有关的问题的信息，其中大约一半(占所有用户的22%)是在前一周这样做的[1]。但许多人也对他们在网上找到的信息保持警惕，并重视可信来源[2]。改善搜索引擎功能提供了一个潜在的解决方案。例如，谷歌正在与梅奥诊所的医生合作，对添加到其用于即时搜索结果的数据库中的健康数据进行管理和检查[3]。同样，英国国民健康服务(NHS)正在与微软和谷歌合作，以提高 NHS 内容在线的可见性[4]。



With increasing smartphone use there is also a particular case for studying health informa-tion obtainable with digital assistants on smartphones. Present literature on digital assistant use is very limited [[5](#page6)–[7](#page6)]. and there appears to be no published research on the use of these tools in providing information or advice on smoking cessation. Therefore we aimed to assess the current situation using the digital assistants Siri and Google Assistant (GA) and to compare these with internet searches.

随着智能手机使用量的增加，研究智能手机上数字助手获得的健康信息也是一个特殊的案例。目前关于数字助理使用的文献非常有限[5-7]。似乎没有关于使用这些工具提供戒烟信息或建议的已发表研究。因此，我们旨在使用数字助手 Siri 和谷歌助手(GA)评估当前的情况，并将其与互联网搜索进行比较。



**Methods**

**方法**

**Selection of digital assistants**

**数字助理的选择**

Siri (Apple) and GA (Google) were selected because they were in common use as personal dig-ital assistants at the time of the Pilot study in October 2017 [[5](#page6), [6](#page6)].

Siri (苹果)和 GA (谷歌)之所以被选中，是因为在2017年10月的试点研究中，它们被广泛用作个人数字助手[5,6]。



**Selection of questions**

**问题选择**

The first set of questions (n = 35) were adapted from the most detailed “frequently asked ques-tions (FAQ)” we could identify: that of the UK National Health Service (NHS) smokefree web-site [[8](#page6)]. The specific questions are listed in S1 Appendix, including slight modifications so they are relevant to an international audience.

第一组问题(n = 35)是根据我们能够识别的最详细的“常见问题(FAQ)”改编而成的: 英国国民健康服务(NHS)无烟网站[8]。S1附录列出了具体的问题，包括轻微的修改，以便与国际受众相关。



The next set of questions (n = 17) were related to the most comprehensive list of short vid-eos on smoking-related disease that we could identify: those produced by the Centers for Dis-ease Control and Prevention (CDC) in the USA for the “Tips From Former Smokers” Campaign [[9](#page6)].

下一组问题(n = 17)与我们能够确定的关于吸烟相关疾病的最全面的短视频清单有关: 那些由美国疾病控制和预防中心(CDC)为“戒烟小贴士”运动制作的视频[9]。



The final set of questions (n = 28) were those devised by us to test responses to a range of

最后一组问题(n = 28)是我们设计的用于测试对一系列

features such as, finding smoking-related pictures, diagrams, instructional videos; and navigat-ing to the nearest service/retailer for quitting-related products.

例如，寻找与吸烟有关的图片、图表、教学视频; 以及导航到最近的服务商/零售商寻找与戒烟有关的产品。

**Data collection**

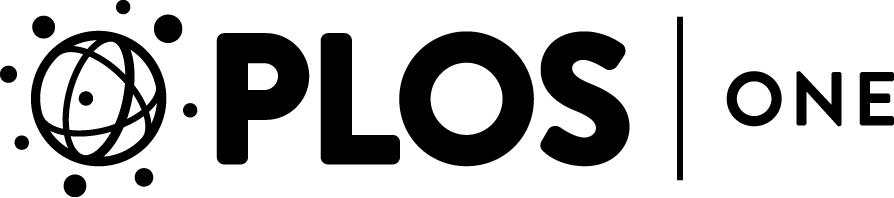
**数据收集**

Data were collected independently by both researchers on a pre-designed form and each inde-pendently conducted their own quality grading and rankings (internet search vs GA vs Siri).

数据由两位研究人员以预先设计的形式独立收集，每位研究人员独立进行自己的质量评级和排名(互联网搜索 vs GA vs Siri)。

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比较智能手机数字助手和笔记本电脑谷歌搜索戒烟建议

For speaking into the smartphones, a maximum of three attempts were made per question by the two authors (both of whom had New Zealand accents). The smartphones used were an iPhone 5S and an iPhone 7, with settings for “English (New Zealand)”. For Google searches on laptops, the site used was that for New Zealand (https://www.Google.co.nz/) and using Google Chrome. Only the first non-advertisement link or information returned was considered in the analysis. All searches were conducted in October 2017 with both researchers being located in New Zealand (in the capital city and a small rural town, 250 km apart).

对着智能手机说话，两位作者(都有新西兰口音)每个问题最多做三次尝试。使用的智能手机分别是 iPhone 5S 和 iPhone 7，设置为“ English (New Zealand)”。对于笔记本电脑上的谷歌搜索，使用的网站是新西兰。Google.co.nz/)和使用 Google Chrome。分析中只考虑了第一个非广告链接或返回的信息。所有的搜索都是在2017年10月进行的，两名研究人员都在新西兰(首都和一个相距250公里的乡村小镇)。

**Hierarchy of information/advice quality**

**资讯/谘询服务质素的层次**

In independently grading the quality of the information and advice, we used the following hierarchy:

在对信息和建议的质量进行独立评级时，我们使用了以下层次结构:

Grade A: Health agencies which had medical expertise whether local or international (eg, Ministry of Health, the national Quitline service, the NHS, CDC, universities, and hospitals).

A 级: 具有本地或国际医疗专业知识的卫生机构(如卫生部、国家退出热线服务机构、国民保健服务机构、疾病预防控制中心、大学和医院)。

Grade B: Sites with “some expertise”. Examples were Wikipedia and commercially orien-tated medical sites such as WebMD, or certified clinicians giving information directly.

B 级: 具有“一些专业知识”的网站。例如维基百科和商业化的医学网站，如 WebMD，或者注册临床医生直接提供信息。

Grade C: Online news items, online magazines and internet sites run by individuals and non-health organisations.

丙级: 由个人及非卫生机构营办的网上新闻、网上杂志及互联网网站。

**Analysis**

**分析**

Inter-rater agreement was calculated on the ratings of quality of the content and which tools were best or equal best in answering each question. The frequency with which the three search tools provided the best information was compared using odd ratios.

根据内容质量的评级以及在回答每个问题时哪些工具最好或同样最好，计算了评级者之间的协议。三种搜索工具提供最佳信息的频率使用奇数比进行比较。

**Results**

**结果**

The tools frequently returned different search results to the two raters. On the 55 occasions that the best quality result was the same for both raters, there was 100% concordance of the rat-ers’ grading of quality of the information (grades: A, B or C).

这些工具经常将不同的搜索结果返回给两个评分者。在两个评分者的最佳质量结果相同的55次评分中，评分者对信息质量的评分(a、 b、 c 级)有100% 的一致性。

Cohen’s kappa was calculated for the level of observer agreement for ranking which tool had returned the best or best equal information. There were eight possible ranking choices for each question (one tool being best alone, or combinations of best equal, or none) and kappa was 0.45 –when blinded, showing moderate agreement. This was surely lowered by instances where the search results returned were different between raters. When instances where the content returned by the best rated tool was the same, kappa rose to 0.56.

Cohen 的 kappa 是根据观察者协议的水平计算的，用于排名哪个工具返回了最好或最好的平等信息。每个问题有八个可能的排名选择(一个工具是最好的单独，或组合的最佳相等，或没有)和 kappa 是0.45-当盲人，显示中度一致。这肯定是降低的情况下，搜索结果返回是不同的评分者。当评分最高的工具返回的内容相同时，kappa 值上升到0.56。

A laptop-based Google search provided the best or equal best information 83% (66/80) of the time (Table 1, see also S1 Appendix for specific results). GA was the better digital assistant, with 76% of the best (or best equal) responses, compared to Siri (28%). All three search approaches were classified as equally successful for only 18 questions (22%). The results for Google searches were not statistically significantly better than GA, but were considerably bet-ter than Siri, odds ratio (OR) = 12.4 (95% CI = 5.8–26.5, p*<*0.0001). GA was better than Siri with OR = 8.5 (4.2–17.3, p*<*0.0001).

基于笔记本电脑的 Google 搜索提供了83% (66/80)的最佳或相同的最佳信息(表1，具体结果参见 S1附录)。GA 是更好的数字助手，与 Siri (28%)相比，有76% 的最佳(或最佳平等)响应。所有三种搜索方法仅被分类为18个问题(22%)同样成功。谷歌搜索结果与遗传算法相比无显著性差异，但与 Siri 相比有显著性差异，优势比(OR) = 12.4(95% CI = 5.8ー26.5，p < 0.0001)。GA 优于 Siri，OR = 8.5(4.2-17.3，p < 0.0001)。

Google searches also had the lowest outright failure rate of providing no useful response for 9% (7/80) of the questions, compared to GA (14%, 12/80) and Siri (53%, 42/80) with no signifi-cant differences between the former and GA, however Google was superior to Siri (p*<*0.0001), as was GA (p*<*0.0001). All three devices failed on only 8% (6/80) questions.

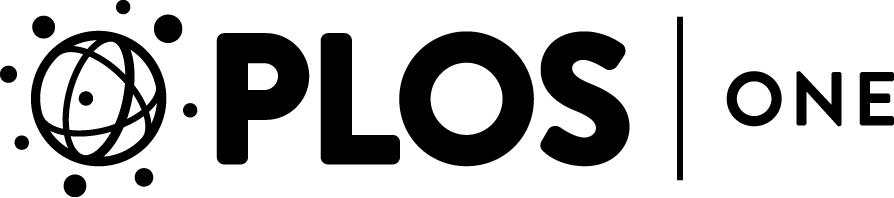
与 GA (14% ，12/80)和 Siri (53% ，42/80)相比，Google 搜索在9% (7/80)的问题中没有提供有用的答案，这也是最低的完全失败率，前者与 GA 之间没有显著差异，但 Google 优于 Siri (p < 0.0001) ，GA 也是如此(p < 0.0001)。所有三种设备仅在8% (6/80)的问题上失败。

For assessing response quality, we considered just the questions relating to the NHS 35 FAQs and also those relating to the CDC’s set of 17 videos on smoking cessation. Taking just the best result for each of these 52 questions, 59% (31/52) of the search questions were answered with a best answer that we determined to be expert sources. These included the CDC

为了评估回应质量，我们只考虑了与 NHS 35常见问题有关的问题，以及与疾病预防控制中心的17套戒烟视频有关的问题。对于这52个问题中的每一个，只取最好的结果，59% (31/52)的搜索问题得到了我们认为是专家来源的最佳答案。这些包括疾控中心

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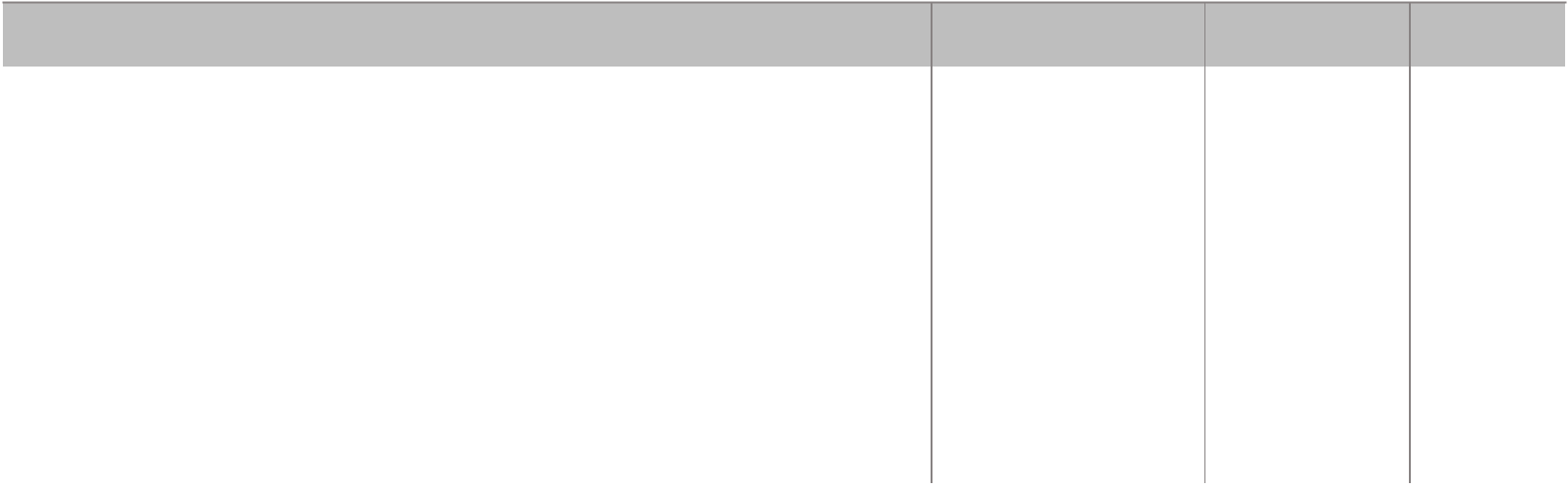
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**Table 1. Results for smoking cessation information and advice provided by Siri, Google Assistant and Google searches (see S1 Appendix for question specific results).**

**表1。Siri，谷歌助手和谷歌搜索提供的戒烟信息和建议的结果(有关问题的具体结果，请参阅 S1附录)。**



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Topic (for all n = 80 questions unless stated otherwise) 主题(所有 n = 80个问题，除非另有说明) | Typed Google search on a 输入谷歌搜索 | |  | Google Assistant 谷歌助理 |  |  | Siri Siri |
|  | laptop 笔记本电脑 | |  | (GA) (GA) |  |  |  |
|  |  | |  |  |  |  |  |
| Provided the best advice (first or first equal) 提供了最好的建议(第一或第一平等) | 83% (66#/80) 83% (66 #/80) | |  | 76% (61/80) 76% (61/80) |  | 28% 28% | (22/80) (22/80) |
| Provided the best advice (first or first equal) for the NHS FAQ questions (n = 35 questions) 对 NHS 常见问题(n = 35个问题)提供了最好的建议(第一或第一等同) | 90% 90% | (32/35) (32/35) |  | 79% (28/35) 79% (28/35) |  | 49% 49% | (17/35) (17/35) |
| Provided the best advice (first or first equal) for the questions around accessing videos (n = 17 对于访问视频的问题提供了最好的建议(第一个或第一个相等)(n = 17 | 79% 79% | (14/17) (14/17) | 85% (15/17) 85% (15/17) | | 0% 0% | | (0/17) (0/17) |
| questions) 问题) |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | |
| Provided the best information (first or first equal) for the pictures, locations and other 提供最佳的信息(第一或第一相等)的图片，位置和其他 | 75% 75% | (21/28) (21/28) | 66% (19/28) 66% (19/28) | | 18% (5/28) 18% (5/28) | | |
| functionality questions (n = 28 questions) 功能性问题(n = 28个问题) |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Failed to provide any useful information 未能提供任何有用的信息 | 9% 9% | (7/80) (7/80) |  | 14% (12/80) 14% (12/80) |  | 53% 53% | (42/80) (42/80) |
| First response was one or more advertisements 第一反应是一个或多个广告 | 21% 21% | (17/80) (17/80) | 28% (22/80) 28% (22/80) | | 8% (6/80) 8% (6/80) | | |
| Mean number of advertisements prior to a non-advertising response 非广告回应之前的平均广告数量 | 0.4 adverts 0.4个广告 | |  | 0.6 adverts 0.6个广告 |  | 0.3 adverts 0.3个广告 | |
|  |  |  |  |  |  |  | |
| Answer was from an expert source (grade A) (n = 52 questions from the NHS/CDC) 答案来自专家来源(a 级)(NHS/CDC n = 52个问题) | 52% 52% | (27/52) (27/52) |  | 49% (26/52) 49% (26/52) |  | 24% (13/52) 24% (13/52) | |
| Answer was from a semi- expert source (grade B) (n = 52 questions from the NHS/CDC) 答案来自一个半专家来源(b 级)(n = 52个来自 NHS/CDC 的问题) | 22% 22% | (12/52) (12/52) | 20% (11/52) 20% (11/52) | | 13% (7/52) 13% (7/52) | | |
|  |  |  |  |  |  |  | |
| Answer was from a non-expert source (grade C) (n = 52 questions from the NHS/CDC) 答案来自非专家来源(c 级)(NHS/CDC n = 52个问题) | 22% 22% | (12/52) (12/52) | 24% (13/52) 24% (13/52) | | 13% (7/52) 13% (7/52) | | |
|  |  |  |  |  |  |  |  |

Notes

注释

* mean of two raters rounded up to next whole number; statistical tests compared GA to Siri:

两个评分者四舍五入到下一个整数的平均数; 统计检验比较 GA 和 Siri:

p*<*0.01 p*<*0.001

P < 0.01 p < 0.001

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(n = 10), Cancer.org (n = 6), NHS (n = 4), and a range of other medical expert-endorsed sites eg, hospitals, specialist clinics, and universities. Around a fifth (18%, 10/52) of searches pro-vided websites with “some expertise” such as Wikipedia articles and commercially orientated ones (eg, private medical clinics), and 19% of searches provided only news items or magazine articles.

(n = 10) ，Cancer.org (n = 6) ，NHS (n = 4) ，以及一系列其他医学专家认可的网站，如医院，专科诊所和大学。大约五分之一(18% ，10/52)的搜索提供了“一些专业知识”的网站，如维基百科的文章和商业导向的网站(如私人医疗诊所) ，19% 的搜索只提供新闻项目或杂志文章。

**Discussion**

**讨论**

**Main findings and interpretation**

**主要发现和解释**

Our search results were encouraging in terms of the usefulness of the information provided, with nearly 60% of searches returning expert content on at least one tool, and Google and GA returning expert content about half the time. However, all search modalities could improve on the chances of finding expert information.

我们的搜索结果在所提供的信息的有用性方面是令人鼓舞的，将近60% 的搜索结果返回至少一个工具上的专家内容，谷歌和遗传算法返回专家内容的时间约为一半。然而，所有搜索模式都可以提高找到专家信息的机会。

Our results are consistent however, with the only other reported health-related study, which was undertaken in 2015/2016 [[7](#page6)]. It found that Siri and other smartphone assistants sometimes trivialised important general health inquiries or failed to provide appropriate infor-mation. We found that all tools had trouble finding gay and lesbian-specific information, Siri was poor when videos were requested by content, and all three tools sometimes returned mag-azine or blog content instead of professional health advice.

然而，我们的研究结果与2015/2016年进行的唯一一项与健康相关的研究是一致的[7]。它发现 Siri 和其他智能手机助手有时会轻视重要的一般健康查询或未能提供适当的信息。我们发现，所有的工具都很难找到男同性恋和女同性恋的相关信息，Siri 在内容要求提供视频时表现不佳，而且所有三个工具有时都会返回杂志或博客内容，而不是专业的健康建议。

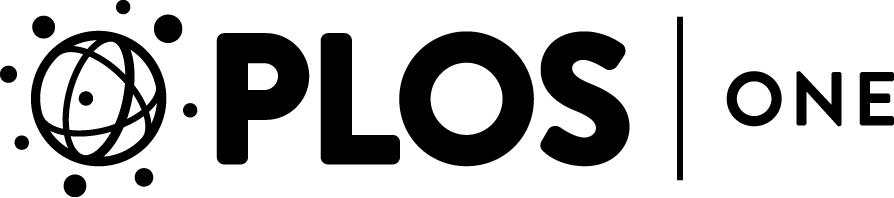


The responses sometimes included a useful Google summary box, and/or a diagram. The summary was often read out verbally by the digital assistants and this has obvious advantages for people with disabilities or some situations such as when the questioner is doing other activ-ities. There was notable variation in the search results between the two researchers. For exam-ple, when asked to find an antismoking advertisement, rater A was directed to a New Zealand public health campaign advertisement, while rater B was shown a Youtube video of the ‘top 40 scariest antismoking ads’ from around the world (S1 Appendix). This variation may reflect the impact of location, Google search history, demographics, ongoing changes in website traffic and website links on search algorithms.

这些回复有时包括一个有用的 Google 摘要框和/或一个图表。数字助理经常口头宣读摘要，这对残疾人或在某些情况下，例如提问者正在进行其他活动时，有明显的好处。两位研究者的搜索结果有明显的差异。例如，当被要求寻找一个禁烟广告时，评分员 a 被引导到一个新西兰公共卫生运动广告上，而评分员 b 则被引导到一个 Youtube 视频，上面是来自世界各地的“最可怕的40个禁烟广告”(S1附录)。这种变化可能反映了位置，谷歌搜索历史，人口统计学，网站流量和网站链接对搜索算法的持续变化的影响。

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比较智能手机数字助手和笔记本电脑谷歌搜索戒烟建议

**Study strengths and limitations**

**学习优势和局限性**

A strength is that this study is the first to consider smartphone digital assistants for the provi-sion of smoking cessation information and advice. It also used questions derived from expert sources (NHS and CDC) and tested a wide range of smartphone functionalities with the two researchers collecting data independently. But a possible limitation is that our results might be superior to questions asked in the real world since we used reasonably precise wording and terms, as opposed to slang words or colloquialisms that some of the public might use. On the other hand, we only considered the first result returned in each search list, and there were often superior sites listed after the initial sites.

一个优势是这项研究是第一个考虑智能手机数字助手提供戒烟信息和建议。它还使用了来自专家来源(NHS 和 CDC)的问题，并测试了广泛的智能手机功能，两名研究人员独立收集数据。但一个可能的限制是，我们的结果可能优于在现实世界中提出的问题，因为我们使用了相当精确的措辞和术语，而不是一些公众可能使用的俚语或俗语。另一方面，我们只考虑每个搜索列表中返回的第一个结果，而且通常在最初的网站之后还有更好的网站。

**Potential research implications**

**潜在的研究意义**

These pilot results demonstrate that a range of useful information is returned to users of digital assistants when asking for smoking cessation advice. This suggests that a larger study of actual smokers wanting to quit is warranted. The larger study could investigate the user experience as well as the quality of the information returned by digital assistants. In the meantime, however, software designers and health authorities should continue to work together to improve search functionality, as is starting to happen in some localities [[3](#page6), [4](#page6)].

这些试点结果表明，当请求戒烟建议时，一系列有用的信息被返回给数字助手的用户。这表明需要对实际戒烟者进行更大规模的研究。更大的研究可以调查用户体验以及数字助理返回的信息的质量。然而，与此同时，软件设计者和卫生当局应该继续合作，改进搜索功能，正如一些地方开始发生的那样[3,4]。



**Conclusions**

**结论**

Google internet searches and Google Assistant were found in this pilot study to be significantly superior to the Siri digital assistant for sourcing smoking cessation content. While expert con-tent was returned over half the time, there is still substantial room for improvement in how these software systems deliver smoking cessation advice.

谷歌互联网搜索和谷歌助手在这项试点研究中被发现在寻找戒烟内容方面明显优于 Siri 数字助手。虽然专家内容被返回超过一半的时间，这些软件系统如何提供戒烟建议仍然有很大的改进空间。

**Supporting information**

**支持性资料**

**S1 Appendix. Search results by question.**

**S1附录。按问题搜索结果。**

(DOCX)

(DOCX)

**Author Contributions**

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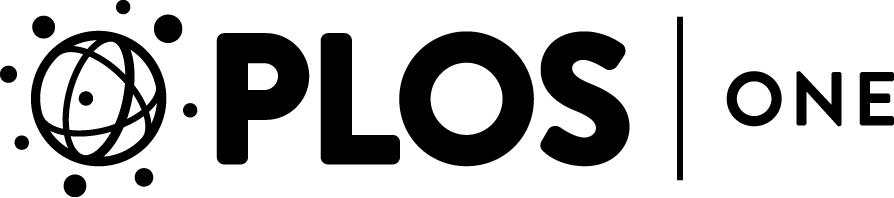
**Writing-original draft: Matt Boyd，Nick Wilson 原稿: Matt Boyd，Nick Wilson。**

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