Diabetes on the Go: A Study of 275 Diabetes Apps

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The public is increasingly accessing health information on the go. Fifty-six percent of all American adults own a smartphone. Over half of these smartphone owners use their devices to get health information, and roughly one-fifth have health apps. The growing use of mobile health applications, games, and social networks help children and adults alike gain control of disease management, maintain independence, build skills, and increase responsibility. Apps serve as a platform for structured communication between parties such as a caregiver and an elderly parent or a child and the school nurse. Apps provide a repository for data, including compliance with medication regimens, activity notes, and food logs that can be shared with a doctor to identify trends and troubleshoot health issues. Notifications and alerts can be tailored for each user, providing reminders and warnings. Data from health and fitness apps, games, and social networks can be used to promote both individual and population health.

With the benefits, come great risks. Any scenario where personal information—especially health information—is collected, analyzed, or stored provides a plethora of privacy concerns. Individuals voluntarily input personal information into apps, but the way in which this data is used, aggregated, and shared can be problematic. An individual’s information may be publicly visible, with or without the knowledge of the user, revealing identifying information. Personal health information readily available on apps can be and is used against individuals.

Researchers at the Institute for Science, Law and Technology and the Center for Diabetes Research and Policy (ISLAT/CDRP) at IIT Chicago-Kent College of Law undertook a project to understand the privacy and liability issues raised by health apps. As part of this ongoing project, ISLAT/CDRP researchers conducted a diabetes app study, which assessed 275 diabetes apps to determine their functions, privacy policies, and whether the apps claimed to be approved by the Food and Drug Administration (FDA). ISLAT/CDRP researchers also reviewed the law and policies that govern the design and use of health and fitness apps.

ISLAT/CDRP Study of Diabetes Apps

An ISLAT/CDRP study analyzed 275 diabetes-specific apps in the Google Play Store (where people can purchase apps for Android phones). Two hundred and two of these diabetes-specific apps were available for free in the Google Play Store. Less than 10%—only 25 out of 275—diabetes-specific apps have privacy statements or link to privacy policies in the Google Play Store prior to downloading the app. Seventy-six percent (19) of the apps with privacy policies acknowledge that the apps collect user data and 40% (10) of those apps openly disclose that cookies are used for data collection purposes. Only three privacy policies explicitly state that neither data nor user logs were tracked. The privacy policies of these apps also state that information is only shared if a user selects a specific person to receive the information.
under 13 years of age. Although a great deal of consumer information is collected via mobile health apps, companies often do not disclose details about their collection practices.

Name, email address, date of birth, and health information represent some of the personal information collected by the apps examined. Health information could include blood glucose levels, blood pressure, and activity logs. Typically, the information is collected when a user registers for the app through an online account. Some apps claim to collect the personal information for “legitimate business purposes” of the application, while others store and analyze user data for other purposes. Some app developers justify their data collection practices by noting that data collection is a means of improving and personalizing the apps’ services. Only five privacy statements note that no personally identifiable information would be sold.

Of the 25 out of 275 apps that have privacy policies, two apps share personal information only with the user’s consent, but 11 share data with unidentified third parties. Seven privacy policies mention that data may be used for advertisement purposes, while only two privacy policies state that no personal information will be disclosed to third parties for advertisement purposes. All of the privacy policies that acknowledge that personal information will be shared with third parties belong to apps that can be downloaded for free. Thus, free apps may pose a greater risk to the user’s privacy than paid apps. The privacy statement of one diabetes forum app states that personal information may be disclosed to analytics and search engine providers or to research organizations when the user registers for a clinical trial. The same app also provides non-personally identifiable information about users to pharmaceutical research organizations. However, even non-personally identifiable information in the aggregate can be used to determine the identity of users.

Only eight privacy policies state that the app uses electronic safeguards for data protection, either in the form of data encryption or storage of confidential information on secured servers. Without security measures, such as data encryption, user information can easily be intercepted by hackers or identity thieves. Some privacy statements also contain information about the consumers’ rights to protect their privacy. For instance, the user can request that certain information not be disclosed, the user can opt-out of cookies, or the user can opt-out of receiving marketing materials.

As part of the diabetes app analysis, ISLAT/CDRP researchers identified 119 educational apps and 89 apps with diabetes management features. The educational apps provide a diverse range of resources, including access to diabetes-related articles and medical animations. Some educational apps have gamified components, utilizing flashcards and interactive quiz features to engage users. One app even provides special yoga instructions for individuals with diabetes.

Almost all of the diabetes management apps (98%) are designed to support diabetes self-management. Diabetes management apps allow the user to monitor health-related parameters
such as blood glucose levels (98% of diabetes management apps), insulin doses (64% of diabetes management apps), and carbohydrate intake (59% of diabetes management apps). Thirty-four percent of the diabetes management apps have an alert function, which can remind users to take their medications or to attend scheduled medical appointments. Fifty percent of the diabetes management apps also include carbohydrate or insulin dose conversion functions. Although most of the apps with a conversion function provide insulin dose recommendations—arguably providing medical advice by guiding patients or caregivers towards decisions about medication administration—alarmingly, only a few of these apps have been thoroughly tested or are regulated by the FDA. ISLAT/CDRP researchers were only able to identify three FDA regulated diabetes apps in the Google Play Store: BlueStar Diabetes, Glooko and MyGlucoHealth.

Health-related personal information is collected by most of the diabetes management apps, yet only 21% of diabetes management app developers provide a privacy policy in the app’s description in the Google Play Store or a link to a privacy policy hosted on another website. Consequently, people who purchased and downloaded diabetes-related apps may not understand the risks to their privacy. Such risks may include information about health, geolocation, and other information being shared with third parties. Those apps without encryption or other security measures place users’ information—including detailed health information—in a vulnerable position. Once shared or stolen, this information could be used against individuals to discriminate against them based on disability, or to serve unwarranted, targeted, and potentially problematic advertisements.

Applicable Laws

Federal laws and regulations do not sufficiently protect consumers who use health apps. Federal and state laws have been implemented to safeguard health information through regulations implemented pursuant to the U.S. Health Insurance Portability and Accountability Act (HIPAA) and similar state laws. The HIPAA Privacy Rule is a collection of regulations that outline how health information should be protected. However, health disclosures on health apps are not protected by these laws. The HIPAA Privacy Rule generally only covers health plans, health care clearinghouses, health care providers, and business associates. There are some exceptions to the rule, such as protected health information used by public health agencies for public health purposes in certain circumstances.

The Food and Drug Administration (FDA) regulates a small subset of medical apps, including those that serve as an accessory to a medical device and those that transform the mobile platform into a medical device. But the majority of health apps will fall through the regulatory cracks. The FDA only gets involved if the app is considered to be a medical device. Additionally, the Federal Trade Commission (FTC) attempts to protect consumers against fraud and misrepresentation, but has had little success in swaying industry to provide adequate self-regulation. While there have been a few FTC complaints issued against mobile health app developers, many apps slide past the FTC’s oversight or jurisdiction. Current laws and regulations fall short of protecting the health information of mobile app users. Without adequate oversight and appropriate regulation, the risks go unaddressed.
There is no universal accepted method to search for mobile health applications (apps). To identify diabetes-related apps, we entered the Google Play Store at https://play.google.com/store/apps and searched for the term
“diabetes” on January 3, 2013. A total of 275 apps were found. We focused on Android apps in our analysis. Each app in the Android store contains pictures of the app interface and a brief description of the app functions. Based on this description, we classified the apps into 6 categories: conversion function (carbohydrates and insulin), diabetes education, nutrition education and recipes, risk assessment, diabetes management, and other. The majority of apps can be downloaded for free (73%). The remaining 7% cost between $0.99 and $39.99. For some apps, there is no available information about the price or whether the app is free or not.


Some diabetes management apps are available for health care providers (Diabetes LogBook) or owners of pets (My Diabetic Pet). The third largest app category (15%) is nutrition education and recipes. Apps in this category offer recipes for popular fast food restaurants (Diabetes and Eating Out). Diabetes risk assessment apps represent another category. Around 4% of diabetes-related apps in the Google Play Store act as risk predictors for the development of type 2 diabetes based on questions about age, physical constitution and lifestyle. Diabetes forums, messengers, and chat apps (Diabetic Connect, Diabetes Manager, BlueStar Diabetes) can provide support for individuals with diabetes, act as meal planners, and also provide the amount of carbohydrates in menus of popular fast food restaurants (Diabetes eDiary).

The privacy policies of different apps vary. Some apps state that they do not collect information from children under 12 (Diabetic Connect, Diabetes HbA1c). Others, like Diabetes HbA1c, state that they do collect information from children (Diabetes eDiary). App developers are required to follow Google Play’s developer policies, which include the Children’s Online Privacy Protection Act (COPPA). Apps that do not comply with COPPA risk being removed from the Google Play Store. It is important for users to read the privacy policies of the apps they use to understand how their data is being collected and used. Some apps provide options for users to manage their privacy settings (Diabetes Manager, Medivo, VCA Diabetes).
25 45 CFR 160; 45 CFR 164.
26 45 CFR 160.102; 45 CFR 160.104.
27 45 CFR 164.512(b).


