Dieting for Diabetes: A Mobile 'App'roach

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Dieting for Diabetes: A Mobile ‘App’roach

by
Alaina Brooks Darby

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

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Abstract

Diabetes mellitus, being a prevalent disease in modern society, is moderately influenced by one’s nutrition. Due to this, mobile programs created especially for tracking food intake can be an important aid for diabetics. The objective of this project was to analyze eight of the most prominent of these applications – MyNetDiary, GoMeals, MyFitnessPal, Fooducate, Lose It!, The Carrot, Diabetes In Check, and Daily Carb – to determine the subsets of diabetics that would benefit most from the utilization of each.

Data was obtained through testing of each app and through the information provided by users on iTunes and Google Play and on the website of the company producing the app, if applicable. From these sources, the usability and features of the app were determined. To determine the usability of each app, both personal testing and user reviews were considered. Using the most basic version of each app, the efficiency and effectiveness were established through experimentation and trial entries. User satisfaction was ascertained by examining the ratings and reviews of each app as found on the iTunes App Store website. The features were deduced through a combination of all methods of data collection and analyzed based upon their usefulness to certain diabetics. Finally, recommendations were made for those who would be able to maximize the benefits of each app based on diabetes type, recency of diagnosis, severity of condition, eating habits, special dietary considerations, age, location, and other more specific factors.
Findings show that specific apps appear to be more relevant to the
generalized diabetic population but that even greater specificity of the apps is
also pertinent for certain categories within the diabetic populace. Each of the
eight apps could be recommended for certain groupings of diabetic individuals by
being more relevant to their specific needs. Ultimately, the combination of
personal characteristics for a user determines which app he should select in
order to most effectively manage his diabetes.
# Table of Contents

List of Tables vi
List of Abbreviations vii
Diabetes and Its Types 1
Diabetes Maintenance and Treatment 4
Nutritional Tracking 10
Evaluation Criteria of TLC Apps 12
Analysis and Recommendations for MyNetDiary® 15
Analysis and Recommendations for GoMeals® 20
Analysis and Recommendations for MyFitnessPal® 25
Analysis and Recommendations for Fooducate™ 31
Analysis and Recommendations for Lose It!® 36
Analysis and Recommendations for TheCarrot.com® 40
Analysis and Recommendations for Diabetes In Check® 46
Analysis and Recommendations for Daily Carb® 50
Summary of Apps 54
List of References 58
Appendix 69
List of Tables

Table 1: Types of Oral Medications and Their Functions 6
Table 2: Evaluation of Apps Based Upon Usability 70
Table 3: Evaluation of Apps Based Upon Cost and Platforms 71
Table 4: Evaluation of Apps Based Upon Food Database, Logging Options, and Location 72
Table 5: Evaluation of Apps Based Upon Additional Tracking Options 73
Table 6: Evaluation of Apps Based Upon Personalization 74
Table 7: Evaluation of Apps Based Upon Progress and Social Aspects 75
Table 8: Evaluation of Apps Based Upon Available API 76
List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A1C</td>
<td>Hemoglobin A1C</td>
</tr>
<tr>
<td>AADE</td>
<td>American Association for Diabetes Educators</td>
</tr>
<tr>
<td>ADA</td>
<td>American Diabetes Association</td>
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<tr>
<td>API</td>
<td>application programming interface</td>
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<tr>
<td>app</td>
<td>mobile application</td>
</tr>
<tr>
<td>BP</td>
<td>blood pressure</td>
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<tr>
<td>carbs</td>
<td>carbohydrates</td>
</tr>
<tr>
<td>DM</td>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>DRS</td>
<td>Diabetes Risk Score</td>
</tr>
<tr>
<td>GI</td>
<td>glycemic index</td>
</tr>
<tr>
<td>GMO</td>
<td>genetically modified organism</td>
</tr>
<tr>
<td>HDL</td>
<td>high-density lipoprotein</td>
</tr>
<tr>
<td>IDDM</td>
<td>insulin-dependent diabetes mellitus</td>
</tr>
<tr>
<td>LDL</td>
<td>low-density lipoprotein</td>
</tr>
<tr>
<td>RBC</td>
<td>red blood cell</td>
</tr>
<tr>
<td>SMBG</td>
<td>self monitoring of blood glucose</td>
</tr>
<tr>
<td>T1DM</td>
<td>Type 1 Diabetes Mellitus</td>
</tr>
<tr>
<td>T2DM</td>
<td>Type 2 Diabetes Mellitus</td>
</tr>
<tr>
<td>TLC</td>
<td>therapeutic lifestyle change</td>
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</table>
Diabetes and Its Types

Diabetes mellitus (DM), more commonly referred to as diabetes, is a prevalent disease in the United States that affects nearly 10% of individuals (National Diabetes Fact Sheet 1). Diabetes, however, is actually a more generalized term that denotes a grouping of similar metabolic diseases, all pertaining to the body's inability to either efficiently produce or utilize insulin or a combination of the two (“Diagnosis and Classification of Diabetes Mellitus” 564). Insulin, a hormone that is produced by the β-cells of the pancreas, is instrumental in lowering the concentration of glucose, or sugar, in the blood (König and Holzhütter 1). This is done by either the body’s immediate utilization of blood glucose following a meal or by promoting its storage in bodily tissues (“Insulin Basics”). Either the insufficient synthesis or the inadequate action of insulin, individually or in combination with one another, leads to a problematically high concentration of glucose in the bloodstream, a condition known as hyperglycemia (“Diagnosis and Classification of Diabetes Mellitus” 564). Due to the prospect of a hyperglycemic condition and its hazardous effects, tests are available to measure blood glucose and, therefore, aid in diagnosis.

An individual may have laboratory tests performed to measure aspects of blood glucose in addition to the self-monitoring of blood glucose (SMBG). SMBG measures the concentration of blood glucose at a specific moment utilizing a personal blood glucose meter. (Diabetes A to Z: what you need to know about diabetes, simply put 2). Another laboratory parameter commonly used for diagnosing or evaluating diabetes control is the Hemoglobin A1C (A1C). An A1C
value reflects the percent of glucose attached to hemoglobin within the red blood cells (RBC). When a RBC is formed, hemoglobin, an oxygen-carrying protein found in the blood, becomes bound with glucose. With increased concentrations of blood glucose, more glucose is available for binding. Formation of glucose-bound hemoglobin is, therefore, increased, allowing the measurement of glycosylated hemoglobin in the RBC to indicate the concentrations of blood glucose over a period of time. The lifespan of a RBC is approximately four months and the hemoglobin and glucose remain joined until the cell’s death. Due to this, the A1C test is able to indicate average blood glucose for a period of 2-3 months. It is this more comprehensive average that allows the A1C test to be useful for diagnosing and evaluating diabetes. (Diabetes A to Z : what you need to know about diabetes, simply put 1).

Though blood glucose concentrations, as influenced by insulin, may be the pivotal factor in each form of diabetes, the causes and manifestations of the specific forms of the disease differ greatly. Some types of the disease are induced by drugs or other chemicals, genetic defects, pancreatic diseases, infections, immune system disorders, and even pregnancy. Though other forms exist, Type 1 Diabetes Mellitus (T1DM) and Type 2 Diabetes Mellitus (T2DM) are the most predominant, accounting for more than 95% of diabetes cases. As an indication of the prevalence of these two subsets of the disease, T1DM and T2DM are often referred to by their more generic nicknames of juvenile-onset and adult-onset, respectively ("Diagnosis and Classification of Diabetes Mellitus" 564-565). These terms describe the usual timeline of the manifestation of each
type, an attribute that is dependent upon the underlying cause for the disease’s appearance.

T1DM constitutes 5 - 10% of diagnosed diabetes cases in adults and generally arises during childhood but may present itself, though rarely, in adulthood (“Diagnosis and Classification of Diabetes Mellitus” 565). Since individuals with T1DM suffer from the inability to produce insulin, either in sufficient quantities or in total, this type of diabetes was formerly known as insulin-dependent diabetes mellitus (IDDM) due to the resulting reliance on administered insulin to regulate blood glucose (National Diabetes Fact Sheet 11). The loss of insulin production, though occasionally without an identifiable cause, is generally the result of an autoimmune response in which the insulin-producing β-cells of the pancreas are attacked and destroyed (“Standards of Medical Care in Diabetes – 2013” S11, “Diagnosis and Classification of Diabetes Mellitus” 564-565). Because the body cannot produce the insulin necessary to maintain blood glucose homeostasis, hyperglycemia results.

T2DM represents 90 - 95% of all diabetes cases, indisputably, the most prevalent form of diabetes (“Diagnosis and Classification of Diabetes Mellitus” 565). The initial insulin resistance that defines T2DM often subsequently results in insulin deficiency. The body’s greater need for insulin results in a more intense shortage due to cell resistance, a vicious cycle that can negatively impact the pancreas’s capacity to produce insulin (National Diabetes Fact Sheet 11). Insulin resistance alone or in combination with insufficient insulin production results in hyperglycemia.
Diabetes Maintenance and Treatment

While the two main forms of diabetes both result in increased concentrations of blood glucose, the treatment options for the two are slightly varied due to the distinct differences resulting in hyperglycemia. The major methods of diabetes management include the addition of insulin or other medication therapy as well as lifestyle modification, namely physical activity and diet (National Diabetes Fact Sheet 11). A combination of these options may be necessary to produce the desired “tight glycemic control” that “substantially decreases the risk of diabetes-related complications,” especially in T2DM (Wulffelé et al. 2133). The optimal combination of these forms of management, however, is dependent upon the type of diabetes with which a patient is diagnosed and the extent of disease progression. In addition, other conditions, medications, and lifestyle choices may influence the combination of treatment options that are preferred for a patient.

Insulin injections are a primary method of treating diabetes, since diabetes is a disease that is directly affected by the body’s ability to produce and use the hormone. Of patients diagnosed with diabetes (T1DM or T2DM), 26% use insulin to treat their condition, 12% of all diabetes patients use insulin as sole therapy (Gebel 42). Insulin may be administered by either insulin pump or injection to aid in regulating blood glucose concentrations. Use of insulin is most prevalent in those with T1DM, since these individuals are unable to produce the hormone themselves and must rely on the externally-delivered insulin for blood glucose regulation and, therefore, survival (National Diabetes Fact Sheet 11).
For the T2DM patient, typically insulin is only administered when other forms of treatment are unable to provide adequate glycemic control. In these cases, insulin may be the sole form of pharmacological treatment or it may be used to supplement other therapies (Wulffelé et al. 2133). Insulin is just one treatment modality that is applicable to both T1DM and T2DM.

Another effective method of managing diabetes from which both T1DM and T2DM patients may benefit is therapeutic lifestyle change (TLC). TLC is often extremely effective in regulating blood glucose, even to the extent in T2DM patients that medications become unnecessary. In fact, 16% of adults who have been diagnosed with diabetes are able to manage their condition without medication (Gebel 42). The two most basic lifestyle changes that are recommended are addition or modification of an exercise routine and a focus on diet (Take Charge of Your Diabetes). Both excessive body weight and obesity negatively impact diabetes sufferers by promoting insulin resistance causing diet and exercise to have positive implications for these individuals (“Diagnosis and Classification of Diabetes Mellitus” 564). Each of these methods of lifestyle modification potentially has a significant impact on diabetes management.

Specifically in T2DM patients, the use of oral medications is common to promote blood glucose regulation. Evidence shows that 58% of patients diagnosed with T2DM manage their diabetes with oral medications alone and 14% take it in combination with insulin (Gebel 42). Metformin is the most commonly prescribed oral medication, being a part of the standard initial treatment regimen (Russell-Jones et al. 252). Metformin does not affect insulin
directly but works by suppressing basal production of glucose in the liver (Bodmer et al. 2086). Metformin may be used in combination with other oral medications if metformin alone is insufficient to control blood glucose as monotherapy (Stolar 52, Garber et al. 332).

Table 1: Types of Oral Medications and Their Functions

<table>
<thead>
<tr>
<th>Medication Class</th>
<th>Medications in Class</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfonylureas</td>
<td>Glimepiride, Glipizide, Glyburide, and others</td>
<td>increases body's insulin production, may prevent deposition of stored glucose to blood</td>
</tr>
<tr>
<td>Biguanides</td>
<td>Metformin</td>
<td>slows release of stored glucose, may increase body's response to insulin</td>
</tr>
<tr>
<td>Alpha-Glucosidase Inhibitors</td>
<td>Acarbose, Miglitol</td>
<td>slows formation of glucose from carbohydrates</td>
</tr>
<tr>
<td>Thiazolidinediones</td>
<td>Pioglitazone Hydrochloride, Rosiglitazone</td>
<td>increases insulin sensitivity of muscle cells, may slow release of stored glucose</td>
</tr>
<tr>
<td>Meglitinides</td>
<td>Repaglinide, Nateglinide</td>
<td>increases body's insulin production</td>
</tr>
<tr>
<td>DPP-4 Inhibitors</td>
<td>Sitagliptan, Saxagliptin, Linagliptin, Alogliptin</td>
<td>increases body's insulin production, decreases body's glucagon production</td>
</tr>
<tr>
<td>SGLT2 Inhibitor</td>
<td>Invokana, Farxiga</td>
<td>decreases the kidney's reabsorption of glucose</td>
</tr>
</tbody>
</table>

Sources:
Exercise is known to generally improve health for all members of the population, but it may have even more significant benefits for patients with diabetes. According to the American Association of Diabetes Educators (AADE) in the article “Diabetes and Physical Activity,” “a growing body of evidence supports that regular physical activity leads to multiple physiologic and psychological benefits that can improve glycemic control, overall health, and quality of life” (Hayes et al. 129). According to this statement, physical activity is instrumental in regulating blood glucose concentrations. While the effects of physical activity on blood glucose concentrations in T1DM are somewhat varied - a greater correlation to exercise exists in patients with T2DM - benefits of exercise are still available to patients with T1DM (Hayes et al. 130). According to a seven-year study, the risk of death in individuals with T1DM can be greatly reduced by moderate-intensity walking (Gebel 44). Though physical activity has a significant impact on diabetes, eating habits are, perhaps, an even more effective form of management.

The main concern in diabetes and its management is one’s blood glucose concentration. Since “the food we eat directly affects our blood glucose concentrations,” (Karmally et al. 124) diet has a significant role in the management of diabetes. The recommended diet for diabetes patients generally includes limited carbohydrates. Carbohydrate intake is determined by the glycemic index (GI) of the foods, which indicates how a food is likely to affect blood glucose (Gilbertson et al. 1137). As recommended by the American Diabetes Association (ADA), a variety of foods should be eaten in order to
incorporate an efficient combination of carbohydrates, protein, and fats into the diet while being vigilant to limit intake of sodium, cholesterol, saturated fat, and trans fat. The ADA suggests that diabetes patients begin by dedicating half of their plates to “nonstarchy vegetables, a quarter of the plate [to] foods high in protein, and the other quarter [to] either whole grains or starchy vegetables” (Dunbar), a recommendation that corresponds to the Idaho Plate Method for diabetes management (Hernandez). The individual should then adjust this generalized diet plan to fit their own needs, especially as related to blood glucose concentrations (Dunbar). The concept of utilizing this knowledge of nutrition has become increasingly important in recent years.

As previously stated, a diet that encompasses and considers the nutrition of many different types of foods is important as all of these foods influence overall health and the maintenance of a healthy weight. However, carbohydrates (carbs) are a major factor in the maintenance of blood glucose, a health aspect which is extremely relevant to diabetics. Carbohydrates are substances that, when broken down by the body, are converted to glucose, which is then absorbed into the blood, causing blood glucose to rise. While sugar is a pure form of carbohydrate, other foods such as fruits, grains, vegetables, and dairy products contain other nutrients that aid in slowing digestion of the carbohydrates in those foods (American Diabetes Association complete guide to diabetes 123). It is due to the effects of carbs on blood glucose concentrations that diabetics should consider them of utmost importance when attempting to regulate blood glucose through diet and nutrient intake.
Due to the importance of carbs in a diabetic diet, a prominent strategy for diabetics in meal planning is by the GI, which categorizes foods based upon their carbohydrates and how they affect blood glucose. The GI differs from a basic carbohydrate count in that it accounts for a variety of factors that affect the metabolism of the carbohydrate, thereby influencing blood glucose (“Glycemic Index and Diabetes”). Nutritional content is a major contributor to the GI with the amount of dietary fiber, fat, and protein playing significant roles in addition to structure of the carbohydrate and preparation method (Overby et al.). Taking these factors into consideration, blood glucose concentration should vary proportionally with the GI of a food (“Glycemic Index and Diabetes”). The GI, though being a prominent method of maintaining blood glucose concentrations in patients with DM, is not the only manner of nutritional maintenance, as many additional factors have significant effects on the health of diabetics and must be taken into account in order to assess the health of these individuals more holistically.

It is evident that nutritional considerations for diabetics are of utmost importance and necessity. Statistics show the prevalence of obesity in diabetes patients to be fairly high, with 40% of T1DM and 80 – 85% of T2DM sufferers being overweight (Gebel 46). In total, 56.9% of all patients diagnosed with diabetes are considered obese (“Data & Trends”). Furthermore, fruit and vegetable consumption in U.S. adults is much lower than recommended, with only 26.3% of individuals eating at least three servings of vegetables daily and 32.5% eating at least two servings of fruit daily, as recommended for health
(Gebel 46). It is obvious that the diets and nutritional intake of most individuals is not optimal, which makes the topic of utmost importance, especially due to its implications to diabetes and those individuals who develop the condition. Though making conscious decisions to follow a specified diet plan is often filled with obstacles, there are methods which may aid in this endeavor.

Nutritional Tracking

One’s ability to continue a nutritionally effective diet is often improved by the logging of meals and snacks. With weight being a major concern in the maintenance of diabetes, journaling is a useful method for increasing weight loss. It has been shown that the number of journal entries is positively correlated to the amount of weight lost (Neithercott). Maintaining a written record of the foods one has eaten along with their carbohydrate and calorie content enables an individual to better identify changes that need to be made to diet by providing a visual representation of nutritional choices (Kamps). Additionally, food diaries have further implications for the diabetes patient. Evidence shows they are an effective method of maintaining a consistent blood glucose concentration. The journal allows one to specifically identify the foods that help maintain constant blood glucose and differentiate them from the specific foods or general categories of foods that may cause blood glucose to spike (Neithercott). This allows the diabetic patient to tailor diet to specific needs.

In recent years, nutritional tracking has evolved to utilize technology in much the same manner as other sectors in the fields of science and medicine.
With smartphones becoming more prominent in society, ownership among American adults, rising from 35% in May 2011 to 56% in May 2013, it is not surprising that this technology has infiltrated the area of dietary tracking with the introduction of mobile applications (apps) for such a purpose ("Cell Phone and Smartphone Ownership, over Time," Dennison et al.). Additionally, making these apps even more promising, a 2012 study found that individuals are more likely to log dietary intake more frequently when using a smartphone tracking tool than with a paper or internet based food diary. In this same study, participants who monitored their diets on a smartphone were also more likely to continue recording personal data for a more substantial period of time. Additionally, adherence to self-monitoring being indicative of weight loss, those tracking with a smartphone were able to lose more weight than with either a paper or online desktop journal (Carter et al.). These positive results likely stem from some important attributes of smartphones: 1) mobile telephones are generally conveniently available to the user throughout the day whereas other forms of logging may not; 2) the associated apps may allow users to connect with others socially by sharing their progress and other information; and 3) these mobile devices allow identification of location which increases the app’s ability to personalize user experience and be more relevant in certain contexts and circumstances (Dennison et al.). Obviously, smartphone apps have the potential to be important tools in nutrition tracking for those who own them; however, their relevance and functionality may vary.
Evaluation Criteria of TLC Apps

The download and use of mobile apps has been increasing – the number of adult mobile phone owners who had downloaded at least one app rising from 22% to 38% in the span between September 2009 and August 2011 (“Half of Adult Cell Phone Owners Have Apps on Their Phones”). However, with the escalating downloading of apps, variety has also risen. Due to the growing variety of apps that have been created to aid in nutrition tracking, it may be difficult to determine which apps are most appropriate, especially with respect to personal preferences and needs. In the remainder of this document, eight popular TLC apps will be evaluated for their use by diabetics. Evaluation of these apps will consider both the technological usability of the app’s design based upon its programming and its features, the latter determining which types of individuals benefit most from utilization. Other criteria such as price, though not directly affecting the usefulness of the app, will play a minor role in the total assessment.

In order to appraise the usability of the app, criteria must first be defined. According to Schoeffel, “usability is the effectiveness, efficiency, and satisfaction with which specific users can achieve a specific set of tasks in a particular environment” (6-7). Efficiency relates to the amount of time required to use the app accurately (Lowry et al. 20). Some main questions that this attribute should be able to answer include “Is the wait time while using the app reasonable?”; “How many steps should this process require?”; and “How long should this task take?” (Selecting a Mobile App: Evaluating the Usability of Medical Applications).
Effectiveness is the ease with which a user may employ the app properly with the greatest accuracy (Lowry et al. 20). For an app to be effective, its operation must positively answer the questions “Is navigation and input within the app straightforward and uncomplicated?”; “Does the app operate as intended?”; and “Is there proper and accurate presentation of information?” (Selecting a Mobile App: Evaluating the Usability of Medical Applications). The final component of usability, user satisfaction, deals with a user’s opinion and perception of the app after employing it for its specific purpose (Lowry et al. 20). To be successful in this area, the user must be able to affirm the question "Does the app fulfill its purpose with an adequate performance level?" (Selecting a Mobile App: Evaluating the Usability of Medical Applications). For both efficiency and effectiveness, these criteria will be evaluated by testing of the basic app for iPhone/iPod touch because all subsequent versions and platforms should function similarly. The user satisfaction will be determined by the user reviews published on the Apple iTunes and Google Play® stores when applicable. iTunes and Google Play reviews are rated out of five stars, five being the highest level of user satisfaction and one being the lowest. For these reviews, only the most recent update of the app will be taken into account unless otherwise noted. Each of these apps will be rated based upon the following consecutive scale: excellent, good, fair, and poor (Table 2) based upon the most recent version of the app as of December 31, 2013. After the usability of the app is determined, the specific features of the TLC app will be analyzed in order to determine the program’s relevance to the
specific concerns of a diabetic. Evaluation of the available features for each app will also be based upon the most recent version of the app as of December 31, 2013. Being diet tracking apps, the most important consideration is the size of the food database and its specificity. For example, the database may include branded foods, restaurant foods, foods from recipes, generic food listings, or a combination of the four. Other relevant and important features may include, but are not limited to, the implementation of recipe calculators and databases, differing methods of food and data entry such as manual entry or barcode scanners, consideration of location in order to suggest restaurants, the option to track other areas of interest such as exercise or blood glucose, the capability of storing favorite foods or meals, the presence of a countdown “meter” for caloric intake and other nutritional data, the addition of reminders for certain activities, and the availability of social interaction with other users through a provided community and by posting to social media. Each category of features has some relevance to diabetics and, with the price of the app, may be used to determine the pertinence of the app to specific patients. Please see Tables 3-8 to view a tabular comparison of all analyzed apps.

The features and considerations mentioned above may be instrumental in improving a patient’s experience with nutritional apps by specifically identifying that person’s individual needs, habits, or lifestyle choices then choosing an app that is more relevant to those characteristics. Certain diabetics may value certain features more than another diabetic. One may prefer eating out to eating at home or cooking one’s own meals rather than eating prepackaged foods. Yet
other individuals may have differing levels of activity, have varying allergies or other dietary restrictions, or be of diverse ages. Even one’s location may cause a specific app to be more relevant. While each app has a similar, overarching purpose, it is the specific features that set the apps apart, allowing for personalization.

Analysis and Recommendations for MyNetDiary®

MyNetDiary, a TLC app offered by MyNetDiary Inc., offers several different versions of their app with customization for several different platforms with syncing across all of these platforms. The mobile app’s platforms include iPhone, iPod touch®, iPad®, Blackberry® and Android™ and the company even offers a web-based component for free. There are also specific versions of the app available, having varying features and ranging in price from as little as no charge to as much as $9.99. The basic version is available for free on iPhone and iPod touch. The Pro version costs $3.99, and is available for iPhone, iPod touch, and Android. A similar version exists for iPad, called MyNetDiary HD, with a cost of $9.99. The company offers a version specifically for diabetes which costs $9.99 and is only available on iPhone and iPod touch. However, for each of these versions of the mobile app, some features are only available on the iPhone and iPod touch or are limited on the other platforms. Finally, MyNetDiary has a maximum subscription feature that is available for all platforms with subscriptions ranging from $5 to $9 per month depending upon length of service.
This option includes some specific features in addition to those of the previously mentioned versions ("MyNetDiary Products and Features").

The assessed usability of the free version of MyNetDiary for iPhone and iPod touch was excellent. The app was efficient, responding quickly to user input and limiting the number of steps necessary to utilize its features. The layout and presentation of information allowed for easy operation, making the app effective (MyNetDiary Inc.). Finally, the app received high ratings from those who have utilized it. In the iTunes App Store, the free version of the app received 232 ratings with an average rating of five stars ("Calorie Counter & Diet Tracker by MyNetDiary"). The diabetic version of the app had an average rating of four and a half stars from 10 users on iTunes ("Diabetes Tracker with Blood Glucose/Carb Log by MyNetDiary") and an average of 4.6 stars on Google Play ("MyNetDiary Subscription Reviews").

MyNetDiary offers some important features. Most importantly, however, is extent of the food database and the ability to log meals, being that MyNetDiary is primarily a nutrition tracking aid. The most basic and all paid versions of the app offer a food database containing generic, branded, and restaurant foods in addition to foods from a recipe. In fact, a recipe calculator is available for those who would like to combine foods available on the current database to determine the nutritional information for a personal recipe. Users even have the option of contributing foods and their nutritional information to the database if the desired product cannot be found (MyNetDiary Inc.). While most users seem to be fairly pleased with the current database of food available, some find it lacking. One
iTunes reviewers stated: “Database – lacking many items” ("App Is Impressive until You See All It Can't Do"). The options for logging foods include both the manual search and a barcode scanner. The free app only includes the option to manually input barcode information (MyNetDiary Inc.).

Other forms of tracking besides simply nutritional logging are also features of the program. Exercise and water consumption can be logged in all versions, with physical activity being added either from existing data or by creating a custom workout (MyNetDiary Inc.). Available with the subscription and diabetes versions of the app are tracking of health and diabetes markers. These include A1C, blood pressure (BP), pulse, insulin, medications, blood glucose, and both high-density lipoprotein (HDL) and low-density lipoprotein (LDL) readings for cholesterol ("MyNetDiary Products and Features").

Varying degrees of personalization are available within the basic app. MyNetDiary automatically stores foods to favorites when it notices patterns allowing users to more quickly access them later. Goals such as weight and daily caloric intake are set by the app based upon one’s age, height, and other relevant characteristics. From this data, a diet plan is also created, outlining daily nutrient goals (MyNetDiary Inc.).

In addition to analyzing daily intake, the app also provides progress updates. The most basic of these being that a daily countdown of calories is available in the main screen. Additionally, weight loss progress is tracked from the time that one begins using the app, even providing the option to include a
before and after picture. Perhaps the most useful feature is the analysis section, offering highlights and tips for reaching goals (MyNetDiary Inc.).

Social integration is also a feature of MyNetDiary. The company provides access to its online community, encouraging motivation and accountability through the support of others. One may even choose to share information from the diary with others which could be beneficial, especially when imparted to health professionals and trainers. Finally, the application has the ability to connect with Twitter® allowing tweets to be posted on the user’s behalf when a goal has been accomplished or other achievement has been made (“MyNetDiary Products and Features”).

Finally, MyNetDiary has partnered with other health technology providers to offer a range of application programming interfaces (API’s) that are compatible with MyNetDiary. This allows MyNetDiary to sync with the information that has been gathered by other apps and integrate it into the user's data in MyNetDiary. Compatible API’s include the Withings® blood pressure devices and body scale in addition to integration with the Fitbit® exercise program (“MyNetDiary Products and Features”). All of these API’s provide further tracking options for that data.

The diabetic version of the app, while being more expensive, provides various benefits specifically for diabetes patients. In addition to calorie tracking, the diabetes version integrates carbohydrate tracking, which records the daily consumption of grams of carbohydrates. The time that snacks are consumed is also reported, a feature that may be especially important to a diabetic. Blood glucose can be tracked and labeled for specific situations and can be set to
correspond to target ranges, as created by the user. The information from this and additional tracking of medications, insulin, A1C, BP, and other relevant data are compiled to create both daily and weekly individualized reports and graphs to analyze data that is specifically important to patients with diabetes. MyNetDiary Inc. is also currently in the process of investigating the possibility of integrating a blood glucose monitor from which data could be directly input into the app ("MyNetDiary Products and Features").

Overall, MyNetDiary offers many positive features but several drawbacks. The wide variety of options available to users, most of them free of charge, is an extremely beneficial aspect of the app. This enables users to test the app’s basic features before upgrading to the more expensive diabetic version. Also, with many platform options and integration across platforms, the app can be utilized by more individuals. Even those without a mobile device may take advantage of the company’s innovation though MyNetDiary’s web-based aspect. The analysis section of the mobile tracker is superb, especially with its tips and pointers for maintaining a healthy lifestyle. The API options make tracking of certain data easier. Additionally, the offering of a diabetic friendly version of the app with considerations especially for those individuals, though costing more, is commendable.

The major complaints for MyNetDiary are related to extent of the food database and cost of the paid versions. The database is not comprehensive; however, if a certain food cannot be found in the existing database, a user has the option of adding it. Additionally, this issue will likely improve as more foods
are added by users. Finally, the diabetic app is fairly expensive ($9.99) but does offer some important tools of particular interest to diabetics.

MyNetDiary would be an excellent recommendation for diabetics who tend to prepare meals at home from recipes, especially older adults, parents, or other individuals who would need their information to be consolidated. Cooking at home would be preferred with this app because the database is not comprehensive and the recipe creation and nutritional analysis tool is straightforward and easy to utilize. Because of the limited database, those who tend to eat at restaurants may find a different app to be more appealing. MyNetDiary does not have any specific features that would attract people from certain regions or with specific dietary restrictions but would likely work well for any of these groups.

Analysis and Recommendations for GoMeals®

GoMeals is a nutritional tracking mobile app produced by sanofi-aventis U.S. LLC and powered by CalorieKing®. The app is available on multiple platforms including iPhone/iPod touch, iPad, and Android and is free to download for each (“GoMeals Mobile Apps”). GoMeals is even available on desktop, and has the ability to sync across different devices. To do so, GoMeals uses Cloud Sync, a program that associates user data with a personal account and stores it for use on multiple devices, thus keeping the profile current. The app is programmed so that even if no Internet connection is available, the user has the ability to access information which has been previously stored. This allows users
to continue tracking information, even without an internet connection and the changes are updated to Cloud Sync once an internet connection is detected (“GoMeals Cloud Sync”).

The iPhone/iPod touch app’s usability is good. It exhibits satisfactory efficiency in that logging food and other data can be done in relatively few steps. Wait time in loading some screens in the app, especially when searching the database, while still being reasonable, is longer than that of many of its competitors. Additionally, some users complain that finding and adding the correct foods is often a tedious task (“Want to love it”). The app is fairly effective, presenting information in an organized manner that is easy to use and navigate. On the iTunes App Store, total user satisfaction is good with an average rating of four stars from 46 users for the current version on iTunes (“GoMeals”) and 3.8 stars on Google Play (“GoMeals Reviews”).

The GoMeals mobile app, offers a database of “40,000 everyday foods and more than 20,000 restaurant menu items” (“GoMeals Food Tracker”). The app allows users to manually log their meals by selecting from generic, branded, and restaurant foods. If a desired dish cannot be found in the database, the user has the option to add it as a custom food (sanofi-aventis U.S. LLC). Many users identify they are not satisfied with the extent of the database saying that it “doesn’t have all popular foods. Example: Kellogg’s rice crispies” (“Bad”). Many users are also unsatisfied with the app’s option to add custom foods and lack of a barcode scanner stating that when using this feature there is “no way to create new foods using barcode” (“Bad”).

21
GoMeals does provide an interesting feature for restaurant goers. Based upon current location and a modifiable radius, the app offers a listing of nearby restaurants categorized by cuisine. The database includes more than 200 assorted restaurants. Additionally, each restaurant listing includes a menu and nutritional information for the menu options, allowing a user to be better informed when choosing a restaurant to visit. Finally, while not affecting health or nutrition, the restaurant listing includes the option to call the establishment, a feature that would potentially be helpful to inquire about wait times when on a tight schedule or even to make reservations when planning ahead (“GoMeals Restaurant Locator”).

While the main form of tracking in the app is nutritional, GoMeals has the ability to track some other applicable data. GoMeals allows for exercise and blood glucose tracking (sanofi-aventis U.S. LLC). The exercise database includes a variety of activities with consideration of intensity for each activity (“GoMeals Activity Tracker”). The blood glucose tracking capability allows users to not only track blood glucose but to add notations to each reading, documenting the timing of that reading in relation to meals and exercise (“GoMeals Blood Glucose Tracker”).

The GoMeals app does allow for personalization. Users are able to manually save certain foods to their list of favorites or even compile a group of foods in the list, creating a custom meal. These personal favorites can then be more easily accessed and added in the future (“GoMeals Food Tracker”). The app also allows for customization of workouts. Users may combine several
exercises to create a personalized workout. The workout can then be saved to favorites for later use (“GoMeals Activity Tracker”).

GoMeals users also benefit from personalized progress reports. While a daily countdown for one’s calorie goal is prominent in the main screen, individualized charts and graphs, which analyze the data that has been logged, are available for longer periods (sanofi-aventis U.S. LLC). The reporting feature can be accessed on a desktop or through the iPad app and provides a visual representation of nutrition, exercise, and blood glucose information. These reports allow one to compare daily data as well as the contributions of certain nutrients such as fat, carbohydrates, and protein to each day’s intake. Finally, assessment of blood glucose concentrations in relation to daily and mealtime consumptions are helpful in identifying how certain foods affect a user personally (“GoMeals Reporting”).

The final feature that GoMeals offers is social integration. Like many apps, GoMeals provides the option of publishing accomplishments and other data from one’s logging with friends and family. The app is able to link with Facebook and Twitter accounts alike, allowing for greater accountability and social interaction (sanofi-aventis U.S. LLC). However, GoMeals combines social integration with the restaurant locator discussed previously to form a unique feature. Users of the app, after searching for and deciding upon a restaurant in the app’s database, have the ability to publish dinner plans to both Facebook and Twitter (“GoMeals Restaurant Locator”). This feature promotes an even greater level of social interaction.
The GoMeals app has substantial helpful attributes but several serious drawbacks. Its strongest positive area is that of restaurant compatibility. The restaurant locator is a great benefit to users who might otherwise make a misguided decision in meal selection at a specific establishment or who want to discover an unfamiliar restaurant that offers meals compatible with their diets. Additionally, the social integration of the restaurant feature is innovative. The ability to track food, exercise, and, especially for diabetic users, blood glucose in the same app is beneficial, since this allows all aspects of lifestyle choices to be compared and analyzed with blood glucose concentrations. The option to continue logging, even without an internet connection, is helpful in encouraging and enabling individuals to continually track progress. Finally, the fact that the app is free of charge to all available platforms is attractive, especially with its ability to sync data across platforms. However, even with significant benefits, the app also has its shortcomings.

The negative aspects of GoMeals are primarily focused in the food database and logging options that the app offers. Since the app is primarily a nutritional tracking program, this is a serious issue. As mentioned previously, the database lacks some popular foods. While this concern would be somewhat alleviated if users would use the feature to add customized foods to the database easily, users report that this feature is time consuming and tedious to operate. Even with these concerns, the app could be beneficial for some individuals.

GoMeals, with its restaurant locator, would be a suitable app for those diabetics who eat most of their meals in restaurants or who travel often. The
database of restaurants and foods each establishment offers seems to be fairly comprehensive, a quality that may outweigh the otherwise lacking food database for those who primarily eat at establishments outside of their homes. Even then, individuals living in urban areas may find the app to be more applicable to them since the chain restaurants represented in the app may be more concentrated in urban areas. Diabetics may also want to consider this particular free app if they travel often or even if they are planning a vacation since the restaurant locator could be quite beneficial in both of those scenarios.

Analysis and Recommendations for MyFitnessPal®

MyFitnessPal is a popular TLC app that is primarily useful for those who those trying to lose weight but may be useful to diabetics as well. The mobile app is free to download and use on all offered platforms and even includes an online desktop component. MyFitnessPal is available on an impressive range of platforms. In addition to being offered to iPhone, iPod touch, Android, and iPad users, a version of the app is also compatible with Blackberry and Windows 7 smartphones. As with many other nutritional tracking programs, MyFitnessPal is able to sync user data across all devices, including desktop (“MyFitnessPal Mobile Apps”).

Usability of the MyFitnessPal for iPhone and iPod touch is excellent. The app works efficiently with fairly short loading times and acceptably streamlined processes for inputting data (MyFitnessPal, LLC). Some tasks could be simplified to save time. As one user states “my only suggestion is to create
fewer clicks to add meal. I feel like every meal that I enter I have to go back and forth typing the name of the food, selecting the food and then having to back and erase my initial typing so I can hit the ‘add’ button” (“This App Is Helping Me a Lot”). The effectiveness of the app is excellent since navigation within the app is easy due to its organized layout and the information is presented in a manner that is understandable and obtainable (MyFitnessPal, LLC). Finally, the user satisfaction of the app is superb. Most users of the current version have bestowed the mobile tracking aid with high ratings. Out of 202 ratings on iTunes, the current version of the app earned an average rating of four and a half stars. Most complaints that it did receive were not directed at the usability of the app itself but at the amount of personal information requested when initially creating a MyFitnessPal profile (“Calorie Counter & Diet Tracker by MyFitnessPal”). On Google Play, it received an average rating of 4.7 stars (“Calorie Counter - MyFitnessPal Reviews”).

The food database and logging options available to users of the MyFitnessPal app are impressive. The food database boasts a collection of more than 2,000,000 various foods (“MyFitnessPal Mobile Apps”). The database includes an assortment of generic, branded, restaurant, and homemade foods that is constantly growing due to the ability of users to add foods that are currently not available to the database. Also, for those who cook, a recipe calculator is provided which computes the amount of calories and other nutrients that are present in a serving of that recipe (MyFitnessPal, LLC). Additionally, as one user states, “the best part is the barcode scanner” (“Love This App!”), a
feature that gives users more viable options for logging food than manually adding either custom foods or foods currently available on the database.

While MyFitnessPal does not include options specifically for diabetics, it does provide some opportunity for other forms of tracking. From either the app or website, users can record many different types of physical activity (“MyFitnessPal Mobile Apps”). The exercise database allows one to choose from a range of both cardiovascular and strength training exercises and to select an option corresponding in intensity and duration. Additionally, the ability to track water intake is available to those wanting to ensure adequate hydration (MyFitnessPal, LLC).

MyFitnessPal offers several different personalized experiences for its users. Within the food and exercise tracking portions of the app, users are given the ability to create and save their own foods, meals, exercises, and recipes for later use. As an additional feature, users may even set up reminders that will appear if they have failed to log a meal within a specified amount of time (MyFitnessPal, LLC).

In order to track data, a user may manually input weight loss and caloric goals or allow the app to calculate these goals itself based on user preferences. Considering these goals, the app compiles user data to offer a wide variety of reports and graphs, many of which are available directly within the app (MyFitnessPal, LLC). However, an even greater number of reporting options can be accessed online. From the website, charts and graphs for nutrition, fitness, and progress alike can be generated. For each category, daily totals
from the past seven, thirty, or ninety days can be compared. Notably, the nutrition category may provide this information for daily intake of carbohydrates, calories, or a variety of other nutrients individually (“Charts and Reports”).

MyFitnessPal integrates an optional social aspect into a user’s experience with the app. The website itself provides a community to its members where they can interact with one another on message boards, become part of a group, maintain a blog of one’s own or read and comment on the blogs of others, and even find other members with similar interests and goals. The message boards even provide an area where members may share recipes with the rest of the community, an aspect that may be attractive for those who enjoy home cooking (“Community”). If one maintains a personal blog or website, badges displaying one’s progress can be copied from the desktop site to be displayed on those personally maintained sites (“Your Personalized MyFitnessPal Badges”). As an additional option to share progress, MyFitnessPal can be integrated with Facebook and set up to automatically post about personal accomplishments. Finally, one may choose to share the diary with others, which may be especially helpful when working with physicians or other health professionals (MyFitnessPal, LLC).

MyFitnessPal is compatible with a wide variety of API’s that provide additional logging options. Some of these API’s such as Fitbug, Netpulse, Runtastic, and EveryMove are additional mobile apps that are able to link to and share their logging information with MyFitnessPal. However, many API’s consist of a variety of compatible devices such as the scales offered by Fitbit, iHealth™,
and Withings, the pedometers created by Striiv® and Runtastic®, and the armbands from Jawbone®, Tictrac®, Scosche®, and BodyMedia® all of which provide information to their respective apps, and therefore to MyFitnessPal (“App Gallery”).

As with other TLC apps, MyFitnessPal offers both benefits and drawbacks. Perhaps the greatest advantage of MyFitnessPal is its extensive food database, this being especially impressive given that the app and its resources are all provided free of charge. The large database is an element that offers users a variety of options in nutritional logging that many other apps do not. Furthermore, the reporting interface, allowing easy analysis of activity, is extremely beneficial. This feature may be especially helpful to diabetics wanting to evaluate daily carbohydrate intake. The extensive community and additional social interaction options may be valuable for those needing support and accountability, accountability in logging also being included in the personalized logging reminders. The final most significant feature of MyFitnessPal is the additional API’s available to enhance one’s experience. This innovative feature is advantageous in that it allows more automatic logging of exercise, weight, and other data.

The shortcomings of the MyFitnessPal app are mostly related to its usefulness specifically to diabetics. Since MyFitnessPal is primarily a weight loss and calorie counting app, it does not provide features like blood glucose monitoring or insulin and medication records that would be especially helpful to diabetics. Consequently, the MyFitnessPal community’s main focus is also on
weight loss and maintenance, making the social interaction somewhat less relevant to diabetics. Nonetheless, some message boards and groups have been created specifically for patients with diabetes, offering additional social support particularly for these individuals.

Overall, the MyFitnessPal app would be most relevant to diabetics who are overweight and primarily concerned with weight loss and an increase in physical activity as a tool for improving their blood glucose concentrations. This app would be best suited for these overweight diabetics due to the vast array of tools that MyFitnessPal offers for weight loss. This app would be especially helpful to those who eat a combination of meals at restaurants and at home due to the extensive food database. However, since more tools, such as the recipe calculator and barcode scanner, are provided for those who eat at home, diabetics who tend to eat more meals at home might have a slightly greater preference for this particular app. Because the barcode scanner works well, the app would be an excellent choice for those who eat many prepackaged foods and meals. Furthermore, because the app offers many options for the tracking of exercise, especially with the integration of the API’s and their respective devices, incorporating physical activity into one’s lifestyle is a more viable option. No recommendations can be made for those having certain dietary restrictions, being of a specific age, or living in particular areas, since the app would be suitable for each consideration.
Analysis and Recommendations for Fooducate™

Fooducate is a TLC app offered by Fooducate, Ltd. It is available on the standard smartphone platforms, Android and iPhone/iPod touch (“Home”). For iPhone and iPod touch, several versions of the app are available at varying costs. While the basic version is free to download and use, a “Plus” version is also available for $3.99 that offers an ad-free experience. Additionally, an “Allergy & Gluten Free” version can be purchased for $4.99 and a “Diabetes” version for $3.99 (“Home”). However, the “Allergy & Gluten Free” and “Diabetes” versions are not available on the Android market. Only the free and ad-free versions can be purchased for that particular platform, the latter of the two being $3.99 (“Apps by Fooducate, Ltd.”).

The basic version of the app on iPhone and iPod touch displays good usability. The app responds fairly quickly to input and requires few steps to log information, making it efficient. The design of the program is simple, it can be easily operated and navigated, and information is presented clearly, making it effective (Fooducate, Ltd.). As the last measure of usability, the current version of the app has fairly high satisfaction with an average rating of four and a half stars from 77 iTunes user ratings (“Fooducate – Diet Tracker & Healthy Food Nutrition Scanner”). On Google Play, it received an average user rating of 4.4 stars (“Fooducate Healthy Weight Loss Reviews”).

Important to the app’s functionality is the extent of the database and logging options. The Fooducate app has a database of more than 200,000 food products (“About Fooducate”). Although the database is somewhat limited
including only generic and branded foods, it does include most common selections of these (Fooducate, Ltd.). One reviewer notes “It’s a bummer that not all foods are listed, but it’s AWESOME for what most people buy” (“Education Is KEY”). Additionally, foods may be added by scanning product barcodes. While not all foods are available in the database, both the product and its barcode can be manually added. A user comments, “The scanner is very useful and when it’s not yet in the database, you get to send the info and they quickly add it” (“Quick Research”). The database provides additional aid in logging food manually in that pictures of each product are provided. This allows users to ensure that they have selected the correct option (Fooducate, Ltd.).

Fooducate does not offer any tracking options specifically for diabetics in any of its versions. All versions of the app, nonetheless, do provide a log for exercise and water intake. By adding exercises from the database, users can determine the number of calories that they have burned. The exercises available in the database are extremely generic, however, and do not allow for modification of intensity, giving only a general idea of the calories burned while performing that activity for the specified amount of time (Fooducate, Ltd.).

The main feature of Fooducate is its innovation in educating its users about nutrients in the foods they are eating. All versions of the app grade products in the database based on their nutrition facts and ingredient list. Based on this information, an algorithm is used to grade the foods on a letter scale, “A” being the most nutritious and “D” being the least nutritious (“How Fooducate Grades Products”). The app then gives the user access to a listing of
ingredients, nutrient facts, and other product details. A specific breakdown of positive and negative aspects of the product with specific explanations of the reasoning for each is also included in the product details. Finally, a user may select the “alternatives” button, and the app will suggest other products which are in the same category but have higher ratings for nutritional value (Fooducate, Ltd.). The diabetes specific version of the app also integrates net carbs and serving size into the grading and prominently displays these facts, since “these two parameters are a strong indication of how […] blood glucose will react” (Weingarten).

Fooducate offers many opportunities for personalization, especially in its focus on food and nutrition education. The app’s algorithms personalize the grades for specific foods based upon a user’s profile (Weingarten). A Fooducate user’s profile is set up with common criteria such as sex, age, activity level, height, and weight; but the profile on the app also incorporates goals such as eating minimally processed foods or fewer genetically modified organisms (GMOs), as a vegan or vegetarian, or to lower cholesterol or BP (Fooducate, Ltd.). The diabetic version of the app also incorporates the type of diabetes that that one has as part of the individual’s profile (Weingarten). All of the factors help to determine what products are most beneficial to that specific user and are incorporated, along with location, into personalized recommendations and alternatives. Like most other apps, the tracking aid also has the ability to save favorite foods (Fooducate, Ltd.).
To track a user’s progress, Fooducate has both daily and more long-term options. A user will first set goals either manually or through app recommendations. Afterward, one may access a screen with information about daily intake, including a countdown of both carbs and calories. The app also provides personalized graphs for calorie and carbohydrate consumption, foodpoint totals, and weight in addition to daily pie charts of the amount of processing in the foods one has consumed (Fooducate, Ltd.).

Though Fooducate offers few opportunities for social interaction, it does provide some social integration. Users have the ability to browse through product listings on the app which offers a slight social aspect in that the listings can be sorted by the most popular products. Additionally, one is able to save products to a shopping list that can then be published on the social media sites, Facebook and Twitter, or sent by email to the user’s own address or to that of someone else (Fooducate, Ltd.).

Fooducate as an app has some important, valuable features combined with some weaknesses. The app, being free in its most basic form, is an attractive option with its innovative concept of educating its customers about the nutritional values of the foods in their diets. The barcode scanner, grading scale, alternative recommendations, and ability to create and share a shopping list are all extremely beneficial, especially when grocery shopping. Finally, the various options for personalization aid the user in creating a customized experience.

Some disadvantages for diabetics using Fooducate include the absence of diabetes-specific tracking tools (i.e. A1C, glucose, etc.), the lack of social
interaction, the inability to create custom recipes, and a food database that is devoid of many items, especially restaurant cuisine. Although Fooducate offers a diabetic specialized app, it does not include the opportunity to log glucose, medicines or other relevant information, a feature that would be useful. The deficit of social interaction, while not necessary to the actual operation of the app, may have some influence on accountability of the user and their likelihood to continue logging data. The absence of a recipe calculator makes it difficult to log homemade foods in one’s profile. This may cause users to have incomplete food diaries and thus lead to inconsistencies. Finally, the biggest issue is the extent of the database, the largest concern being the inability to track meals eaten at restaurants due to a lack of data for those establishments.

Fooducate would be especially useful to newly diagnosed diabetics who are attempting to manage their diabetes solely through modifications in lifestyle and behavior. Of these individuals, the app would be more beneficial still to those who eat mostly pre-packaged meals and snacks because these are the bulk of what is available in the food database. This also means that those in urban areas would gain the most from using the app since they would have more grocery stores available in the area in which they live, providing more opportunity for alternative suggestions. However, the app does account for location, making it a viable option for rural dwellers, as well. As a final consideration, since the app rates foods based upon one’s profile, those with dietary considerations due to other medical conditions such as heart disease or lifestyle choices such as vegetarianism would benefit from the use of this app.
Analysis and Recommendations for Lose It!®

Lose It! is a TLC app produced by FitNow, Inc. whose primary objective, as its name implies, is to help its users lose weight. The app is offered on a wide range of platforms, including the more common iPhone, iPod touch, iPad, and Android devices, but also extending services to include Kindle and Nook (“Lose It! Premium”). An online desktop component is also available for this program, in addition to the mobile apps (“How It Works”). While the download of the app is free, an in-app premium subscription of $39.99 per year is required to unlock many features. Even without a subscription, however, users do have access to a substantial number of basic features that accompany the free download (“Lose It! Premium”).

Usability of the iPhone/iPod touch app is excellent. With reasonable wait times and a well-organized layout, tasks can be performed quickly and with few steps. The layout also allows for presentation of information in a useful manner that is comprehensible. This being true, the app is considered to be both efficient and effective (FitNow, Inc.). With an average rating of four and a half stars for 40 consumer reviews on iTunes (“Lose It!”) and 4.6 stars on Google Play (“Lose It! Reviews”), the user satisfaction of the current version of the iPhone/iPod touch app is excellent.

The Lose It! app food database provides a variety of logging options in addition to a substantial database with which most users seem satisfied (“Lose It!”). The database includes generic, branded, and restaurant foods in addition to the options to add custom foods and calculate and add personal recipes. The
app also offers users the ability to search specifically in certain categories such as brand name or restaurant items. Logging options include selection of food from the database through manual search or barcode scanning, manual creation of a personal food, or quick selection from a previous meal (FitNow, Inc.). About these attributes, one user writes, “Huge database aids daily entry. Has large number of restaurant foods. Easy to add entire meal from ‘previous meals’ section. Keeps track of often used foods and presents those first…Makes keeping track a breeze” (“Great Diet App”).

In addition to tracking food consumption, Lose It also provides options for recording other forms of data. As with many other apps, Lose It! can track exercise, providing the number of calories that each activity burns based on intensity and duration of that particular physical activity (FitNow, Inc.). Only available to paid subscribers, the app allows users to keep a record of certain medical and behavioral data. The medical considerations include blood glucose readings, BP measurements, and one’s Diabetes Risk Score (DRS) as obtained from the PreDX test, and the behavioral data includes hydration and sleep (“Lose It! Premium”). Of these, the blood glucose logging aspect would likely be the most relevant to diabetics with PreDX DRS possibly having some value.

Like other apps, Lose It! also provides options for personalization, especially when one chooses to augment it with the paid subscription. One has the ability to set reminders to log at specific meal times or at the end of the day. For each option, the user may enter the specific time. As previously mentioned earlier, a user may create custom foods, exercises, and recipes within the app,
but one may also select the specific nutrients such as fat or carbohydrates that are of special interest to be displayed and reported (FitNow, Inc.). A personalization feature specific to premium members is access to meal and exercise planning in which these elements may be logged in an inactive form prior to consuming the meal then activated by the user later (“Lose It! Premium”).

In order to track progress, goals are created and reports are generated in accordance with these goals. The reports that are produced contain daily or weekly information or even data from the entire extent of the program and may be imported into an Excel file for easier analysis (FitNow, Inc.). While weight loss is a goal available in all versions, the goals in the premium version also consider targets for exercise, medical data (i.e. blood glucose, BP, etc.), specific nutritional elements, sleep, and body measurements (“Lose It! Premium”).

Lose It! users may connect socially with both social media and the Lose It! online community. The Lose It! app supports integration with both Twitter and Facebook for the free and premium versions in order to share weight loss, exercise, and goal achievement updates with friends (FitNow, Inc.). Users may also interact with the program’s online community to find friends, join groups, or even participate in challenges. As a benefit of the premium subscription, these users have access to a wider variety of groups and challenges in addition to the ability to create their own (“Lose It! Premium”). The final method of social interaction involves the reporting feature. Both paid and basic users may email reports to themselves, medical advisors, or friends, increasing the extent of accountability available (FitNow, Inc.).
Just as the MyNetDiary and MyFitnessPal apps were compatible with other apps and devices, Lose It! has also partnered with other companies to offer its own set of API’s. The basic app supports the Nike FuelBand, an activity tracker, as its only API. Users who have a premium subscription, however, may integrate other popular fitness apps such as Nike+ Running, RunKeeper, and MapMyFitness in addition to two different wireless scales, three activity trackers, and the Withings BP monitor (“Lose It! Premium”). Each API helps users to track their data by providing a more automatic method of logging certain data.

Users will find the Lose It! app and related programming to have many attractive aspects in addition to some shortcomings. The initial free download of the app with its most basic features and access to the online community are beneficial aspects of the program. The app expertly eliminates excuses that users may have for not continuing the plan or for failing to log frequently. The community and integration of social networking provide motivation and support as well as accountability. The barcode scanner and multiple logging options make it more convenient to enter nutritional data while the reminders ensure that one does not forget to log this data. The many API’s, while most only being functional with a paid subscription, allow for automatic logging of exercise, weight, and other data. As a final consideration for diabetics, the ability to log and track blood glucose is a benefit to those with the premium service.

The primary disadvantage of the Lose It! app is the cost of the premium subscription but some other minor inconveniences exist. The cost of the subscription service in order to receive and utilize additional features is not ideal;
However, the greatest downfall is the lack of a shorter subscription option that one may find useful to test the product. Though a minor issue since the app offers the ability to create recipes, the app’s existing database does not appear to include homemade foods. The addition of these items to the database would be helpful in assessing home-cooked meals.

Due to the extensive offerings of API’s, syncing across a wide range of devices, and presence of social integration, Lose It! is likely best for diabetics in early adulthood. This recommendation considers that this is the age group most likely to own and utilize a variety of devices in addition to having a greater presence on social media. Since a majority of the API’s are weight and exercise logging aids, a subset of these younger individuals, who are overweight and using both nutrition and exercise to manage weight and diabetes, would find the app most helpful. As an additional consideration, because the database includes mostly branded and restaurant foods, the app would be more suited for someone who is not hoping to log the nutrition from recipes found in magazines or online. This is often more likely to characterize a career person without children, a subset of individuals that would also be more common in young adults.

Analysis and Recommendations for TheCarrot.com®

TheCarrot.com, created by Health Analytic Services, Inc., is not solely a nutritional tracking app but does have a food and nutrition-tracking feature. While the app is only available for iPhone and iPod touch, it does incorporate an online desktop component. In fact, the app is created as a supporting feature of
the website, making desktop access a more vital aspect of the program. The iPhone and iPod touch apps are free to use, as is the website. Both systems require one to create an account and allow syncing of data that users may enter remotely from mobile devices when they do not have access to a computer (“Tour iPhone App”).

Usability of The Carrot is fair, leaving much opportunity for improvements. Having efficiency, the layout of the app is sufficient to limit the number of steps necessary to complete a task (Health Analytic Services, Inc.). The effectiveness of the app could use some improvement. The loading times are slightly longer than those of the other apps and the completion of tasks is delayed by reported crashes. One user writes, “every time I click on one of the trackers it shuts down” (“Has potential to be great....”). However, since that review was published, a new version that reportedly updates “the app to resolve bugs introduced with iOS 6” has been released, possibly offering a solution for that particular issue. Finally, user satisfaction for all versions of the app is low with an average rating of two stars. It is important to note that these 2111 ratings are reviews of older versions of the app, since the iTunes App Store does not consider the newest version to have yet received enough user reviews to provide an average rating (“TheCarrot.com – Track your Life”).

The food database and logging options are fairly limited, which can be expected being that the app is not specifically designed for this purpose. As one user comments, “The food journal portion leaves very much to be desired” (“Great Idea but leaves much to be desired”). TheCarrot.com does reportedly
have “thousands of items to choose from” (“Trackers”) in its database, each of
these items including nutritional values for the food product listed. The tracker
does not have an option to personally add additional foods to the database,
which would expand the database, and only allows for the manual entry of foods
(Health Analytic Services, Inc.). The logging of food does provide the option of
attaching a picture of the meal to its entry, allowing for better tracking and easier
recall of the exact meal and portion (“Tutorial”).

TheCarrot.com’s true advantage is in alternative forms of tracking. The
app and its desktop site provide users with an extensive array of options in many
diverse areas of lifestyle tracking. Many general logs are available, collecting
data on activity, body measurements, energy level, exercise, job satisfaction,
medication, meditation, mood, pain, sex, sleep, smoking, symptoms, and
television viewing. More specific categories of trackers are also offered for vitals,
body, test results, specific conditions, women’s health, and fitness (“Trackers”).
The most relevant of these to diabetics being the diabetes condition tracker, the
individual trackers for medications, and the results from the fasting glucose and
A1C tests. The fasting glucose and A1C logs provide the tracking options that
their names imply. The medication tracker records specific medications and their
strengths. The diabetes condition tracker logs blood glucose, carbohydrates,
and the time that has elapsed since one’s last meal (Health Analytic Services,
Inc.).

The vast array of tracking options also provides an opportunity for
substantial personalization. Within the app, a user can select the specific
trackers to be used. For efficient data logging and easy access to these trackers, the selected trackers are the only options displayed in the main screen (Health Analytic Services, Inc.). From the app, the user may even store favorites for each of his trackers, allowing for easier access and logging ("Tour iPhone App").

TheCarrot.com offers programs to users that allow for goal setting and then use the relevant trackers to measure progress toward those goals. Individuals even have access to a diabetes-specific program. As an additional feature, a user may access personalized reports about the specific areas that they track. The reports may even include a combination of data from several different trackers in order to make the relationships among various subsets of data more apparent. TheCarrot.com offers users the option of contacting the company by email in order that they may formulate and provide reports that are specifically created for that individual ("Tutorial").

Social integration and online sharing are an important aspect of TheCarrot.com. While it cannot be linked to social networking sites, TheCarrot.com does have an online community that can be accessed from the desktop site, connecting users to other members with similar interests and goals. Some programs even include their own optional online communities, which provide support and motivation ("Tutorial"). The information that one logs, while being available to share with the site’s own online community, can also be sent to various other individuals such as healthcare providers or friends and family ("About TheCarrot.com"). TheCarrot.com emphasizes privacy and security of
information, providing users with many options for sharing and the ability to easily evaluate the extent of sharing (“Tutorial”).

TheCarrot.com provides many beneficial features that other apps do not. The app is free to download and provides users with many personalized options. The wide range of tracking options, being its most attractive characteristic, allows one to combine data from various aspects of daily living. This is especially true for diabetic users, as many lifestyle choices have a particular impact on diabetes. The reports that can be generated have the potential to be extremely helpful in analyzing behavior and its effects because of this wide range of records. A user, through these summaries and reports, is able to analyze lifestyle choices and the effects on health, providing better information for the most effective methods of behavior modification. A diabetic user may use these reports to identify specific causes of increased blood glucose concentrations or when medication should be taken to better regulate blood glucose. The online community and specialized programs also aid users in setting, working toward, and reaching goals, the diabetes program and related community being especially useful for diabetes patients.

Although providing a wide range of beneficial features, it does have its drawbacks, especially for meal logging. Being a tracking program for one’s life rather than specifically nutrition, TheCarrot.com is lacking in many of its food tracking capabilities. The food database, being smaller than that of many other programs, is a major concern when attempting to manage diabetes through nutrition. The lack of integration with social networking sites does limit social
integration and the community from which users may find motivation, support, and accountability. The app itself is somewhat limited. Its role being a supporting device to the desktop site, the app cannot function well without the desktop aspect, since it lacks access to many of those features such as the online community and programs. Finally, only being available to iPhone and iPod touch, individuals with Android or other platforms are unable to download the mobile app.

TheCarrot.com, though having many drawbacks in its nutritional logging capabilities, would still be particularly beneficial to certain subsets of diabetics. TheCarrot.com would be most beneficial to those who simply need a general indication of how foods affect their blood glucose. Because of this, both those who have had diabetes for a significant amount of time and those whose diabetes is well managed would find the app helpful. Those who have been diabetics for an extended period should have more experience with the effects of various nutritional choices. These individuals should be able to select existing options in the database that are similar in nutritional value to the actual contents of their meals, making the database size less limiting in functionality. Someone who is successful in managing diabetes is likely to only need the accountability of tracking or may even find the additional forms of tracking to be valuable. Furthermore, individuals in both of those subsets who have multiple conditions or concerns would find the app extremely helpful in holistically evaluating lifestyle choices. With no specific considerations for those of diverse ages and in differing locations, no recommendations can be made for those categories.
Analysis and Recommendations for Diabetes In Check®

The Diabetes In Check app is mobile tracker designed by Everyday Health, Inc. specifically for diabetes patients. The free app is available for iPhone, iPod touch, and iPad. While the app is free to download initially, a supplemental $3.99 per week subscription cost is required to take advantage of additional features. Unlike most of the other TLC apps, this Diabetes In Check is a stand-alone program with no online desktop component (“Diabetes In Check”).

The Diabetes In Check app for iPhone/ iPod touch demonstrates good usability. The app is fairly easy to navigate, allowing time necessary to complete tasks to be minimized since logging data requires few steps. Although the loading time for some screens is somewhat slow, the program is still fairly efficient. As an effective mobile app, operations are carried out as intended and information is presented accurately (Everyday Health, Inc.). User satisfaction for the current version is high with an average rating of four stars from 72 users. As one user praises, "Helps keep track of everything a diabetic needs to do to get and/ or keep their diabetes under control; carbs eaten, exercise, medication, glucose readings…everything. As you can tell…I am a fan!" (“A Must-Have For Those Newly Diagnosed”).

The food database and logging options, being a nutritional app, are vital to its function. The existing database contains more than 80,000 foods (“Diabetes In Check”). While somewhat more limited than some other databases, this issue is circumvented partially by the ability of its users to add new, custom foods (Everyday Health, Inc.). To make logging easier, recently- and frequently-logged
foods are stored in memory, and a barcode scanner is available to find pre-packaged meals and foods ("Diabetes In Check"). All of these logging tools can be accessed without a subscription.

In addition to nutrition, Diabetes In Check is able to track some diabetic specific data. Physical activity, medications, and blood glucose readings can all be added to the daily log ("Diabetes In Check"). Different types of exercise can be tracked along with the time spent doing those activities. The intensities of those workouts, however, are not taken into account for the entries. Medication regimens and blood glucose concentrations can both be entered with the time they were taken, relative to food or exercise (Everyday Health, Inc.). The presence of these additional tracking options are especially beneficial to diabetics in analyzing how different activities affect blood glucose and learning to manage their condition, particularly where timing is concerned.

Diabetes In Check offers several tools for someone wanting to personalize the experience. With the ability to set reminders for all types of logging, users are less likely to forget to take medication, measure blood glucose, or enter data ("Diabetes In Check"). By setting goals, users get more personalized suggestions for the number of carbohydrates to be consumed at each meal in addition to the percentage of each type of food that should constitute those meals. Target ranges for blood glucose are also shown (Everyday Health, Inc.). Additionally, the app offers a reference of generic foods and how they compare to a diabetic’s nutritional needs. A listing of recipes also exists for all users with
accompanying meal plans and additional recipes available to subscribers, encouraging users to prepare diabetic friendly meals (“Diabetes In Check”).

Within the app, progress toward goals is tracked using several methods. Daily totals of caloric and carbohydrate intake are visible in addition to a countdown of remaining calories. Progress reports for blood glucose and weight loss can be generated for the extent the app’s use. These reports contain only a listing of the recorded data, however, with no graphs or other form of visualization (Everyday Health, Inc.).

Finally, some social aspects are integrated into the Diabetes In Check mobile app. Though no integration with social media is available through the app, access to digital “community of over 200,000 people” (“Diabetes In Check”) who have similar concerns is included in both the free and subscription versions. Through message boards, members of the community, all striving to manage their diabetes, interact to support and encourage one another through personal stories and experiences. Finally, the sharing of data with doctors, other medical personnel, family, and friends can be done through email (“Diabetes In Check”). This feature is useful for involving others in one’s journey and informing them of the progress that has been made.

As with other mobile apps, both positive and negative aspects of Diabetes In Check are present. The recipe database is extremely helpful to those searching for recipes that complement a diabetic diet. As a stand-alone app with no desktop component, the program is completely transportable which is beneficial to someone who does not own a computer. The reminders for and
availability of logs for the tracking of blood glucose, medication, exercise, and nutrition being within a single app allow for a more comprehensive analysis. All of these aspects may be evaluated in relation to the others, allowing for a deeper understanding of their impacts on each of the others. This provides great benefits for a diabetes patient attempting to manage his condition with the inclusion of time references in each logs enabling even deeper analysis of this data.

Some other, more negative, attributes of Diabetes In Check must also be taken into account. Primarily, the subscription plan is quite expensive for the additional recipes and meal planning features it provides. Being a stand-alone app can be beneficial in some regards, it also limits the program’s capabilities. For example, a desktop can provide a better platform for the reporting of data in the form of charts or graphs. Finally, the absence of a recipe calculator results in somewhat limited logging options, and a lack of integration with social media, confining the degree of social interaction, are both aspects that inhibit the functioning of the app.

The features of Diabetes In Check are applicable to fairly newly diagnosed diabetics who eat at home and are taking either oral medications or insulin to manage their diabetes. The suggested target range for blood glucose and mealtime carbohydrate intake would best aid someone with little experience in diabetes tracking. The ability to compare exercise, blood glucose, medication, and nutritional data would allow one to evaluate specific needs and responses. Both the barcode scanner and recipe database would be of use to someone
eating at home, the barcode scanner being more applicable to someone eating pre-packaged dinners and the recipe database being more pertinent to one preparing meals from scratch. Finally, the tracking of medication treatment can only be utilized by someone taking diabetes medications but is particularly helpful to someone who is new to taking these medications, especially with the logging reminders. This is also true of the blood glucose data and its reminders. This app provides no features specific to someone of a certain age, location, or supplemental diet and could, therefore, be applicable to a person in any of those categories.

Analysis and Recommendations for Daily Carb®

Daily Carb is a tracker for nutrition as well as a variety of other diabetes specific data. The app, produced by Maxwell Software, is compatible with the Apple platforms, iPhone/ iPod touch and iPad. The app, however, supports no online desktop component, making it a stand-alone program. On each of the supported platforms, the basic app is free with the option of adding additional features through in-app purchases of $0.99 per feature (“Daily Carb”). A premium version of the app is also available for $2.99. This version includes all of the additional features that are available for purchase within the free app (“Daily Carb Premium”).

The Daily Carb mobile app demonstrates good usability. Within the basic app, searches are not immediate, requiring several seconds to load, and more steps than should be necessary are required to log data, causing the tasks to
take longer than they should. For these reason efficiency is could use some
improvement. The app’s effectiveness, however, is excellent with its methodical
presentation and layout, allowing easy navigation and operation (Maxwell
Software). User satisfaction is fairly high for both the premium and free versions
of the app, though it is important to note that the current updates have not
received extensive reviews. The premium app, with 30 total ratings for the
current version, received an average rating of four stars (“Daily Carb Premium”).
The free app, however, having 138 ratings for the current version, received an
average rating of four stars. Most issues that users have found are due to the
inability, in some instances, to open the app after download (“Daily Carb”).
Overall, when the app has downloaded properly, its usability is acceptable.

The food database and logging options for Daily Carb are respectable.
The existing database includes generic, branded, and restaurant foods that are
conveniently organized as such within the search options. If one cannot find the
correct option from this list, a user even has the ability to add his own food to the
log or to create a recipe, the nutritional value of the combination being calculated
by the app (“Daily Carb”). However, even with these additional logging features,
the less than extensive size of the existing database is a drawback. One user
notes, “The food directory is seriously lacking. Missing a lot of choices compared
to other apps” (“Need to improve food choices!”).

The Daily Carb mobile app does provide many options for additional
tracking, especially with the premium version. Within the free and premium apps,
users may track both water and weight in addition to food (“Daily Carb”). The
additional tracking features for exercise, glucose and insulin, BP, lipid panel, and medications are available to premium users (“Daily Carb Premium”). These supplementary trackers are also available for individual purchase for $0.99 per tracking feature within the free app. Exercises are correlated with type and intensity of the workout; the BP tracker takes both BP and heart rate into account; and the lipid panel includes a log of cholesterol, triglycerides, HDL and LDL. As for the more diabetes specific trackers, glucose and insulin logs record glucose and A1C readings and the medication log associates dosage and time (“Daily Carb”).

Personalization is also an important component of Daily Carb. All users can take advantage of being able to customize their experience by adding favorite foods. Conversely, those who have purchased the additional exercise feature or are a premium subscriber can add certain exercises as favorites or even customize their own. Also available within the premium app or for separate purchase are reminders that can be set to prompt one to measure or log data. Finally, the ability to purchase relevant features separately within the free app also provides a degree of customization. The insulin and glucose log, especially, provides for personalization, since it has the ability to calculate one’s needed amount of insulin for a particular instance (“Daily Carb”).

In order to measure personal progress, the app provides options for short- and long-term tracking. A user can create a daily carbohydrate goal in addition to goals for blood glucose, BP, heart rate, and weight. A daily countdown for carbohydrates can then be viewed based upon the user’s personal goal (Maxwell
Software). Finally, personalized reports and graphs can be produced for all available tracking features (“Daily Carb”).

While extensive social integration is not present, some opportunities are still provided by the Daily Carb mobile app. Users are able to send the data they have logged to others. This may include family, friends, or medical professionals. However, no social media incorporation or specialized Daily Carb community is available to users (“Daily Carb”).

As with other apps, Daily Carb has both positive and negative attributes. The ability to download only the features that are specifically relevant to the user allows it to be more affordable and optimized for that individual. Additionally, the variety of medical tracking options available for purchase -- especially those that are diabetic specific -- are extremely advantageous to those needing assistance in tracking and improving their health. Finally, the ability to calculate recipes is helpful for those who cook.

Some drawbacks do exist in the Daily Carb mobile app. Primarily, the size of the existing database is limiting, especially with its lack of home cooked choices. The optimization of the app for only the iPhone/ iPod touch and iPad platforms and lack of an equivalent app for the Android market, especially, restricts which individuals may download it. Lastly, the lack of social integration undermines the accountability, support, and motivation that are provided by a community.

Daily Carb would be of most assistance to someone with specific needs. Since the app focuses on carbohydrates, it would be most helpful to someone
hoping use nutrition to enhance a management regimen but not necessarily looking to lose weight. While the other apps would be most beneficial to T2DM diabetics, this app is potentially beneficial to someone with T1DM. This difference is due to the fact that the Daily Carb app provides the option to purchase the insulin, possesses a glucose-tracking feature, and even calculates the amount of insulin needed in specific circumstances. Both those who eat at home and at restaurants regularly would profit from use of the app due to the recipe calculator and database of restaurant foods. Nonetheless, those eating mainly prepackaged meals would not find the app particularly useful due to its lack of a barcode scanner. Since no specific considerations for specific dietary restrictions, age ranges, or locations exist, the app would be relevant to any combination of these individuals.

Summary of Apps

Certain apps are specifically applicable to certain individuals. This specificity of apps is the features of the apps in relation to characteristics of the person using the program. While the broad group identified for the preceding analyses was diabetics, this category consists of subdivisions. The main categories consider the type of diabetes, duration of diabetes, level of maintenance, eating habits, specific dietary considerations, age, and location in addition to some other special considerations.

Overall for diabetics searching for a TLC app, certain apps seem to be more relevant. MyNetDiary, GoMeals, Lose It!, TheCarrot.com, Diabetes In
Check, and Daily Carb each have logging options for blood glucose as well as other various diabetic-specific features. While some of these options are only available for the paid versions of their respective apps, the benefits of these forms of tracking as well as presence other relevant features may outweigh such a cost. Due to the additional features for blood glucose maintenance, these six apps would be the most preferred for the typical diabetic.

Type of diabetes, time since diagnosis, and severity of the diabetes are all important considerations for the functionality of an app for a specific individual. While all of the apps that were analyzed would be useful for both patients with T1DM or T2DM, T2DM individuals who are taking medications may benefit by utilizing MyNetDiary, Diabetes In Check, and Daily Carb due to the medication tracking options. T1DM patients may find the MyNetDiary, TheCarrot.com, Diabetes In Check, and Daily Carb mobile apps to be of the greatest advantage, due to the ability to track insulin specifically. Daily Carb may be most recommended since it can even calculate the amount of insulin needed. MyNetDiary, Fooducate, and Diabetes In Check would be best for the newly diagnosed due to the tips and suggestions provided, while experienced diabetics would find any of the apps suitable. Patients who are able to appropriately manage their blood glucose should be able to use any of the apps effectively. Those who are having less optimal blood glucose control, however, should give special consideration to those apps that record both nutrition and blood glucose, especially MyNetDiary and Diabetes In Check due to the variety of options
included in their databases, providing the ability for more specific nutritional tracking.

Eating habits and dietary restrictions are both extremely influential in app preference. Those who usually eat at restaurants would likely be most attracted to the GoMeals app but may find MyFitnessPal, Lose It!, TheCarrot.com, and Daily Carb to be of use as well. Those who eat mostly pre-packaged, branded foods may find MyFitnessPal, Fooducate, Lose It! and Diabetes In Check to be of most value because of its barcode scanner. Those who cook, however, would be attracted to MyNetDiary, MyFitnessPal, Lose It!, and Daily Carb with their options for recipe calculating or to Diabetes In Check with its provision of a recipe database. Those eat a combination of homecooked, restaurant, and branded food would find the MyFitnessPal database most helpful because it seems to be the most comprehensive. Since Fooducate is the only app that specifically caters to gluten free, vegan, vegetarian, or other specific diets, those with these particular nutritional restrictions should give additional consideration to this app.

Age and location are also a factor in choosing the best app for one’s needs. Older users may be more comfortable using a desktop component such as the ones provided for MyNetDiary, GoMeals, MyFitnessPal, Fooducate, Lose It!, and TheCarrot.com. Younger users would be more likely to have interest in syncing data across a variety of platforms. MyNetDiary, MyFitnessPal, and Lose It! all provide programming for various platforms and even include the option of using supported API’s. These younger users are also more likely to be represented on social media, making MyNetDiary, MyFitnessPal, and Lose It!
more appealing. While location is not a major concern, those living in rural areas may be less attracted to GoMeals and Fooducate than someone living in a larger area since they would be less likely to utilize the app’s suggestions.

Finally, some additional considerations may apply for some of the apps. Both MyFitnessPal and Lose It!, being primarily weight loss apps, would be optimum for a diabetic whose principal issue is being overweight or obese, which contribute to increased blood glucose. Both of these apps would be beneficial for directing the weight loss of these individuals. Since GoMeals provides a listing of nearby restaurants and their nutrition facts, the app would be exceptionally valuable for someone who is vacationing or travels often.

While any of the apps could be beneficial to a patient with DM, some have additional features that are more relevant to certain individuals. It is the job of each individual to evaluate which features they find most important and to choose an app accordingly. By determining which categories that person fits and choosing the app that best fits those characteristics, the user’s needs should be effectively fulfilled.
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Table 2: Evaluation of Apps Based Upon Usability

<table>
<thead>
<tr>
<th>App</th>
<th>Efficiency</th>
<th>Effectiveness</th>
<th>User Satisfaction</th>
<th>Overall Usability</th>
</tr>
</thead>
<tbody>
<tr>
<td>MyNetDiary</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>GoMeals</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>MyFitnessPal</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Fooducate</td>
<td>Good</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Lose It!</td>
<td>Excellent</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>TheCarrot</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
<td>Fair</td>
</tr>
<tr>
<td>Diabetes In Check</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Daily Carb</td>
<td>Fair</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
</tr>
</tbody>
</table>
Table 3: Evaluation of Apps Based Upon Cost and Platforms

<table>
<thead>
<tr>
<th>App</th>
<th>Version</th>
<th>Cost</th>
<th>Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>iPhone/iPod touch</td>
</tr>
<tr>
<td>MyNetDiary</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Pro</td>
<td>$3.99</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>$9.99</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Subscription</td>
<td>$5-$9/mo</td>
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</tr>
<tr>
<td>GoMeals</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td>MyFitnessPal</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td>Fooducate</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Plus</td>
<td>$3.99</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Allergy &amp; Gluten Free</td>
<td>$4.99</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>$3.99</td>
<td>x</td>
</tr>
<tr>
<td>Lose It!</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Premium</td>
<td>$39.99/yr</td>
<td>x</td>
</tr>
<tr>
<td>TheCarrot</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td>Diabetes In Check</td>
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<td>Free</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Subscription</td>
<td>$3.99/wk</td>
<td>x</td>
</tr>
<tr>
<td>Daily Carb</td>
<td>Basic</td>
<td>Free</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Full</td>
<td>$2.99</td>
<td>x</td>
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</table>
Table 4: Evaluation of Apps Based Upon Food Database, Logging Options, and Location

<table>
<thead>
<tr>
<th>App</th>
<th>Version</th>
<th>Food Database</th>
<th>Logging</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Generic</td>
<td>Branded</td>
<td>Restaurant</td>
</tr>
<tr>
<td>MyNetDiary</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Pro</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Subscription</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>GoMeals</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>MyFitnessPal</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Fooducate</td>
<td>Basic</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Plus</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Allergy &amp;</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Gluten Free</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Lose It!</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Premium</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>TheCarrot</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
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<td>Diabetes In Check</td>
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<td>x</td>
<td>x</td>
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<tr>
<td></td>
<td>Subscription</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Daily Carb</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Full</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>App</td>
<td>Version</td>
<td>Exercise</td>
<td>Water</td>
<td>Blood Glucose</td>
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<tr>
<td>--------------</td>
<td>---------------</td>
<td>----------</td>
<td>-------</td>
<td>---------------</td>
</tr>
<tr>
<td>MyNetDiary</td>
<td>Basic</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
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<td>Pro</td>
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</tr>
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<td>GoMeals</td>
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Table 7: Evaluation of Apps Based Upon Progress and Social Aspects

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Table 8: Evaluation of Apps Based Upon Available API’s

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