

An aerial photograph of a city street, showing a crosswalk with white stripes. A person is walking across the crosswalk, carrying a backpack. The image is overlaid with a dark, semi-transparent layer to make the text stand out.

# N-of-1

The Power of Hyper-Personalization

# Revolutionizing Wellness Engagement, One Person at a Time

In the world of statistical analysis, the letter “N” represents the sample size of a study. In an N-of-1 clinical trial, for example, the sample size is a single person. In such a study, the ultimate goal is to use objective data-driven criteria to determine the optimal intervention for one individual.

At Onlife Health, we see using the N-of-1 methodology to create a hyper-personalized experience for consumers as the next step for wellness engagement programs.

We define hyper-personalization as a consumer experience in which all interactions are specifically tailored to match and dynamically respond to each individual's health goals and needs, preferences, demographics and interests.





# A Proven Concept

More and more evidence indicates that such a hyper-personalized approach is more effective at increasing wellness engagement activity compared to a one-size-fits-all method. Personalization is a relationship builder that makes consumers feel welcomed, remembered, and valued as individuals, as well as creating the ability to provide content that is relevant and genuinely helpful. As we shall see later in this paper, when information is hyper-relevant instead of generic, people are more likely to pay attention, become engaged, and transform healthy actions into sustainable changes and lifelong habits.

## The Timing Is Right

Advances in mobile health technologies, combined with greater access to more and more consumer and claims data, have made the N-of-1 methodology (the individual as a unique study subject) and the creation of a hyper-personalized wellness experience a real possibility. This presents an unprecedented opportunity for wellness programs to increase engagement as well as precisely predict each individual's behavior in order to provide more effective motivational “nudges” to better health.

In this paper, we'll first review a third-party research study that examined the impact of personalization in influencing people to exercise. We'll then consider three different practical applications that wellness engagement programs can implement to engage each user on a 1-on-1 personal level and precisely inform each person about “the next right thing to do” for better health.

## 3 Reasons Why Wellness Needs to Embrace Personalization

### 1 Personalization is the way of the future.

98% of marketers agree that personalization advances customer relationships, and 87% say they've realized a measurable lift in business results from their personalization campaigns.<sup>1</sup> Companies like Netflix, Amazon and Facebook understand the power of personalization to build long-term relationships and make customers feel appreciated by providing customized content.

### 2 Wellness engagement programs are no exception when it comes to personalization.

According to the Harvard Business Review, 75% of participants in wellness programs say that a personalized approach is an important part of a wellness engagement program, and 70% say that a company offering a wellness program is an indicator that their employer cares about them.<sup>2</sup>

### 3 A lack of personalization can have a dramatic negative impact on engagement.

In one survey, 37% of those not engaged in the wellness program stated that it was because they didn't find the program personally relevant.<sup>3</sup>

# Proving the Power of Hyper-Personalization

## Can the effectiveness of hyper-personalization be empirically verified?

To answer that question, a team of medical professionals from Columbia University, Stony Brook University and Yale University conducted a 12-month study to determine how sending a single personalized communication would impact physical activity.<sup>4</sup> Their study, entitled “Using Behavioral Analytics to Increase Exercise: A Randomized N-of-1 Study,” was published April 2019 in the *American Journal of Preventive Medicine*. The following is a summary of their methodology and results.

The study began by acquiring six months of intensive longitudinal data from the subject group, including accelerometer-based physical activity via wearable activity trackers (e.g., Fitbit) as well as smartphone-based Ecologic Momentary Assessment (EMA) reports of stress and daily exercise (see Table 1). Combining these data sources allowed researchers to build personalized, observational, N-of-1 models in order to determine the factors that best predicted the likelihood of an individual exercising or not exercising on a given day.

At the end of six months, participants were randomly assigned to either an intervention or a control group. Both groups received the same one-time email communication, a summary of statistics measuring their exercise and stress levels. However, each member of the intervention group also received an “activity fingerprint” as part of the email (see example on page 5). This short paragraph described the one personalized factor that was most successful in predicting whether or not that person exercised on any given day.

Table 1. Variables Considered for Inclusion in Personalized Activity Fingerprint

CONCEPTS	MEASUREMENTS
<b>Self-determination</b>	Morning rating of likelihood of exercising today <sup>b</sup>
<b>Perceived stress</b>	Last night's summary rating of actual stress for yesterday <sup>a</sup> Last night's rating of expected stress today <sup>a</sup> Morning rating of expected stress today <sup>b</sup> Midday rating of stress <sup>b</sup> Evening summary rating of actual stress today
<b>Temporal patterns</b>	Day of the week Weekend versus weekday
<b>Exercise</b>	Last night's report of whether exercised yesterday (self-report) <sup>a</sup> Whether had a 30-minute bout of exercise yesterday (by actigraphy) <sup>a</sup>

<sup>a</sup>Also considered was this variable assessed the day before yesterday and the day before that.

<sup>b</sup>Also considered was this variable assessed yesterday, the day before yesterday, and the day before that.

## Results

For the control group, the number of days of exercise decreased by 10.5 percent. In contrast, the number of days exercising for the intervention group was statistically unchanged. This significant difference was achieved with only a one-time email communication that contained a single paragraph of personalized information.

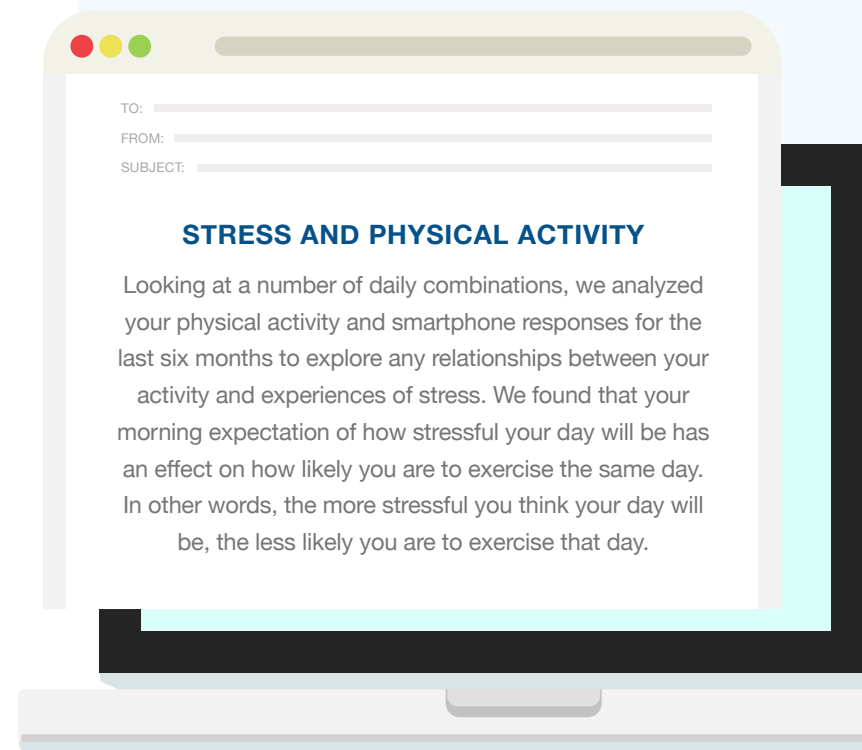
A reasonable inference from this finding is that a more systematic and consistent level of communications would produce an even greater positive impact in increasing physical activity. By syncing activity trackers and apps to a wellness platform, and by capturing healthy behavior tracking through the member portal, wellness engagement programs already have the data needed to provide this type of personalized messaging that encourages and motivates healthy behaviors.

## Point of Interest

The increasing growth of wearable activity trackers is providing a wealth of new data about each person's health habits and lifestyle. And with the explosive growth of smartphone technology, real-time data about stress levels, sleep quality, nutrition and other health factors can now provide additional context and information at the individual level.

## “Activity Fingerprint”

Below is one example of an actual personalized “activity fingerprint” that was sent to members of the intervention group. In this case, the expectation of having a stressful day was the main driver in reducing the likelihood of exercising that same day.



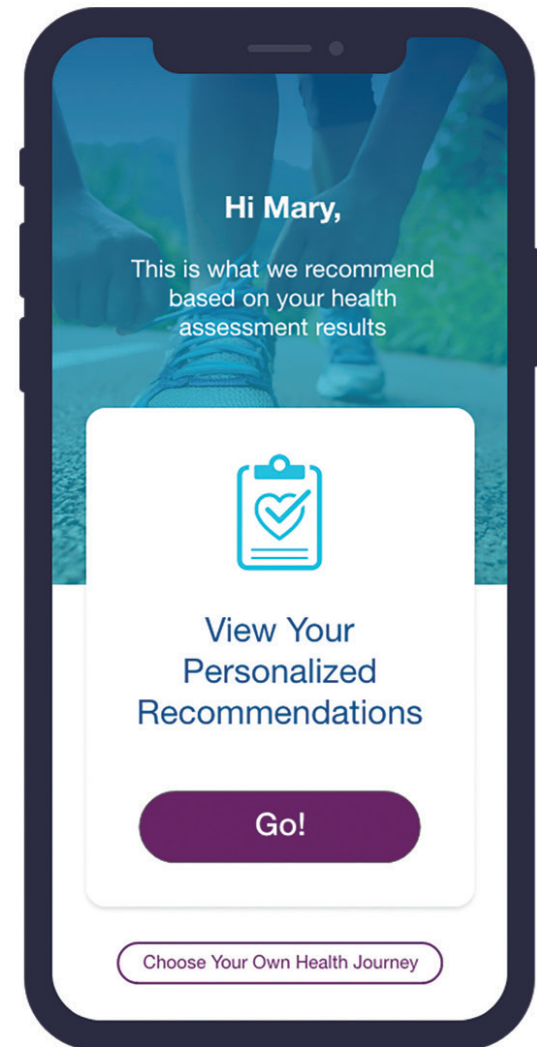
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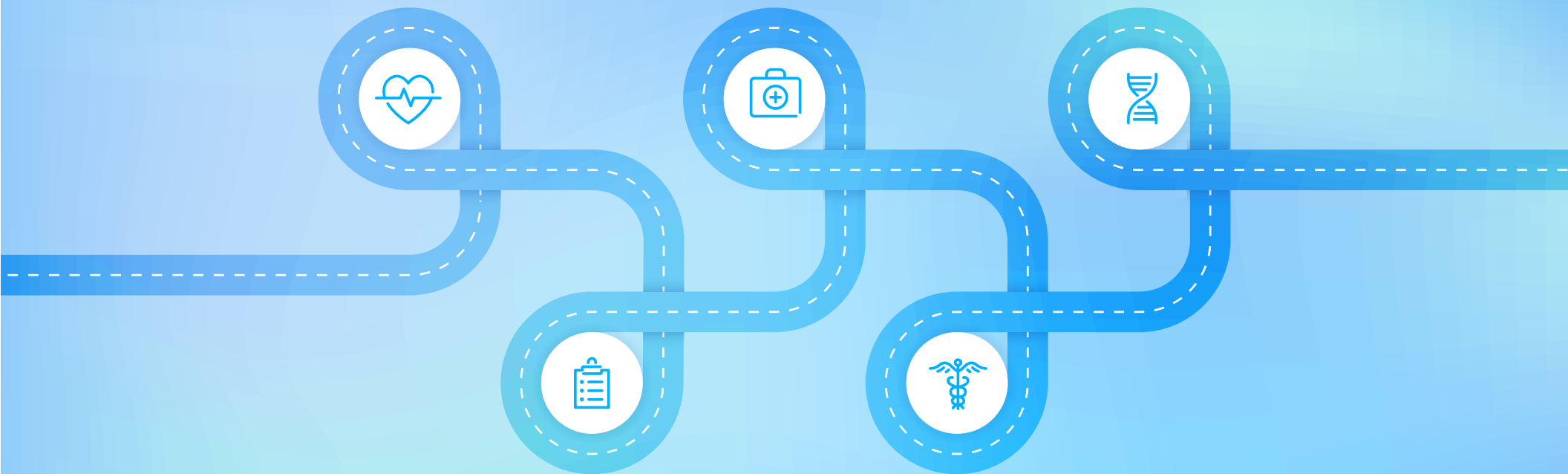
Having seen how a minimal amount of personalization can positively impact physical activity, let's now consider three different approaches for personalizing the overall wellness engagement experience.

# Personalization Through Dynamic Interaction

For any wellness program, the member portal/mobile app serves as the key interface for connecting with consumers, making it an ideal candidate for hyper-personalization.

Such a site would leverage each user's data and then curate advice, tools, information and recommendations in a way that specifically matches that person's health goals, interests, and aspirations, as well as their preferences and demographics.





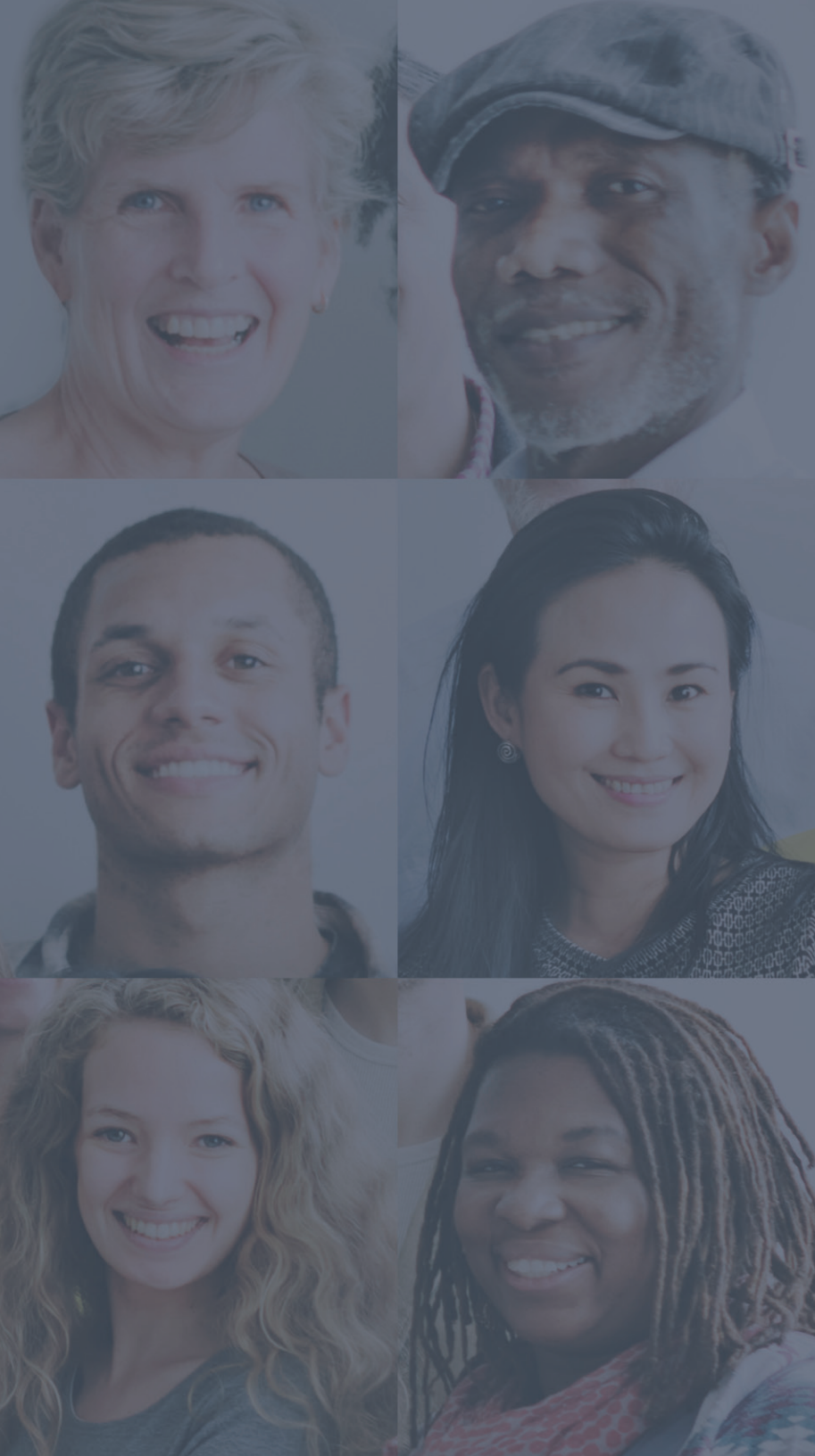
## My Journey

At Onlife Health, we have developed a consumer-oriented interactive feature called *My Journey* that is structured to provide users with a personalized “road-map” of their healthcare journey.

After collecting information from the patient’s health assessment, biometric screenings, health records, public data, claims and eligibility files, **My Journey** uses high-level data analytics to identify each person’s specific health issues. It then creates a prioritized catalog of customized healthy-living activities, incentives, tools and resources that are displayed on each member’s personal dashboard. As a result, each member has a customized step-by-step plan that guides and informs them about “the next right thing to do” to improve their health.

**My Journey** dynamically interacts with each user’s action, providing new information and feedback for each step taken and goal achieved, as well as when new data is received. For example, if a user has started but not completed a challenge, he or she will receive an ongoing series of push notifications that encourage completion of the challenge. Likewise, a congratulatory push notification is sent upon completing a self-directed course, for example.

Through its personalized, data-driven dashboard, **My Journey** is able to provide the knowledge, support and resources that meet each person exactly where they are on their life/health journey. Members now have a wellness experience that speaks directly to their goals and aspirations, guides them on their unique health journey, encourages their progress, incentivizes their actions, and celebrates their accomplishments, creating a personalized connection that promotes long-term engagement.



# Personalization Through UI Design

Another method for creating a hyper-personalized wellness experience is the intelligent application of user interface (UI) design in creating the website portal and mobile app.

Different components of the home page offer multiple opportunities to speak directly to the consumer as well as deliver customized information.

The following screen shot demonstrates how Onlife Health fully incorporated the idea of personalized wellness into the design and structure of its members' home page.



# Creating a Personalized Experience through UI Design

## My Health

Users can review the results of their most recent biometric screening by clicking on the menu icon and choosing My Health.

## My Journey Overview

This section serves as a road map for each person's health journey. Users can scroll through to see both what they've already achieved in the past (providing a sense of accomplishment) and also see where they're headed on their health journey.

## My Journey

Onlife's UI design prominently displays the top three personalized wellness recommendations based on each person's health status. This layout provides a simple-to-understand hierarchy of priorities for the user to understand "next right things to do" in his or her journey to better health. Just as we read from left to right, the layout features the first step on the left side (twice as large to communicate its priority), with the next two steps listed on the right side.

## Explore

This online library of health education materials (podcasts, videos, print articles and more) and available programs is personalized to match each user's goals and health needs. Content is dynamically ordered. With each login, new content is displayed to keep the member engaged and checking in for new material.

## Connected Devices and Apps

Users can easily add a new personal activity tracker or app.

## Points Earned

Point totals are prominently displayed so the user knows exactly how many points they have earned and how many points are still available to maximize their rewards for that month, quarter or year.

## Welcome Message

The welcome message is personalized with the user's name, and the greeting changes with the time of day (Good Morning, Good Afternoon, Good Evening) to make the salutation friendlier and more relevant.

## My Profile

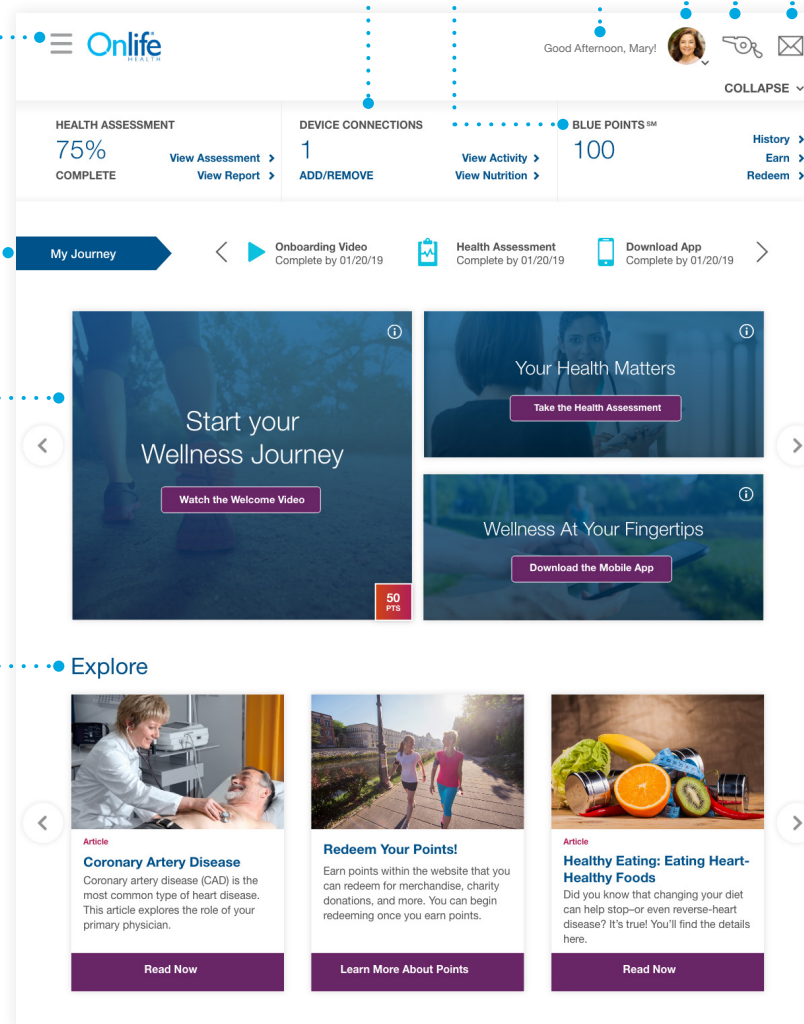
By clicking on this icon, each user can access a full-page version of his or her My Journey, where they can see in detail what they've already accomplished in the past and what lies ahead on their personal journey to better health. Each user can also review and change their individual settings and profile.

## Coaching

If coaching is available, users can type a message and make direct contact with a health coach to start a conversation or ask a question about almost any aspect of their personalized health journey.

## Notifications

Personalized push notifications inform and encourage each user about his or her progress. A recent study found that push notifications that contain personalized content can boost open rates by up to 800 percent.<sup>5</sup>



## UI Increases Engagement

With the rollout of the new user interface (UI), as well as a few changes to the incentive design, the Onlife platform has achieved the following increases in engagement.

51%

increase in  
distinct portal  
users

95%

increase in total  
logins

26%

increase in  
distinct members  
using courses

32%

increase in  
courses taken

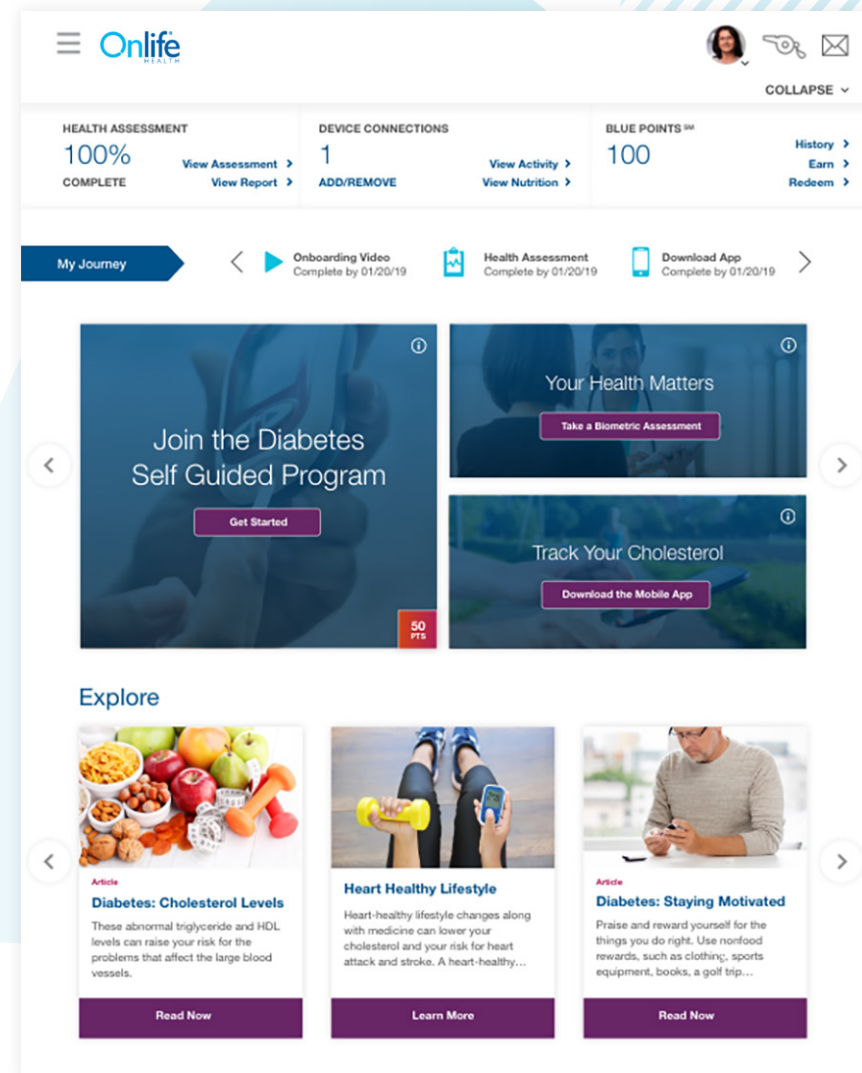
261%

in distinct  
members using  
trackers

## Another Example of Personalization

### Home Page for Diabetes Patient

This screen shot shows the home page for a person who has been recently diagnosed with diabetes. Almost all of the information displayed has been personalized in order to have unique “conversation” with the user. The Explore section, for example, features a series of relevant articles to provide the user with timely information on a variety of topics to help them better manage their diabetes.



# Personalization Through SDoH

According to a recent study, up to 80 percent of a person's health is determined by Social Determinants of Health (SDoH), the socio-economic conditions and physical environment of the communities where people live, work and play.<sup>6</sup> SDoH include a person's education, income level, job status, access to transportation, access to healthy food, neighborhood safety, housing, and a multitude of other social factors, as well as how those factors influence a person's behavior.

Clearly, by addressing SDoH, wellness engagement programs have an enormous opportunity to improve health and well-being of both individuals and entire communities.

At Onlife Health, we already have the capability to add SDoH questions to our Health Assessment and combine that information with socio-economic data from multiple sources, including the U.S. Census, CDC's American Community Survey, NHSTA's Bikeability Transit Rating and EPA's Community Walkability score, just to name a few. By analyzing this data, we can identify each person's barriers to good health (food insecurity, for example) and then address these issues by providing members with helpful information, social support and awareness about the various community resources that can help them overcome their specific SDoH.

In addition, Onlife is currently developing an SDoH Vulnerability Score that will provide even deeper insights concerning the SDoH risk factors that both individuals and communities are facing.

Onlife's SDoH Vulnerability Score is modeled, in part, on the Social Vulnerability Index created by CDC. This index uses 15 social factors, such as poverty levels, lack of vehicle access, and crowded housing, to help local officials identify communities that may need support in preparing for hazards or recovering from disaster. Just as the CDC Social Vulnerability Index measures the resilience and the resources available to communities when confronted by external stresses on human health (natural or human-caused disasters and disease outbreaks, for example), Onlife's SDoH Vulnerability Score will measure the risk factors associated with Social Determinants of Health. That information, together with the use of personas and a robust tagging infrastructure, will enable us to populate each person's content with information that addresses the specific risk factors facing that individual.





# The Five Key Social Determinants of Health

## 1 Economic Stability

- Poverty
- Food Security
- Employment
- Housing Stability

## 2 Education

- High School Graduation
- Enrollment in Higher Education
- Language and Literacy
- Early Childhood Education and Development

## 3 Social and Community Context

- Social Cohesion
- Civic Participation
- Discrimination
- Incarceration

## 4 Health and Health Care

- Access to Health Care
- Access to Primary Care
- Healthy Literacy

## 5 Neighborhood and Built Environment

- Access to Healthy Food
- Quality of Housing
- Crime and Violence
- Environmental Conditions

Source: HealthyPeople 2020 Campaign



# Executive Summary

The unprecedented amounts of consumer data now available, combined with the ever-increasing computational power to analyze that data, has laid the groundwork for a new type of consumer experience. With hyper-personalization, businesses and organizations can speak directly to each consumer by addressing his or her specific needs, goals and situation, providing exactly the right resources at exactly the right time. All of this creates a one-to-one connection with each consumer that makes each interaction more beneficial and engaging.

Wellness engagement programs that already embrace hyper-personalization are forging a new level of engagement that can have profound consequences not only for the health of each member but for the entire healthcare system. In the future, new possibilities for hyper-personalization, from helping members arrange a ride to the doctor's office to setting up a Health Savings Account, will keep expanding the ability of wellness engagement programs to realize their full potential and transform the health and wellness of millions.

# Appendix

**Artificial Intelligence (AI):** The ability for machines to learn from experience, adjust to new inputs and perform human-like tasks.

**Machine Learning:** An application of AI that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.

## References

<sup>1</sup> “New Evergage Study Highlights Personalization’s Increasing Importance and Impact – Along with Areas for Improvement.” Evergage. April 25, 2018. Accessed May 09, 2018. <http://www.evergage.com/blog/press/new-evergage-study-highlights-personalizations-increasing-importance-and-impact-along-with-areas-for-improvement/>

<sup>2</sup> McManamy, Sean. “Why People Do - and Don’t - Participate in Wellness Programs.” Harvard Business Review. October 10, 2016. Accessed May 09, 2018. <https://hbr.org/2016/10/why-people-do-and-dont-participate-in-wellness-programs>

<sup>3</sup> Spiezio, Caroline. “Wellness Programs Need Personalization, Employees Say.” Employee Benefit News. July 26, 2016. Accessed May 09, 2018. <https://www.benefitnews.com/news/wellness-programs-need-personalization-employees-say>

<sup>4</sup> Yoon, Sunmoo, PhD, RN, Joseph E. Schwartz, PhD, Matthew M. Burg, PhD, Ian M. Kronish, MD, Carmela Alcantara, PhD, Jacob Julian, Faith Parsons, MS, Karina W. Davidson, PhD, and Keith M. Diaz, PhD. “Using Behavioral Analytics to Increase Exercise: A Randomized N-of-1 Study.” American Journal of Preventive Medicine. April 2018. Accessed June 27, 2019. <https://doi.org/10.1016/j.amepre.2017.12.011>

<sup>5</sup> Fleit, Brittany. “How to Get 800% More App Engagement with Personalized Messages.” Leanplum. March 08, 2018. Accessed June 27, 2019. <https://www.leanplum.com/blog/personalize-or-bust/>

<sup>6</sup> Magnan, Sanne. “Social Determinants of Health 101 for Health Care: Five Plus Five.” National Academy of Medicine. August 17, 2018. Accessed June 28, 2019. <https://nam.edu/social-determinants-of-health-101-for-health-care-five-plus-five/>



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