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Medgadget Joins the Verily Baseline Project Study, Part 2: The Tech

OCTOBER 27TH, 2017 SCOTT JUNG EXCLUSIVE, MEDICINE, NET NEWS, SPORTS MEDICINE

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Project Baseline

This is the second of a two-part series about Medgadget editor Scott Jung joining the Verily Baseline Project Study. Click here to read the first part.

The Project Baseline Study is a landmark, 10,000-subject trial sponsored by Verily Life Sciences (**Alphabet**'s life sciences division) and coordinated in partnership with Stanford University and Duke University. Much of the appeal of the study was how a major technology company like Alphabet would utilize the kind of technologies marketed toward consumers to make health and medical discoveries about entire populations.

For this inaugural, four-year study, Verily has chosen to use three key devices: a wrist-worn wearable containing multiple sensors called the "Verily Study Watch," a bed sensor developed by Israel-based **EarlySense** called "EarlySense Live," and a wireless hub called the "Verily Study Hub". There is also an optional mobile Android or iOS "Baseline" app. Here are our thoughts after our first week using the devices.

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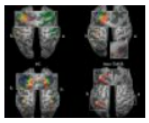
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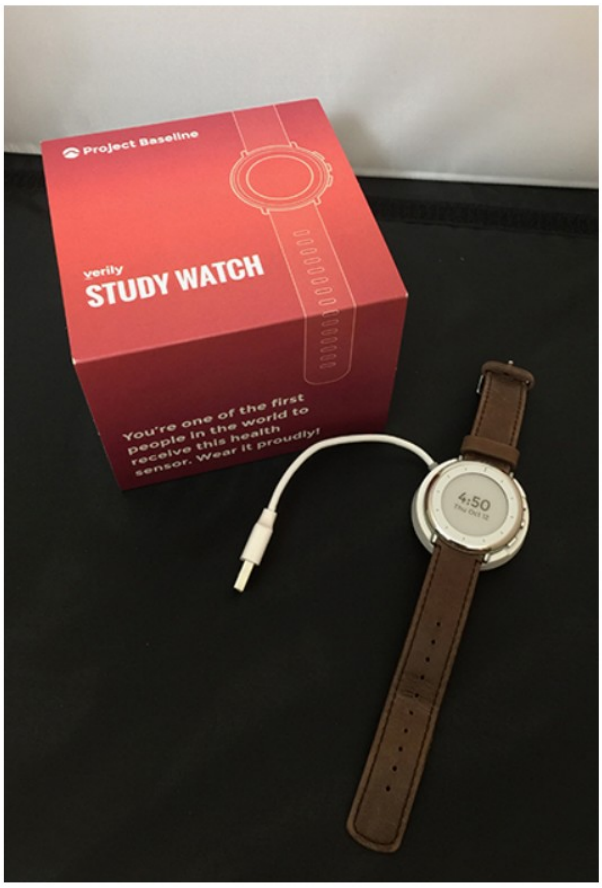
The Study Watch



Verily took everyone somewhat by surprise when they announced the Study Watch back in April. In a market where Google is constantly releasing new Android Wear smartwatches with bigger and brighter screens, new hardware, and smarter software, many thought this was going to be the Apple Watch killer. But for a 10,000-subject study encompassing many different ages, educational backgrounds, and levels of technological expertise, Verily made the right choice in keeping the study's *pièce de résistance* simple.

The Study Watch features a round, e-ink display that is always on and currently will only show the date and time (digital only), and certain instructions related to a study. According to one of the Stanford research associates, Verily is hoping to allow the watch to display some of the watch's measurements and other useful data related to the study in the near future. But until then, we can't really vouch for accuracy nor precision. Surrounding the e-ink display is a white bezel with hour markers that aren't being used; the analog watch face was supposedly scrapped last-minute. On the bottom of the watch are the green LEDs and optical sensors that detect the heart rate, metal electrodes that measure electrodermal activity, a one-lead electrocardiogram (ECG), and several contacts that act as the charging and syncing interface for the watch. If any cardiac electrophysiologists are wondering how you could capture an ECG with one electrode, the outer metal ring of the watch surrounding the bezel acts as the second electrode: placing your thumb and index finger on the ring when prompted completes the bioelectrical circuit. There's an accelerometer inside to detect movement and step counts, and a vibratory motor for alerts and notifications. And, additionally, the watch's manual states that the device is capable of measuring skin temperature, bioimpedance, altitude, pressure, relative

humidity, environmental temperature, ambient light level, and sound levels. That's a pretty impressive set of measurements. And in case you're curious, we also managed to calculate that the watch contains about 512 MB of storage. Syncing and charging is done by placing the watch into the included USB cradle. The USB dock connects directly into the Verily Study Hub; syncing appears to be wired only; we couldn't determine if the watch has any wireless Bluetooth or Wi-Fi capabilities.

This bears repeating again: the Study Watch, in its current form, is only a data collection device, and you won't be able to see any of the measurements the watch collects. Consequently, the three buttons flanking the right edge of the watch have limited functionality: the top button changes the screen between the current date/time, the record ECG mode, and an info screen with device ID and remaining battery percentage. The middle button starts the ECG recording when on the ECG recording screen, or after 24 hours has elapsed since the previous ECG recording. There's an additional menu we saw that the clinical staff (and snooping *Medgadget* editors) can access with a special button combination, but this was only used for tagging when a specific on-site test was performed. Finally, the bottom button turns on the backlight, a bluish, slightly uneven glow originating from a single hidden LED near the 11 o'clock position that reflects off the surface of the e-ink display. It makes the electroluminescent backlighting in our 1990's Timex Ironman look pretty high-tech in comparison.

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In the few days we've been wearing the Study Watch, we've actually been quite pleased. While it lacks ~~some~~ most of the bells and whistles of similar watches on the market, it's far from the worst we've seen. The simple, round face with the muted e-ink screen is actually a nice change from bright and flashy smartwatches. And we think it looks rather elegant paired with the brown leather band we selected; this watch might just stay on our wrist during our next formal affair. While we haven't had the chance to drain the battery completely to see how long it lasts, wearing the watch for 24 hours continuously decreased the battery percentage to 86%, which calculates to just a bit over seven days. That matches Alphabet's claim of up to a week of battery between charges, and is pretty impressive considering the LEDs that measure the heart rate are always blinking. But then again, the low-power e-ink display and (apparent) lack of wireless keeps the battery usage low. We think if Alphabet allowed access to the sensor measurements and placed the Study Watch on the consumer market, it could actually be a worthy competitor, especially for the older demographic or more tech-adverse who are curious what the smartwatch craze is all about.

Additionally, we learned that a new version of the Study Watch is already in the works. Other than a new display, we weren't told much else about it, but it's expected to be released in the next year or so, and the Project Baseline Study subjects will be receiving the upgraded devices. We'll keep you posted when that happens!

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The Study Hub

There isn't a whole lot to the Verily Study Hub. We were told it's a modified 4G cellular hotspot on the T-Mobile network. It has a simple design with muted teal and white accents. Three large indicator lights on the front show when the hub is connected to the network, when it is syncing with the Study Watch and sending data to the network, and if there's some sort of error. The single button at the top toggles the indicator lights off and on. The only other external feature is a USB port on the right side which connects to the Study Watch's dock to provide power and send and receive data. Aside from a 4G cellular antenna, we can also assume that the hub has Bluetooth Low Energy wireless capability, as this is needed to communicate with the EarlySense Live mattress sensor.

We were pleased that Verily decided to go with a cellular hub and eliminate the hassles of connecting it to a Wi-Fi network. It also makes things easy for subjects if they need to take the hub with them on a vacation.

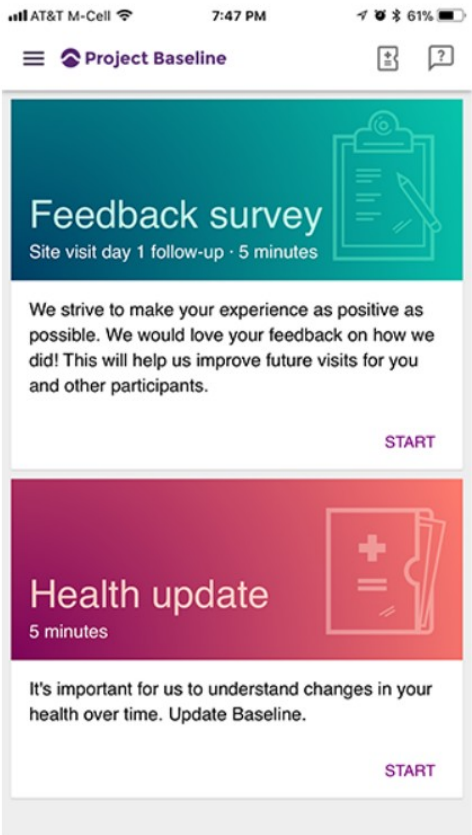
The EarlySense Live

The EarlySense Live is a device that is placed between your mattress, and your boxspring or bed's slats. It's a contact-free electromagnetic sleep monitor with ultra-sensitive detectors that can identify body movements, and measure the heart rate and breathing rate. It's similar to the RestOn and recently-discontinued Beddit

sensors we've reviewed that use ballistocardiography, and you can even purchase an EarlySense Live for yourself. Unfortunately, as the EarlySense Live is again just a data collection device, we couldn't get a real idea of how well it works or even what measurements it's sending to Verily. And it's pre-configured to only communicate with the Study Hub, so downloading the EarlySense Live app won't work. But, as EarlySense has been around for quite a while and has FDA-approved devices already in use in hospitals, we don't see any reason why the sensor wouldn't work properly. The EarlySense Live transmits data via Bluetooth Low Energy, which means you'll need to keep the Verily Study Hub within 25 feet of your bed.

The Baseline App

The Baseline App is an optional download for subjects with an iPhone or Android device. Right now, the app acts primarily as a mobile version of the Project Baseline website. Within the app itself, you are able to log into your account to take surveys, report any significant health changes to the Baseline study team, view study-related documents, and stay informed about the latest Project Baseline happenings. It's possible that as the study progresses and Verily deems it suitable, the app might be able to display additional information about preliminary study findings or about your own health. Until then, we still think it's worth keeping the app on your phone.



Conclusion

The Baseline Project Study is already unprecedented in its size and scope, but the fact that it's one of the first to utilize a suite of consumer-friendly technology makes it even more significant. Over the next four years, it will be interesting to see what insights about our health Verily can learn from these devices. They certainly make medicine a little more fun.

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Interested in trying these gadgets for yourself by participating in the Baseline Study? Verily is actively enrolling subjects all over the United States. Click here to visit the study's website and see if there's an enrollment site near you.

Scott Jung

Scott Jung (@scottjung) is a Silicon Valley-based medical and health technology journalist and advocate. He has been a guest contributor to Intel's iQ e-magazine and Rock Health's corporate blog and has provided live, on-site coverage of the International CES and Digital Health Summit, TEDMED, and Stanford Medicine X conference for Medgadget. Most recently, he has been appearing on TWiT.tv's The New Screen Savers as a semi-regular medical and health technology correspondent. Scott holds a B.S. degree in Biomedical Engineering from the University of Southern California. Scott is always looking for the next big thing in medical technology and digital health. Interested in helping him transform lives? Get in touch with him at http://scottjung.net

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