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**TECHNOLOGY**

# Is your pregnancy app sharing your intimate data with your boss?

As apps to help moms monitor their health proliferate, employers and insurers pay to keep tabs on the vast and valuable data

By Drew Harwell

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Like millions of women, Diana Diller was a devoted user of the pregnancy-tracking app Ovia, logging in every night to record new details on a screen asking about her bodily functions, sex drive, medications and mood. When she gave birth last spring, she used the app to chart her baby's first online medical data — including her name, her location and whether there had been any complications — before leaving the hospital's recovery room.

But someone else was regularly checking in, too: her employer, which paid to gain access to the intimate details of its workers' personal lives, from their trying-to-conceive months to early motherhood. Diller's bosses could look up aggregate data on how many workers using Ovia's fertility, pregnancy and parenting apps had faced high-risk pregnancies or gave birth prematurely; the top medical questions they had researched; and how soon the new moms planned to return to work.

"Maybe I'm naive, but I thought of it as positive reinforcement: They're trying to help me take care of myself," said Diller, 39, an event planner in Los Angeles for the video game company Activision Blizzard. The decision to track her pregnancy had been made easier by the $1 a day in gift cards the company paid her to use the app: That's "diaper and formula money," she said.

Period- and pregnancy-tracking apps such as Ovia have climbed in popularity as fun, friendly companions for the daunting uncertainties of childbirth, and many expectant women check in daily to see, for instance, how their unborn babies' size compares to different fruits or Parisian desserts.

But Ovia also has become a powerful monitoring tool for employers and health insurers, which under the banner of corporate wellness have aggressively pushed to gather more data about their workers' lives than ever before.

Employers who pay the apps' developer, Ovia Health, can offer their workers a special version of the apps that relays their health data — in a "de-identified," aggregated form — to an internal employer website accessible by human resources personnel. The companies offer it alongside other health benefits and incentivize workers to input as much about their bodies as they can, saying the data can help the companies minimize health-care

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Emboldened by the popularity of Fitbit and other tracking technologies, Ovia has marketed itself as shepherding one of the oldest milestones in human existence into the digital age. By giving counseling and feedback on mothers' progress, executives said, Ovia has helped women conceive after months of infertility and even saved the lives of women who wouldn't otherwise have realized they were at risk.

But health and privacy advocates say this new generation of "menstrual surveillance" tools is pushing the limits of what women will share about one of the most sensitive moments of their lives. The apps, they say, are designed largely to benefit not the women but their employers and insurers, who gain a sweeping new benchmark on which to assess their workers as they consider the next steps for their families and careers.

Experts worry that companies could use the data to bump up the cost or scale back the coverage of health-care benefits, or that women's intimate information could be exposed in data breaches or security risks. And though the data is made anonymous, experts also fear that the companies could identify women based on information relayed in confidence, particularly in workplaces where few women are pregnant at any given time.

"What could possibly be the most optimistic, best-faith reason for an employer to know how many high-risk pregnancies their employees have? So they can put more brochures in the break room?" asked Karen Levy, a Cornell University assistant professor who has researched family and workplace monitoring.

"The real benefit of self-tracking is always to the company," Levy said. "People are being asked to do this at a time when they're incredibly vulnerable and may not have any sense where that data is being passed."

Ovia chief executive Paris Wallace said the company complies with privacy laws and provides the aggregate data so employers can evaluate how their workforces' health outcomes have changed over time. The health information is sensitive, he said, but could also play a critical role in boosting women's well-being and companies' bottom lines.

"We are in a women's health crisis, and it's impacting people's lives and their children's lives," he said, pointing to the country's rising rates of premature births and maternal deaths. "But it's also impacting the folks who are responsible for these outcomes — both financially and for the health of the members they're accountable for."

The rise of pregnancy-tracking apps shows how some companies increasingly view the human body as a technological gold mine, rich with a vast range of health data their algorithms can track and analyze. Women's bodies have been portrayed as especially lucrative: The consulting firm Frost & Sullivan said the "femtech" market — including tracking apps for women's menstruation, nutrition and sexual wellness — could be worth as much as $50 billion by 2025.

Companies pay for Ovia's "family benefits solution" package on a per-employee basis, but Ovia also makes money off targeted in-app advertising, including from sellers of fertility-support supplements, life insurance, cord-blood banking and cleaning products.

An Ovia spokeswoman said the company does not sell aggregate data for advertising purposes. But women who use Ovia must consent to its 6,000-word "terms of use," which grant the company a "royalty-free, perpetual, and irrevocable license, throughout the universe" to "utilize and exploit" their de-identified personal information for scientific research and "external and internal marketing purposes." Ovia may also "sell, lease or lend aggregated

Personal Information to third parties," the document adds.

Milt Ezzard, the vice president of global benefits for Activision Blizzard, a video gaming giant that earned $7.5 billion last year with franchises such as "Call of Duty" and "World of Warcraft," credits acceptance of Ovia there to a changing workplace culture where volunteering sensitive information has become more commonplace.

In 2014, when the company rolled out incentives for workers who tracked their physical activity with a Fitbit, some employees voiced concerns over what they called a privacy-infringing overreach. But as the company offered more health tracking — including for mental health, sleep, diet, autism and cancer care — Ezzard said workers grew more comfortable with the trade-off and enticed by the financial benefits.

"Each time we introduced something, there was a bit of an outcry: 'You're prying into our lives,' " Ezzard said. "But we slowly increased the sensitivity of stuff, and eventually people understood it's all voluntary, there's no gun to your head, and we're going to reward you if you choose to do it."

"People's sensitivity," he added, "has gone from, 'Hey, Activision Blizzard is Big Brother,' to, 'Hey, Activision Blizzard really is bringing me tools that can help me out.' "

With more than 10 million users, Ovia's tracking services are now some of the most downloaded medical apps in America, and the company says it has collected billions of data points into what it calls "one of the largest data sets on women's health in the world." Alongside competitors such as Glow, Clue and Flo, the period- and pregnancy-tracking apps have raised hundreds of millions of dollars from investors and count tens of millions of users every month.

Founded in Boston in 2012, Ovia began as a consumer-facing app that made money in the tried-and-true advertising fashion of Silicon Valley. But three years ago, Wallace said, the company was approached by large national insurers who said the app could help them improve medical outcomes and access maternity data via the women themselves.

Ovia's corporate deals with employers and insurers have seen "triple-digit growth" in recent years, Wallace said. The company would not say how many firms it works with, but the number of employees at those companies is around 10 million, a statistic Ovia refers to as "covered lives."

Ovia pitches its app to companies as a health-care aid for women to better understand their bodies during a mystifying phase of life. In marketing materials, it says women who have tracked themselves with Ovia showed a 30 percent reduction in premature births, a 30 percent increase in natural conception and a higher rate of identifying the signs of postpartum depression. (An Ovia spokeswoman said those statistics come from an internal return-on-investment calculator that "has been favorably reviewed by actuaries from two national insurance companies.")

But a key element of Ovia's sales pitch is how companies can cut back on medical costs and help usher women back to work. Pregnant women who track themselves, the company says, will live healthier, feel more in control and be less likely to give birth prematurely or via a C-section, both of which cost more in medical bills — for the family and the employer.

Women wanting to get pregnant are told they can rely on Ovia's "fertility algorithms," which analyze their menstrual data and suggest good times to try to conceive, potentially saving money on infertility treatments. "An

average of 33 hours of productivity are lost for every round of treatment," an Ovia marketing document says.

For employers who fund workers' health insurance, pregnancy can be one of the biggest and most unpredictable health-care expenses. In 2014, AOL chief executive Tim Armstrong defended the company's cuts to retirement benefits by blaming the high medical expenses that arose from two employees giving birth to "distressed babies."

Ovia, in essence, promises companies a tantalizing offer: lower costs and fewer surprises. Wallace gave one example in which a woman had twins prematurely, received unneeded treatments and spent three months in intensive care. "It was a million-dollar birth … so the company comes to us: How can you help us with this?" he said.

But some health and privacy experts say there are many reasons a woman who is pregnant or trying to conceive wouldn't want to tell her boss, and they worry the data could be used in a way that puts new moms at a disadvantage.

"The fact that women's pregnancies are being tracked that closely by employers is very disturbing," said Deborah C. Peel, a psychiatrist and founder of the Texas nonprofit Patient Privacy Rights. "There's so much discrimination against mothers and families in the workplace, and they can't trust their employer to have their best interests at heart."

Federal law forbids companies from discriminating against pregnant women and mandates that pregnancy-related health-care expenses be covered in the same way as other medical conditions. Ovia said the data helps employers provide "better benefits, health coverage and support."

Ovia's soft pastels and cheery text lend a friendly air to the process of transmitting private health information to one's employer, and the app gives daily nudges to remind women to log their progress with messages such as, "You're beautiful! How are you feeling today?"

But experts say they are unnerved by the sheer volume and detail of data that women are expected to offer up. Pregnant women can log details of their sleep, diet, mood and weight, while women who are trying to conceive can record when they had sex, how they're feeling and the look and color of their cervical fluid.

After birth, the app asks for the baby's name, sex and weight; who performed the delivery and where; the birth type, such as vaginal or an unplanned C-section; how long labor lasted; whether it included an epidural; and the details of any complications, such as whether there was a breech or postpartum hemorrhage.

The app also allows women to report whether they had a miscarriage or pregnancy loss, including the date and "type of loss," such as whether the baby was stillborn. "After reporting a miscarriage, you will have the option to both reset your account and, when you're ready, to start a new pregnancy," the app says.

"We're their companion throughout this process and want to … provide them with support throughout their entire journey," Ovia spokeswoman Sarah Coppersmith said.

Much of this information is viewable only by the worker. But the company can access a vast range of aggregated data about its employees, including their average age, number of children and current trimester; the average time it took them to get pregnant; the percentage who had high-risk pregnancies, conceived after a stretch of infertility, had C-sections or gave birth prematurely; and the new moms' return-to-work timing.

Companies can also see which articles are most read in Ovia's apps, offering them a potential road map to their workers' personal questions or anxieties. The how-to guides touch on virtually every aspect of a woman's changing body, mood, financial needs and lifestyle in hyper-intimate detail, including filing for disability, treating bodily aches and discharges, and suggestions for sex positions during pregnancy.

"We are crossing into a new frontier of vaginal digitalization," wrote Natasha Felizi and Joana Varon, who reviewed a group of menstrual-tracking apps for the Brazil-based tech activist group Coding Rights.

Ovia data is viewable by the company, their insurers and, in the case of Activision Blizzard and other self-insured companies, the third-party administrators that process women's medical claims.

Ovia says it is compliant with government data-privacy laws such as the Health Insurance Portability and Accountability Act, or HIPAA, which sets rules for sharing medical information. The company also says it removes identifying information from women's health data in a way that renders it anonymous and that it requires employers to reach a certain minimum of enrolled users before they can see the aggregated results.

But health and privacy experts say it's relatively easy for a bad actor to "re-identify" a person by cross-referencing that information with other data. The trackers' availability in companies with few pregnant women on staff, they say, could also leave the data vulnerable to abuse. Ovia says its contract prohibits employers from attempting to re-identify employees.

Ezzard, the benefits executive at Activision Blizzard, said offering pregnancy programs such as Ovia helps the company stand out in a competitive industry and keep skilled women in the workforce coming back. The company employs roughly 5,000 artists, developers and other workers in the United States.

"I want them to have a healthy baby because it's great for our business experience," Ezzard said. "Rather than having a baby who's in the neonatal ICU, where she's not able to focus much on work."

Before Ovia, the company's pregnant employees would field periodic calls from insurance-company nurses who would ask about how they were feeling and counsel them over the phone. Shifting some pregnancy care to an app where the women could give constant check-ins made a huge difference: Nearly 20 women who had been diagnosed as infertile had become pregnant since the company started offering Ovia's fertility app, Ezzard said.

Roughly 50 "active users" track their pregnancies at any given time, and the average employee records more than 128 health data points a month, Ezzard said. They also open the app about 48 times a month, or more than once a day.

Ezzard said that the company maintains strict controls on who can review the internal aggregated data and that employees' medical claims are processed at a third-party data warehouse to help protect their privacy. The program, he added, is already paying off: Ovia and the other services in its "well-being platform" saved the company roughly $1,200 per employee in annual medical costs.

Health experts worry that such data-intensive apps could expose women to security or privacy risks. The ovulation-tracking app Glow updated its systems in 2016 after Consumer Reports found that anyone could access a woman's health data, including whether she'd had an abortion and the last time she'd had sex, as long as they knew her email address. Another Ovia competitor, Flo, was found to be sending data to Facebook on when its users were having their periods or were trying to conceive, according to tests published in February in the Wall

users were having their periods or were trying to conceive, according to tests published in February in the Wall Street Journal. Ovia says it does not share or sell data with social media sites.

The company says it does not do paid clinical trials but provides data to researchers, including for a 2017 study that cited Ovia data from more than 6,000 women on how they chose their obstetricians. But even some researchers worry about ways the information might be used.

"As a clinician researcher, I can see the benefit of analyzing large data sets," said Paula M. Castaño, an obstetrician-gynecologist and associate professor at Columbia University who has studied menstrual-tracking apps. But a lot of the Ovia data given to employers, she said, raises concerns "with their lack of general clinical applicability and focus on variables that affect time out of work and insurance utilization."

Ovia says its "fertility algorithms," which analyze a woman's data and suggest when she would have the best chance of getting pregnant, have helped 5 million women conceive. But the claim is impossible to prove: Research into similar promises from other apps has suggested there were other possible explanations, including the fact that the women were motivated enough to use a period-tracking app in the first place.

The coming years, however, will probably see companies pushing for more pregnancy data to come straight from the source. The Israeli start-up Nuvo advertises a sensor band strapped around a woman's belly that can send real-time data on fetal heartbeat and uterine activity "across the home, the workplace, the doctor's office and the hospital." Nuvo executives said its "remote pregnancy monitoring platform" is undergoing U.S. Food and Drug Administration review.

Diller, the Activision Blizzard employee, said she was never troubled by Ovia privacy worries. She loved being able to show her friends what size pastry her unborn daughter was and would log her data every night while lying in bed and ticking through her other health apps, including trackers for food, sleep and "mindfulness."

When she reported the birth in Ovia, the app triggered a burst of virtual confetti and then directed her to download Ovia's parenting app, where she could track not just her health data, but her newborn daughter's, too. It was an easy decision. On the app's home screen, she uploaded the first photo of her newly expanded family.