An Examination of the Fitbit Data Used at Nicola Bulley's Inquest

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July 7, 2023

I am a professional writer and director with many years of experience in the technology sector, but first and foremost, I am a concerned member of the public. I have been following the Nicola Bulley case since Ms. Bulley first went missing and have conducted relevant research on the case related to my professional experience.

I have serious concerns about the police findings during this investigation as it relates to Nicola's Fitbit device, as well as the inquest proceedings and verdict, which incorporated data from her Fitbit. My research following the inquest has led me to believe that what happened to Nicola may have been a criminal matter, and that this possibility must be considered.

My biggest concern is that Ms. Bulley's Fitbit data was referenced at the inquest as helping to prove that she entered the water at the River Wyre, where she is alleged to have quickly died by asphyxiation due to cold-water shock. Having worked for technology companies in director-level positions, I can say with certainty that the Fitbit data shared at the inquest does not help to make this case at all. In fact, the data suggests that neither this device nor Nicola entered the water at all on January 27, or for days or weeks thereafter, and that the device may have been temporarily removed from Nicola's wrist before being found on her body on February 19.

I will outline the research behind these possibilities below.

Issue #1: The inquest established that Nicola's Fitbit detected a heart rate intermittently until February 4th, eight days after she is believed to have fallen in the River Wyre.

In general, newer wearables can detect a heart rate from water moving between the device and wrist, but they can also erroneously detect a heart rate due to other types of movements of a body on land, deceased or alive, and from stationary objects near the device, which they mistakenly "think" is a wrist. This is because the LED technology that measures heart rate by blood flow in the capillaries in the wrist is not a perfect technology.

Anecdotally, people writing on Fitbit's public forums have reported getting heart rate readings for loved ones who were wearing Fitbits after their loved ones had been officially declared dead. Some have stated that their deceased relatives' heart rates were recorded by their Fitbits when their relatives' bodies were touched or moved, e.g. by a loved one or coroner. Others have stated that their Fitbits have recorded high spikes in heart rate while their devices were in their gym bag or on a countertop.

One theory about this, unacknowledged by the company, is that the devices approximate a reading of heart rate based on historical averages for that user even when a person has died; when some kind of movement of the deceased body occurs; and even when a device is not on a (living) person's wrist, such as in a bag or on a counter.

The Fitbit data on Nicola's device, which according to the inquest recorded legitimate-looking heart rate until 11:48am on January 27, and then sporadically until February 4, cannot categorically tell us that she fell into the river that morning. The heart rate could have just as easily been detected while the device was on land, on her wrist, or by an object close to the device if it was removed from her wrist. This is especially true given my research on the battery performance of lithium battery wearables in cold water, referenced in the next section.

In particular, the heart rate readings recorded until 11:48am need to be examined more closely. They speak to the possibility that Nicola may have been alive and perhaps unconscious until this time.

Issue #2: The inquest established that Nicola's Fitbit held a charge for 8 days while submerged in 3- to 4-degree-Celsius water, and that data was successfully recovered from the device when her body was found on February 19.

Nicola's device is rated to a water depth of 50 meters, but its battery life (listed as "6+ days" by Fitbit), and arguably the device itself, would be compromised by being in cold water for this long, and the battery would not likely last for more than two days. It is not designed for such use, nor are most wearables, except top-of-the-line models from e.g. Garmin and Apple, and watches specifically designed for diving.

IP ratings, which rate how well a device performs in severe conditions involving dust and water, is not a rating system that Fitbit uses. Fitbit told me that they simply use ATM as a measure of water depth suitable for their devices. Nicola's device is rated to 5 ATM, meaning it is water-resistant, but not waterproof, to a depth of 50 meters. It is likely that there would be performance and cosmetic issues with the device if it remained on in cold water for any length of time (i.e. more than one or two days).

The water in the Wyre was reported at the inquest as 3.6 degrees Celsius on Jan 27 and somewhere in the range of 3 to 4 degrees Celsius for the 23 days thereafter. The Fitbit Versa 4 uses a lithium polymer battery. Lithium polymer is the preferred technology for batteries used in smaller devices (vs lithium ion) due to its lighter weight, lower cost, and other advantages. But it performs worse in water and in extreme temperatures than lithium ion, which itself sees reduced battery life in cold and hot temperatures—in my findings, as much as a 73% reduction in battery life depending on water temperature and device settings. The choice of LiPo (lithium polymer) may be a reason why Fitbit eschews IP ratings. LiPo isn't ideal for extreme conditions such as very cold water, or over the long term.

Wearable manufacturers are hard-pressed to get anything over 5 to 6 days in battery life—let alone 8—in normal operating conditions. This is particularly true for wearables that are actively and continually recording heart rate, or attempting to. Based on everything I know about this technology, it is not possible for Nicola's Fitbit to have held a charge for 8 days in those water conditions while attempting to record heart rate data (which we know it did until February 4).

Issue #3: The inquest established that Lancashire Police were able to obtain nine days of unsynced data from Nicola's device when she and the device were found on February 19.

The inquest revealed details about Nicola's walk, heart rate and last movements up until 9:30am on Jan 27, plus heart rate data recorded after 9:30am (including "spikes" at 9:33am, accurate-looking heart rate data until 11:48am, and intermittent readings up until Feb 4). In total that is nine days' worth of data. If Nicola's friend Emma White's remarks to The Sun on Feb 4 (https://thesun.co.uk/news/21274369/nicola-bulley-cops-examine-fitbit-data/) are to be believed, the device was last synced to Nicola's phone on Tuesday, Jan 24, three days before she was reported missing.

It is important to note that her device cannot sync to the cloud automatically. It requires a Bluetooth-linked phone to sync to the app and cloud (data, once synced via phone app, can also be accessed on the web at fitbit.com by logging in to your account).

According to Fitbit, if it is not synced to the phone, the Versa 4 device only stores 7 days' worth of data on the device itself. "Summary data" may be available going back 30 days, but it does not contain the level of detail that was presented at the inquest as to what occurred on January 27 regarding steps and heart rate. So how was Lancashire Police able to extract nine days of detailed data (January 27-February 4) after February 19? This was never explained at the inquest. The supposition, based on the information shared at the inquest, is that the device might have been synced to her phone sometime after her reported date of death (January 27) and before she was found (February 19).

Issue #4: The inquest purported that Nicola's steps were recorded in fifteen-minute increments. In other words, no further level of detail could be ascertained about her steps in the minutes before she allegedly fell in the river.

In fact, Fitbit records steps in five-minute increments in both the app and on the website. This should allow for a higher level of detail as to what happened between 9:18am and when the device stopped recording data (February 4).

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In summary, I feel strongly that the inquest made erroneous assumptions about Nicola's Fitbit data to tell us that she unequivocally went in the water on the morning of January 27, and rejected, disregarded or failed to explain data that could well prove that she never went in the water at all that morning, or for days or weeks afterward.

Below are the questions that I believe need to be reexamined and more thoroughly answered by Lancashire Police in conjunction with the other evidence in the case.

1. **How did Nicola's device exceed its official battery capacity by two days while submerged in 3.6-degree water?** Cold water shortens lithium battery life in wearables by as much as two to five days—and as much as 73%—it does not lengthen it. It is pretty much inconceivable that this device could record data including heart rate for eight days and be fully recoverable when found.

2. **Was the Fitbit and its owner in the water on January 27 or in the days thereafter?** The absence of steps after 9:30am on January 27, and spikes in heart rate around that time, cannot prove that Nicola fell in the river that morning. The absence of steps, and presence of heart rate readings until 11:48am on January 27, as well as additional intermittent heart rate readings until February 4, could be due to other factors, namely: 1) The device was removed from Nicola and moved locations, picking up false heart rate readings from its surroundings until February 4, or 2) The device picked up false readings after the death of its wearer, in a location on land, while still on Nicola's wrist.

More in-depth research into this matter, with citations, can be found on my website at the following link: https://mickey.ghost.io/she-was-never-there-july-7/

Sincerely,
Michaela Lanier
July 7, 2023