

Ayaan

Invasiveness of mHealth technology

Ayaan is a manager at a large department store. She and her husband, Tim, have two young children. Tim takes care mostly of the household, but it is a busy life for Ayaan, who also wants to have time to practice sports (swimming and kickboxing) and meet with her friends regularly.

Recently, and surprising only to herself, she has been feeling more and more tired, sometimes even dozing off at boring work meetings.

Therefore she buys a sleeping wearable, called Sleep Accountant, which she attaches to her wrist at night and which monitors her sleeping activity, heart rate, and whether or not she makes snoring noises. Unfortunately, both Ayaan and Tim occasionally snore, and so Tim's snoring interferes with her data.



Source: <https://www.pexels.com/photo/white-bed-comforter-212269/>

Increasingly, Ayaan feels that, instead of providing her with options, Sleep Accountant dictates what she should do with her life. For example, if she is not in bed by 10 p.m., Sleep Accountant sends out a fairly annoying, high pitched warning signal. This is a default setting, which she could change, but she is

reluctant to do so, because she feels that she should conform to the 'healthy' norm. Sleep Accountant also tells her to keep her 'sleep debt percentage' under 5%, which is hard to attain during the weekdays, especially since apparently she does not get enough 'deep sleep'. If the app notices that Ayaan does not sleep well, it asks what is the matter: is she experiencing stress at work, did she drink too much coffee or alcohol, is she training enough? Ayaan always tries to answer truthfully, although sometimes she forgets to update the data.

Later, Ayaan starts to develop headaches, which sometimes prevent her from going to work. She discovers that Sleep Accountant has a function that enables her to log the headaches as well, matching her data to that of 500.000 other users of Sleep Accountant. According to Sleep Accountant, she should take vitamins and eat more avocado - even though she doesn't really like avocado. The sheer amount of data that Sleep Accountant has gathered on her, gives Ayaan the impression that she is in safe hands and so, when Tim suggests that she should maybe see a doctor, she brushes him off, saying.

"Sleep Accountant might be annoying at times, but it knows more about me than a doctor I see once every two years"

Discussion: Invasiveness of mHealth technologies

Maybe Ayaan is right: doctors make mistakes too, and some of them have sleep deficiency, just like Ayaan. So it may very well be that Ayaan receives more reliable information from her 'Sleep Accountant' than she would from a real life doctor. Then again, she may also be falsely relying on the pure quantity of data gathered by the application. The methodology of comparing large amounts of data sets can in some instances be a very effective way to detect abnormal results, but the interpretation of these data is a different matter, and at least in some cases a doctor, even a sleepy one, will offer a much more reliable diagnosis than any current 'artificial intelligence' system. And this is true in the best of cases, when the input gathered by mHealth technologies is accurate. But we have already seen that the snoring of Tim interferes with Ayaan's log, so the data might not be nearly as reliable as Ayaan seems to suppose.

Apart from interference with sounds, sleeping apps tend to have a difficult time in reading and interpreting users lying still in bed, often leading to an overestimation of the amount of sleep that users get.

An unreliable app or wearable need not be ethically problematic in itself, even if it concerns health data. The constant monitoring, feedback and the impact this makes on Ayaan's personal life seems however invasive in a way that, when combined with the lack of reliability, seems at least to raise ethical questions. Ayaan is very busy, and at first is only looking for a 'technological fix', something to help her manage her responsibilities. The Sleep Accountant however takes over part of her life, from her sleeping and waking habits, to her diet and even the decision to see a doctor or not. If all that happens under the potentially false pretense of objective measurements, we may wonder whether Ayaan is not being manipulated. From a moral perspective, may Sleep Accountant justifiably claim such a big chunk of Ayaan's life? Should she not be informed better on the ways in which the data may fail to accurately predict? Is there not something addictive to an app that constantly asks for acknowledgement - and should this addictive character somehow be regulated?

LITERATURE

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SOURCE

Both the unreliability and the invasive, counterproductive character of some sleep apps have been described, in academic and popular media.

As far as we are aware, there are currently no health apps that combine the functions described in this case, although there exist applications that combine diagnostic function with functionality that helps structure one's life, for example in the case of mental health apps ([Link to Nature.com](#)).