Wearable Device Comparison Table

	Medical-Grade Wearables	Consumer Wearables
Will you have access to raw sensor data?	Yes. Raw data files are provided and easily accessible for researchers to use in company software (like ActiLife or CentrePoint) or other open source programs (such as GGIR).	Maybe. Consumer wearable companies may only provide access to processed data, or often access to raw sensor data is not easily available (i.e., required log-in to third party app or paid premium membership).
Are transparent algorithms used to generate digital measures?	Yes. For example, the algorithms used calculate step counts in ActiGraph devices are published and open source Python packages are available for use.[1]	Algorithms used by consumer wearable companies are often proprietary and therefore not disclosed to customers. This can make it unclear to researchers how measures are being calculated from raw data and difficult to compare to other studies.
Are data privacy and usage control policies clear?	Yes. Medical-grade devices are required to have clear data privacy and usage control policies as part of their regulatory approval.	Researchers can obtain consent from participants to collect and use their wearable data, but consumer wearables are not regulated in the same way as medical-grade devices and data protection laws can vary by location, often making it unclear to the participant how their data will be stored and used by the company.[2]
Is the wearable specifically designed to collect reliable, high-quality data?	Yes, these devices are designed for use in scientific research and clinical trials. They are specifically optimized for patient usability and to limit noise as much as possible from sensor data.	Researchers have reported observing data “noise” such as passive movements being inaccurately logged as true physical activity and Bluetooth connectivity issues resulting in missing data in consumer wearables.[2] Consumer-grade devices have been reported to overestimate step count and/or activity measures in multiple populations.[3,4,5]
Does the wearable provider offer strong sensor signals?	Yes, medical-grade wearables are designed to be fit-for-purpose for clinical research, and therefore prioritize signal quality. Researchers can have confidence in sensor performance will not be sacrificed based on other factors built into the device.	Some consumer wearables are known to have signal drop out, which can be due to the device performing multiple tasks (ex. phone calls, apps, etc.). The device will draw power away from the health data sensors to support the task at hand such as a phone call.
Is the data collected visible / shared with the patient (via device or app)?	No. Medical-grade devices provide raw data to the research/ study team. This allows for study designs where participants are blinded to the condition do not see their data on the device.	Yes. Participants can view their data either on devices or via an app. This allows participants in interventional studies to have real-time and easy access to their data.
Can data be easily extracted?	Yes, ActiGraph offers several robust options for extracting both raw and scored data. These options included csv. exports, API integrations, custom data transfer agreements, and raw data archiving.	Limited, most consumer wearables do not offer customized extraction tools for both scored and raw data. They depend on third-party software platforms which offer limitations.
Does the wearable supplier provide operational and/or scientific support?	Yes. Companies like ActiGraph have dedicated team members to support your study setup and execution, as well as a scientific team that specializes in wearable data collection and analysis.	Maybe. Many consumer wearable providers promote the integration of their hardware with third party platforms, leaving the researcher with the task of figuring out which party to contact: the hardware provider or the software provider?

1. Neishabori et al. Quantification of acceleration as activity counts in ActiGraph wearable. Sci Rep. 2022; 12: 11958.
2. Dobson et al. Use of Consumer Wearables in Health Research: Issues and Considerations. J Med Internet Res. 2023; 25: e52444.
3. Dominick et al. Physical Activity Assessment Between Consumer- and Research-Grade Accelerometers: A Comparative Study in Free-Living Conditions. JMIR, Vol 4, No 3 (2016): Jul-Sept.
4. Block et al. Validation of a consumer-grade activity monitor for continuous daily activity monitoring in individuals with multiple sclerosis. Multiple Sclerosis Journal - Experimental, Translational and Clinical. 2019;5(4).
5. Brown et al. Comparing three wearable accelerometers to measure early activity after cardiac surgery. JTCVS Open, Vol 11, 2022, Pages 176-191.