PitchBook

EMERGING TECH RESEARCH

Retail Health & Wellness Tech

Q2 2020

Contents

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This Emerging Technology Research report is updated on a quarterly basis to reflect changes in venture capital deal activity and other market related updates deemed valuable by the research analyst. The previous quarterly report can be accessed **here.**

Executive summary

Increasing recognition that traditional provider-based medicine is not keeping up with the evolving needs of the population is giving rise to a new era of consumer-focused healthcare products and services designed to improve personal health & wellness at a lower cost than traditional alternatives. These emerging products largely rely on digital technologies that enable convenient at-home or mobile use, the ability to integrate with other services, and large-scale data collection and analysis to help drive personalized offerings.

Startups in this sector are working to develop solutions that can help reduce ongoing epidemics related to chronic diseases, reign in healthcare costs and improve overall wellbeing. While this burgeoning industry includes new ways to obtain traditional care (e.g. telehealth), it also includes a range of alternative health & wellness tech products such as digital therapies and behavioral tools; fitness-related products, including exercise equipment, health-monitoring tools and nutrition-related services; and emerging tools related to genomic science.

In the wake of the coronavirus pandemic, we expect governments and organizations will prioritize technologies that can help mitigate the health impacts of future pandemics. This is likely to accelerate investment into technologies in the realm of telehealth.

In general, VC activity within the health & wellness tech space has spiked significantly as consumers, employers and policymakers adopt related initiatives. Today, the venture ecosystem is a vital incubator for this space. In the second quarter of 2020, VC funding for retail-oriented companies in the health & wellness tech industry totaled $1.9 billion across 120 deals.

In this report, we focus on the retail side of this industry, segmenting it into the following five categories: virtual health, mobile & digital health, biometric wearables & devices, dietary supplements and personalized medicine & testing. In another report, we explore enterprise health & wellness tech.

Industry drivers

COVID-19 pandemic crisis: We believe a robust pandemic preparedness and response infrastructure is likely to consist of several technology-based capabilities focused on predicting, identifying, tracking, containing and treating outbreaks. This will benefit companies developing solutions in disease testing and telemedicine. It is unlikely these responses will all emerge as a singular effort but will consist of several overlapping systems funded by various stakeholders, including governments, non-governmental organizations (NGOs), health systems and businesses. We expect startups focused on these opportunities could benefit from current and future investment into pandemic infrastructure.

Furthermore, stay-at-home orders have eliminated people's ability to attend "non-essential" doctor appointments in person and demanded all fitness centers close their doors indefinitely. This pushes consumers to adapt their usual health & wellness routines, increasing the use of mobile wellness applications, remote monitoring devices and at-home fitness devices.

Doctors focusing more on preventive care and healthy lifestyles: Healthcare professionals have come to view healthy lifestyles as a key preventive measure to improve health outcomes. This includes a focus on diet, sleep and regular exercise. Medical caretakers have highlighted the benefits of these practices, which include reducing high-cost curative solutions. In addition, they've indicated that healthy lifestyles can potentially yield several non-financial benefits, such as heightened productivity, improved morale and enhanced interpersonal relationships.

Increased consumer health awareness and healthy eating index: Consumers are seeking ways to boost daily activity levels, driving demand for wellness-related products and services. The global health and fitness industry lured in $94 billion in revenue in 2019.[1]

Consumer wellness startups partnering with corporations: We expect workplace benefits platforms to partner with wellness startups to improve employee benefits. For example, HR software platform Zenefits announced a partnership with well-being platform **Thrive Global** in October 2018 to offer its wellness-tracking app on Zenefits' platform. In August 2019, payroll and HR provider Justworks teamed up with **ClassPass** to offer exclusive rates to its global network of over 10,000 fitness studios.

Growing elderly population and increased life expectancy: The geriatric population has expanded as baby boomers have aged and life expectancy has extended. This has driven the demand for wellness solutions among the elderly, who are looking to stay healthier as they age. Younger consumers are also pursuing these solutions, hoping to delay the impacts of aging.

Digital economy opens door to telehealth, personalized solutions and fitness applications: Smartphone apps are an effective tool for delivering personalized physical activity interventions while enabling providers to reach a large audience. According to one estimate, the global fitness app market was valued at approximately $3.2 billion in 2019 and is anticipated to grow close to 26% annually over the next several years.[2] Digital solutions enable personalization, allowing consumers to curate fitness plans and adopt healthy behavior modifications with services including individualized meal plans, exercise monitoring devices and shopper-tailored grocery lists. Furthermore, the mass adoption of mobile devices expands the userbase for telehealth providers that offer apps enabling real- time health monitoring.

Population increase coupled with lack of medical providers: By 2032, the AAMC predicts a primary care physician shortage of 21,100 to 55,200 and a non-primary care specialty

1: The 2019 IHRSA Global Report, IHRSA, 2019

2: Fitness App Market Share, Size, Trends, & Industry Analysis Report: Segment Forecast, 2020-2026, Polaris Market Research, February 2020

INDUSTRY DRIVERS

physician shortage between 24,800 and 65,800 in the US.[3] Hospitals have begun launching virtual care centers to help meet rising demand for wellness solutions, which can further decrease the need for in-person visits.

Growth of social media: Active lifestyles and working out have become ubiquitous on social media, with consumers relying on photo- and video-sharing platforms as go-to sources for fitness inspiration and motivation. Social challenges on platforms such as Facebook can increase participation, as users share their activities and vie for influencer status. For example, a quick search of the popular "#fitspo" hashtag on Instagram brings up tens of millions of posts related to fit and active lifestyles. New technology such as Snapchat glasses, improved cameras and video-editing tools make it easier to post quality content and drive more activity and engagement across social platforms.

Consumer and provider demand for healthcare flexibility: Consumers and physicians are seeking more convenient and accessible models of care. Mobile applications, telehealth and biometric devices allow for greater workout flexibility and enable individuals to create personalized health plans, discuss medical conditions and share monitored data with physicians remotely.

Expanding cost of traditional healthcare: National health spending is projected to grow at an average annual rate of 5.4% for 2019-2028, reaching $6.2 trillion by 2028.[4] Several factors have contributed to the swelling costs of traditional healthcare, including the prevalence of chronic diseases, rising obesity rates, increased sleeping disorder rates and the expanding geriatric population. These costs are especially burdensome in emerging countries where out-of-pocket spending on healthcare to combat communicable and non-communicable diseases is higher. In the US as well, company-sponsored private health insurance has allowed for a significant escalation in cost of care. This puts pressure on consumers, providers and insurers to find ways to reduce the growing cost burden, such as promoting lower-cost alternatives.

Advancements in AI and Big Data: Providers of health & wellness services are using new technologies such as AI to gain new insights and opportunities. These include accelerating diagnostic capabilities, automating processes and providing AI-based treatments.

3: The Complexities of Physician Supply and Demand: Projections from 2017 to 2032, Association of American Medical Colleges, April 2019
4: National Health Expenditure Data, Centers for Medicare & Medicaid Services

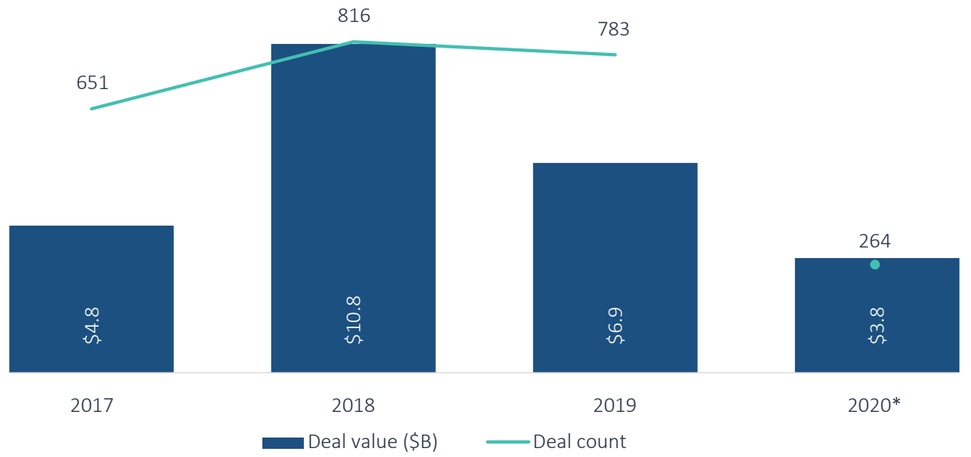
VC activity

In the retail health & wellness tech sector, 120 deals closed in Q2 2020 for a total of $1.9 billion in VC funding. The largest deals of the quarter were **Amwell**'s $194 million Series C, followed by **Insitro**'s $143.2 million Series B. These deals are of similar value of the larger deals which occurred in Q1, such as **KRY**'s $156 million Series C and **Element Science**'s $146 million Series C. However, they do not compare to 2019's largest deals, which include **Babylon Health**'s $550 million Series C and **iFit**'s $200 million late-stage VC round. Despite the smaller deal sizes in Q2, the late stage comprised 41.7% of the quarter's overall deal count and 78.6% of deal value, reflecting the industry's maturity.

In 2019, we saw a total of 54 exits; 2020 is not on pace to match 2019, with only 15 exits so far, eight of which occured in Q2. The largest exits in the quarter include Google's (NASDAQ: GOOGL) acquisition of **North** for $180 million and **Omada**'s (a VC-backed company) acquisition of **Physera** for $30 million. In comparison, the largest VC exits in 2019 were **Peloton**'s (NASDAQ: PTON) $6.9 billion IPO and **Stoke Therapeutics**' (NASDAQ: STOK) $424 million IPO. The sector's muted VC exit activity in 2020 mirrors that of all industries worldwide. The disappointing early aftermarket performances of some of the most notable tech IPOs—including **Livongo**, **Uber**, and **Peloton**—highlight a growing concern about public market appetite for tech unicorns seeking to list without a path to profitability. While the challenged economy may reduce exit activity in 2020, health & wellness tech providers able to offer aid in the pandemic may be more likely to complete a favorable exit.

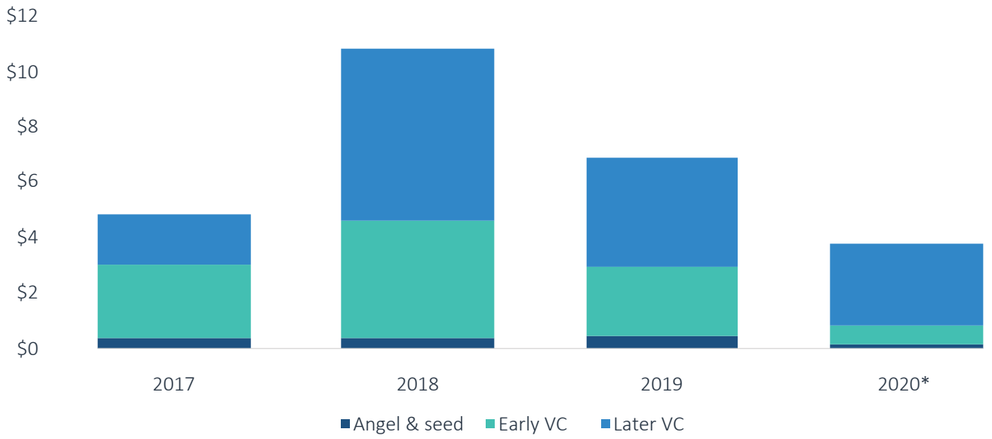
Startups in the personalized medicine & testing and virtual health spaces had much larger deal sizes than the other segments in the retail health & wellness tech industry. The lofty median deal size of personalized medicine & testing startups may be due to the segment's large number of biotech-related companies, which typically close larger deals than retail-oriented startups.

Figure 1. RETAIL HEALTH & WELLNESS TECH VC DEAL ACTIVITY



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 2. RETAIL HEALTH & WELLNESS TECH VC DEALS ($B) BY STAGE



Source: PitchBook | Geography: Global
*As of June 30, 2020

Retail health & wellness tech market map

Virtual health

Telehealth

babylon, lyra, KRY, Preventice Solutions, dr. on demand, NURX, 98point6, health, tytocare, halodoc, Healthy.io, MAVEN, AliveCor, Dialogue, JAWBONE HEALTH, LEMONAID, Ready Responders, MEDABLE, H4D, Medically Home, Woundtech, 中国平安 PINGAN, amwell, TO, Zocdoc, 赛客倾诉 SaiKeWang, Quartet, MDLIVE, talkspace

Remote patient monitoring (RPM) tools

ELEMENT SCIENCE, EarlySense, vitalconnect, INFOBIONIC, glooko, higi, pager, ForeseeHOME

Biometric wearables & devices

Biometric monitoring wearables

GOQII, WHOOP, willow, beam, EIGHT SLEEP, WITHINGS, ŌURA, Owlet, dreem, elvie, ATHOS, ebb

Smart devices

eGYM, 远点 明视 Mofajing, TEMPO, TONAL, hydrow, nanit

Personalized medicine & testing

Ad-hoc personalized testing

color, KARIUS, iCarbonX, cue

Bioinformatics

MGI 华大智造 MGI Tech, zymergen, genuity sciences, DNAnexus, insitro, KALLYOPE, GenapSys, enterome, ma2e, SOPHiA GENETICS, syapse, Mammoth Biosciences, CENTRILLION TECHNOLOGIES, ANORAD 安诺优达, PAIGE, celmatix, GENOMICS PLC, Yikon GENOMICS, genome MEDICAL

Genomic testing

23andMe, HUMAN LONGEVITY INC., Helix, PATHWAY GENOMICS, PGDx, ORIGEN, SINGLERA Genomics, MyHeritage, ACT GENOMICS, VeritasGenetics, pieriandx

Dietary supplements

Sports supplements

KILL CLIFF

Vitamins & supplements

hims, FRS healthy energy, spoonful one, care/of, ALOHA, Evolve BioSystems, ELYSIUM, kate farms, creative biogene, Ritual, GoodBelly PROBIOTICS, microphyt

Mobile & digital health

Fitness application

cure.fit, keep, ZWIFT, Aaptiv, STRAVA, Vi, FiNC, fabfitfun, FREELETICS

Behavorial modification tools

headspace, mindstrong, Calm

Personal health tools & tracking

Welltok, 美柚 Meet You, vida, Yaolan 摇篮网, foodsmart, Natural Cycles, OVIVA, 掌上糖医 Zhangshang Tangyi

Digital therapeutics

Click Therapeutics, PEAR THERAPEUTICS, Hinge Health, neurotrack, theranica, AppliedVR, BrainCo, virta, AKILI, CARROT

Companies included are VC-backed, segmented by primary use case and sorted by total capital raised.

SEGMENT DEEP DIVE

Virtual health

Overview

The virtual health (or telemedicine) category includes companies involved in the distribution of health services via telecommunication platforms accessed through the web or mobile applications. Telehealth products and services provide remote communication between patients and providers. They also transmit and collect medical imaging information and data. Current segments include:

Remote patient monitoring (RPM) tools: RPM tools utilize at-home diagnostic technology to electronically collect and transmit information between patients and physicians. This technology can be deployed in healthcare settings and at home via mobile devices, carts, robots and other digital tools.

Telehealth services: Telehealth connects patients and healthcare providers via computers, mobile devices and audio-visual systems to provide remote treatment. This category also contains AI-powered chat bots that provide medical advice and cognitive therapy. Telehealth service providers can be segmented into two different buckets:

- **Direct-to-consumer (D2C) telehealth companies:** These companies contract with employers, insurers or patients directly to provide an on-demand telehealth service—typically urgent care or primary care. Players in this area hire or contract their own physicians to provide consultation and/or create AI-powered chat-bots that can service the patient.
- **Telehealth service platforms:** These companies provide IT infrastructure to healthcare providers who wish to develop and provide their own telehealth services.

Telehealth has the potential to provide benefits across the ecosystem, not just for the end consumer. For example, hospitals deploying telehealth services reduce costs for consumers and insurers, increase convenience to users and improve capacity constraints, as outlined in Figure 3.

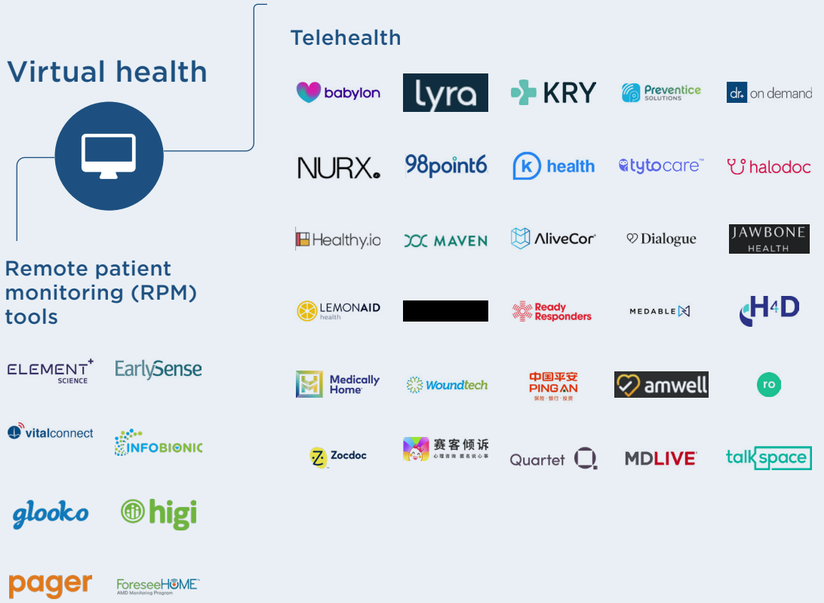


Figure 3.

The benefits of telehealth to providers, patients, payers and employers

BENEFIT	PROVIDER/HOSPITAL	PATIENT	INSURER/PAYER	EMPLOYER
Reduces readmissions and avoids penalties	X	X	X	
Reduces length of hospital stay	X	X	X	
Increases patient satisfaction	X	X	X	x
Reduces overuse	X			
Reduces no-shows	X			
Improves medication management	X	X	X	x
Improves complex condition management	X	X	X	x
Increases quality of care	X	X	X	x
Increases provider efficiency	X			
Provides goodwill opportunities	X			
Increases market access	X			
Provides better medical access		X		
Increases retention rates	x		x	
Lowers total cost of care		x	x	x

Source: PitchBook

Business model

Telehealth companies sell to healthcare providers through D2C, B2B or B2B2C models, offering either software or hardware (e.g. video devices for hospital exam rooms and RPM devices).

Revenue is generated via unit sales, SaaS subscriptions and digital visits. B2B and B2B2C Telehealth service platforms sell strictly to healthcare providers who offer telehealth services to patients, these patients are often unaware of what telehealth platform is being utilized as they are on the back end and may be white labeled. D2C providers attract consumers to their platform and connect them with their own or third-party medical providers.

B2B: On a B2B basis, providers sell their platforms and services to hospitals, employers and/or insurers through a SaaS business model. Prices vary based on physician and employee usage as well as session volumes and additional features. RPM devices are typically sold directly to the hospital for patient distribution, which may or may not be covered by insurance.

D2C: D2C telehealth providers target individuals directly. In the US, D2C providers partner with insurers and employers to ensure coverage; however, in countries with universal healthcare, they receive funding from the government and may bypass that step. Consumer prices vary based on insurance levels and whether employers offer telehealth benefits. Telehealth services that use only chat bots, text messaging and/or online risk assessments typically have standard prices and do not partner with insurers, though they may partner with employers. For example, **98point6**, which diagnoses patients through text messaging, charges individuals a $120 annual fee and $1 for each visit. Employee-sponsored plans cover the annual fee, but users still may have to pay the visitation fee. Primary customer acquisition channels include physician referral and direct marketing.

Market size

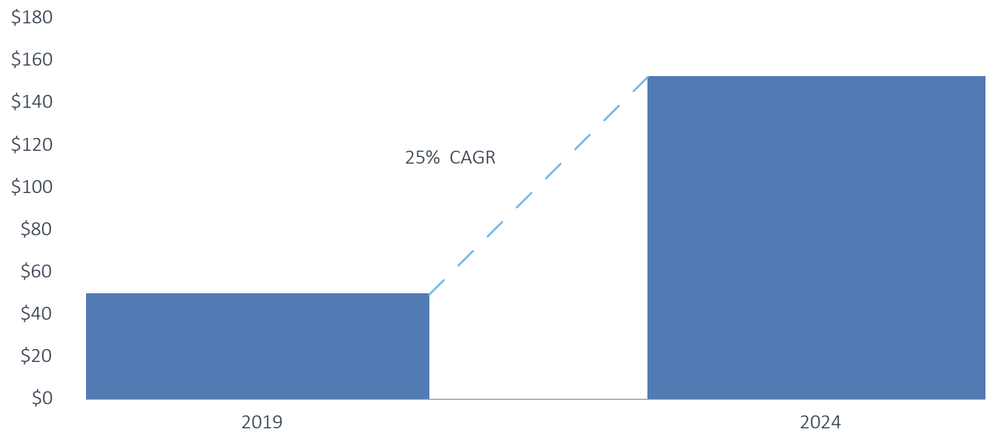
Before the COVID-19 pandemic swept through the world, the global virtual health market was projected to grow at a CAGR of 23.4% to $266.8 billion in 2026 from $49.8 billion in 2018.[5] Most of this growth is driven by telehealth platforms and services as opposed to remote patient monitoring devices. While we expect the COVID-19 pandemic will serve as a strong catalyst for near-term growth, we believe the total size of the market in the long term will remain relatively unchanged from pre-pandemic forecasts. In the US, the telehealth services industry, driven by advancements in medical technology and telecommunications, is in the growth stage of its life cycle. It is expected to grow at an annualized rate of 9.2% to $3.7 billion in 2024 from $2.4 billion in 2019.[6] The global remote patient monitoring devices and equipment market is expected to grow to $3.7 billion in 2024, growing at a CAGR of 15.8%.[7]

Industry drivers

Technological innovation: Advances in technology have led to significant innovation in remote patient and self-monitoring devices, including at-home diagnostics that measure heart and respiratory rates, insulin levels and skin PH levels; mobile communications and high-speed networks that enable real-time communication between patients and providers; and online triage bots that can assist with routing patients to the appropriate clinical teams. Breakthroughs in telecommunication technology have inspired vendors to focus investments into integrating hardware and software to contrive remote healthcare services to end users.

5: "Telehealth: Global Market Analysis, Insights, and Forecast, 2019-2026," Fortune Business Insights, July 2019.
6: "Telehealth Services in the US," IBISWorld, Jack Curran, October 2019.
7: "World Remote Patient Monitoring Devices & Equipment Markets: Analyses & Projections (2015-2030)—ResearchAndMarkets.com," Businesswire, November 12, 2019.

Figure 4. VIRTUAL HEALTH MARKET SIZE ($B)



Source: PitchBook estimates | Geography: Global

COMMON INDUSTRY KPIS FOR VIRTUAL HEALTH COMPANIES

- Lifetime value (LTV)
- Customer acquisition costs (CAC)
- CAC/LTV ratio
- Gross profit margin
- Customer churn & revenue churn (software)
- Monthly recurring revenue (software)
- Per-unit manufacture cost (hardware)
- Cost of goods (COG)/unit sales (hardware)

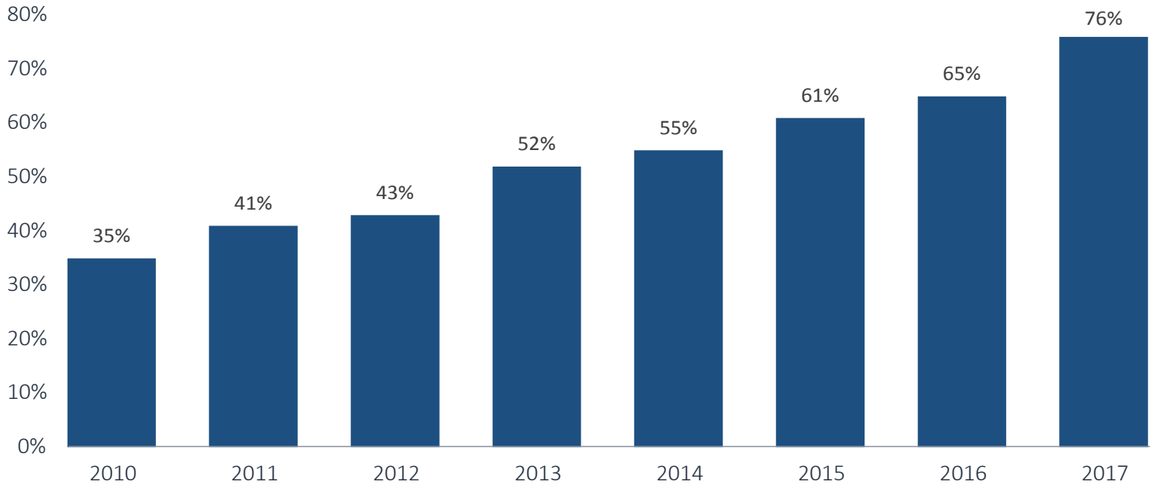
The COVID-19 pandemic as an adoption catalyst: The COVID-19 pandemic is driving a surge in demand for telehealth capabilities to help in diagnosing and treating patients. Telehealth can help extend treatment to rural locations, scale treatment in dense cities and protect front-line healthcare workers from the highly contagious disease. To facilitate the use of telehealth, regulators have eased restrictions, and payers have extended insurance coverage. This is likely to be a significant near-term catalyst for the industry that could have long-term ramifications as patients, providers and insurers become accustomed to telemedicine and as the technology itself improves to address the crisis. Telehealth is also likely to remain a critical component of future pandemic response systems. Furthermore, practices that traditionally only offered in-person appointments have begun to offer virtual appointments. For example, **Heal**, which previously only provided house calls, will soon offer telemedicine services.

Rising healthcare costs and the push for value-based care: Telemedicine is often less expensive to provide relative to facility care because remote treatment requires fewer resources. As studies continue to validate the efficacy and cost efficiency of telemedicine, both private and public health insurers are more likely to cover telehealth services. For example, at the University of Pittsburgh Medical Center, a video-based home monitoring program helped drop hospital readmissions among patients with congestive heart failure to just 5% from 28%.[8] D2C clear aligners (alternatives to braces) cost approximately 50% less than doctor-directed aligners and are conveniently delivered.

Demand for healthcare in rural areas: The patient-to-primary care physician ratio in rural areas is only 39.8 physicians per 100,000 people, compared to 53.3 physicians per 100,000 in urban areas,[9] and about 20% of Americans live in rural areas without suitable access to dentists and orthodontists.[10] Telehealth can also give rural residents better access to specialists who may not be available physically.

Figure 5.

Percent of hospitals fully or partially implementing computerized telehealth system (2010-2017)



Source: 2011 to 2019 American Hospital Association Annual Survey IT Supplement | Geography: US

Increase in number of remote clinical trials: Remote patient monitoring (RPM) technology enables clinical trials to be conducted remotely while lowering costs and improving efficiencies. RPM has been found to provide value in the following five areas: Passive reporting, longitudinal data, convenience, tracking and support.[11] Furthermore, telemedicine will likely facilitate clinical trials' recruitment processes and eliminate geographic boundaries.

8: "Use of Telemedicine Surges at UPMC," Biz Journals, Kris B. Mamula, May 23, 2014
9: CDC, NCHS, National Ambulatory Medical Care Survey, Electronic Health Records Survey

10: "Facts About Teledentistry," American TeleDentistry Association, n.d.
11: "How Telehealth & Remote Care Enable Faster, More Efficient Virtual Clinical Trials," Care Innovations, n.d.

Increase in number of patients requiring ongoing monitoring: The growing elderly population and an increasing number of patients with chronic conditions, such as diabetes, cancer and obesity, has expanded the use of devices RPM that allow patients to reduce hospital trips and recuperate at home. Management of chronic illnesses accounted for more than 75% of healthcare costs in 2016, with chronic heart diseases, diabetes and strokes named the leading global causes of mortality by the World Health Organization.[12]

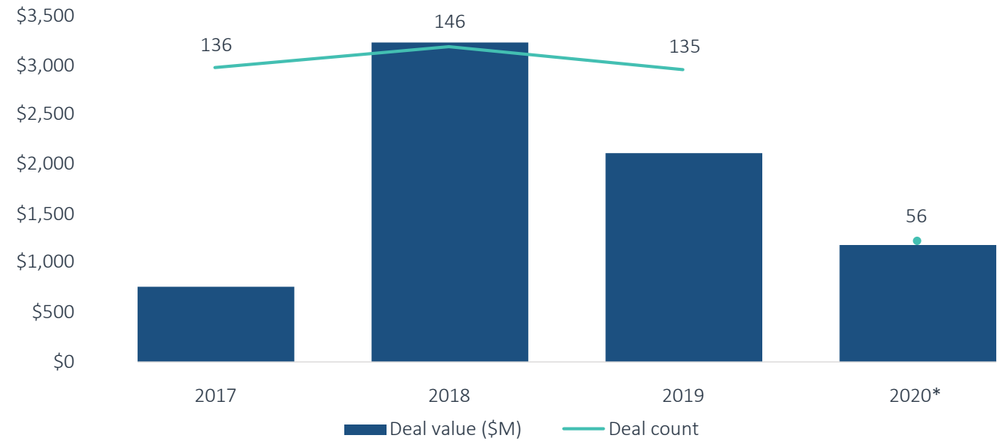
Growing governmental support and funding for telemedicine: Until recently, US policy placed many restrictions on telehealth reimbursement. However, new initiatives have recently been passed to expand Medicare reimbursement for telehealth. In addition, many regulations were significantly eased in response to COVID-19; we believe it may be hard to reverse these changes. Furthermore, we expect to see increased government investment in healthcare technology as legislators prioritize public health over lingering privacy concerns. This could boost investment in telemedicine. Currently, the National Health Institute and the US-funded Office for the Advancement of Telehealth (OAT) provide funds to support technology development for telehealth..

VC activity

Companies tracked in the virtual health segment raised roughly $534 million in venture funding in the second quarter of 2020 across 29 deals, down in terms of deal value but in line with Q1 2020 deal count. There were 29 late-stage VC deals which accounted for about 86.5 % of the deal funding so far this year, which is higher than in previous years (44% in 2018, 66% in 2019) and signals industry maturity. AmWell brought in the top deal this quarter with a $194 million

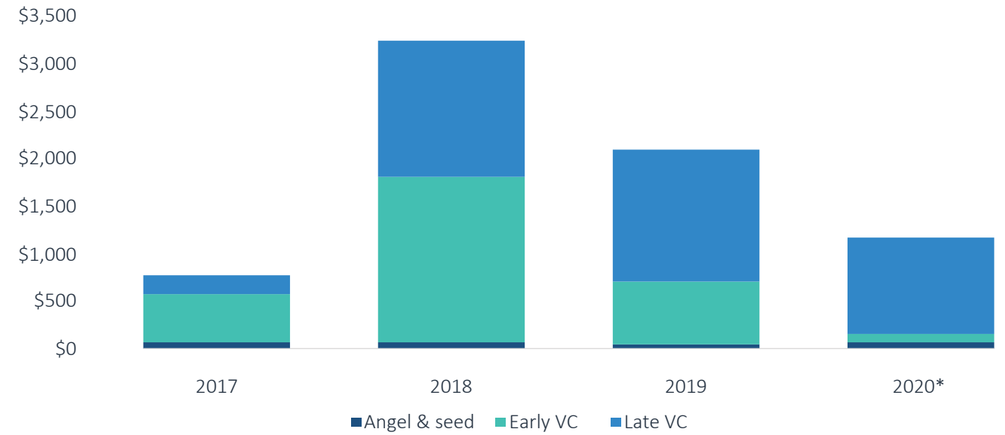
12: "The Top 10 Causes of Death," World Health Organization, May 24, 2018.

Figure 6. VIRTUAL HEALTH VC DEAL ACTIVITY



Source: PitchBook | Geography: Global

Figure 7. VIRTUAL HEALTH VC DEALS ($M) BY STAGE



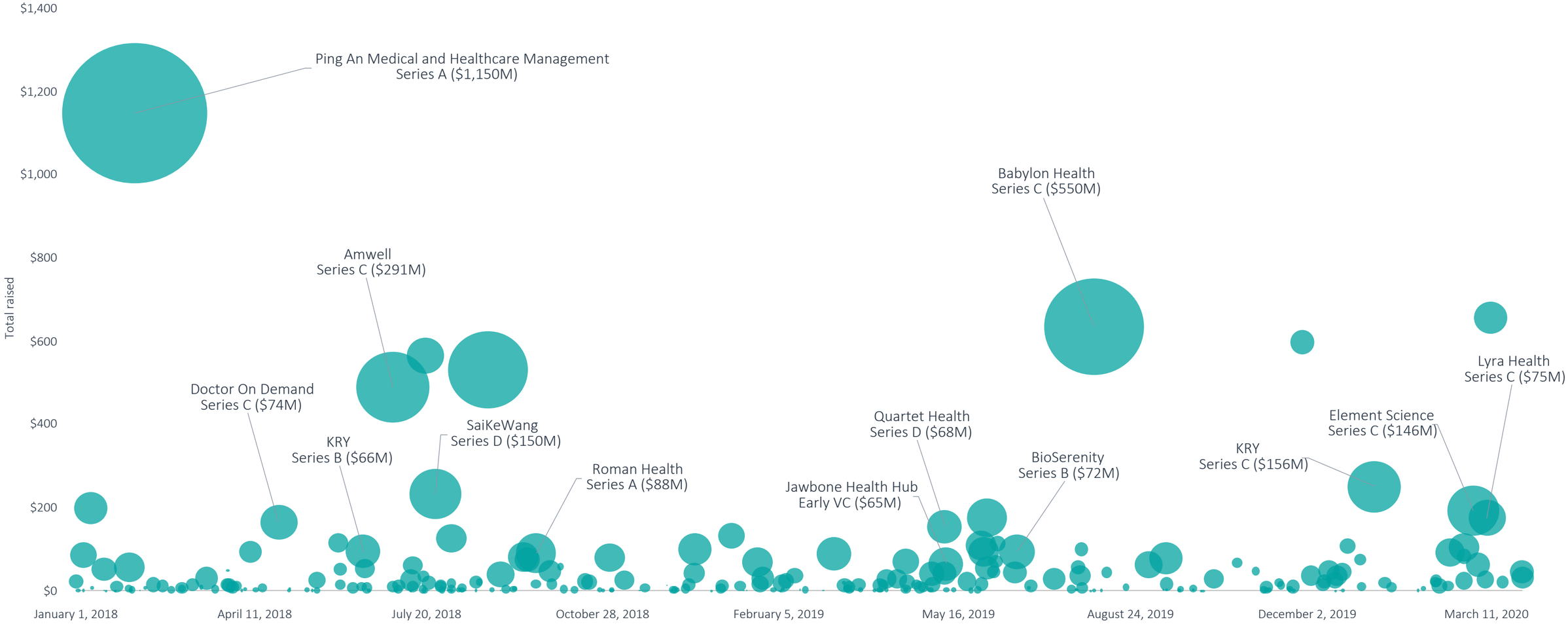
Source: PitchBook | Geography: Global

Series C after taking a two-year hiatus from fundraising. **Amwell**'s telehealth platform connects consumers with board-certified healthcare professionals via video over web or mobile. Another notable deal was **98point6's** $43 million Series D. **Inui** was acquired for $9 million by **Healthy.io**, a VC-backed company which turns smartphone cameras into medical devices. After the close of the quarter, **Teladoc** and **Livongo** agreed to merge in a deal valued at $18.5 billion. This suggests a potential increase in valuations across the space as **Teladoc** was purchased at about a 10% premium.

After the close of the quarter, **Lyra Health** raised a $10 million Series D round, giving the company unicorn status. **Lyra Health**'s digital health platform is designed to transform mental health care through connecting members to a curated network of therapists.

Figure 8.

Current virtual health VC landscape ($M)



Source: PitchBook

Note: The left axis indicates total VC raised as of deal date. Bubbles indicate amount raised.

Figure 9.

Notable virtual health VC deals

COMPANY	CLOSE DATE	SUBSEGMENT	DEAL SIZE ($M)	DEAL TYPE	LEAD INVESTOR(S)	VALUATION STEP-UP
KRY	January 7, 2020	Telehealth	$156	Series C	Teachers' Innovation Platform	N/A
ELEMENT SCIENCE	March 3, 2020	RPM tools	$146	Series C	Qiming Venture Partners, Deerfield Management	N/A
lyra	February 21, 2020	Telehealth	$75	Series C	IVP	2.00x
amwell	March 20, 2020	Telehealth	$194	Series C	N/A	N/A
health	February 27, 2020	Telehealth	$48	Series C	Mangrove Capital Partners, 14W	2.05x

Source: PitchBook

Figure 10.

Notable virtual health VC exits

COMPANY	CLOSE DATE	SUBSEGMENT	EXIT SIZE ($M)	EXIT TYPE	ACQUIRER OR TICKER	VALUATION STEP-UP
one medical	January 31, 2020	RPM tools	$1,689	IPO	N/A	1.13x
inui	June 26, 2020	RPM tools	$9	M&A	Healthy.io	N/A
Propeller	January 6, 2019	RPM tools	$225	M&A	ResMed	3.22x
MEDLEY	December 12, 2019	Telehealth	$141	IPO	N/A	N/A

Source: PitchBook

Figure 11.

Key VC-backed virtual health companies

COMPANY	VC RAISED TO DATE ($M)	SUBSEGMENT	KEY PRODUCTS	PRODUCT DIFFERENTIATION
中国平安 PING AN 保险·银行·投资	$1,150	Telehealth	Virtual telehealth platform	Targets healthcare providers, patients and payers; integrates into EHR systems
amwell	$685	Telehealth	Telehealth video appointments, chatbot, healthcheck survey	Chatbot uses AI to identify cause and connect users
babylon	$635	Telehealth	Remote telehealth appointments, CareConnect	CareConnect enables professionals to treat patients by video, KRY platform targets consumers
KRY	$251	Telehealth	Wearable cardioverter defibrillator	Minimizes risk of sudden cardiac death by enabling continuous heart monitoring
ELEMENT SCIENCE	$193	Remote Patient Monitoring	Wearable cardioverter defibrillator	Minimizes risk of sudden cardiac death by enabling continuous heart monitoring

Source: PitchBook

Figure 12.

Key virtual health incumbents

COMPANY	HOLDING STATUS	SUBSEGMENT	ENTERPRISE VALUE ($B)	KEY PRODUCTS
TELADOC	Public	Telemedicine	$13,076	Virtual care solution to connect organization to individuals
Aerotel Medical Systems	Corporation	RPM	N/A	Remote ECG monitoring software
SHL Telemedizin	Public	Telemedicine & RPM	$61	ECG, Blood pressure, Oximeter devices; 24/7 telemedicine center
PHILIPS	Public	Telemedicine & RPM	$42,924	Enterprise telehealth services; suite of patient monitoring devices

Source: PitchBook

Opportunities

Credentialing software: Medicare eligibility requires healthcare facilities and providers to have a physician credentialing and privileging process for in-person and telehealth treatment. Obtaining and proving these credentials can be streamlined through a process called "credentialing by proxy (CBP)." CBP permits hospitals to rely on the privileging and credentialing decisions made by the hospital providing the telemedicine services and can reduce onboarding and go-live time from months to days. However, only 33% of respondent hospitals use telemedicine CBP.[13] This is due to fear of losing control with CBP and a lack of understanding regarding the benefits of CBP. Credentialing software could help save money and time. **Modio Health** is currently the largest medical credentialing software. However, startups such as **Kareo** are hoping to enter the space. **Kareo** raised a $9.9 million Series H round in October 2018, raising its post-money valuation to $359.9 million.

Telehealth platforms targeting businesses: With employer-sponsored healthcare benefits approaching $15,000 per employee,[14] many companies are looking to telehealth to reverse this trend. Several large employers have introduced telehealth in recent years, with over half of respondents in the 2019 Large Employers' Health Care Strategy and Plan Design Survey planning to add more virtual care (telehealth) solutions.[15] These expanded offerings are likely to drive higher rates of use. Companies may also view telehealth as an effective means to offer new kinds of treatments. 13% of large employers planned to introduce mental/behavioral and diabetes management telehealth services in 2019, a reflection of the growing perception that telehealth can help companies address gaps in their healthcare coverage.[16] Startups **98point6** and **TAO Connect** focus on both the employer and consumer markets.

Providing various services through a single channel: Telehealth software can be used as a productivity-enhancing tool in a variety of applications that can help broaden the customer base. For example, **Doctor on Demand** initially launched as a virtual urgent-care clinic. In 2014, it was one of the first to expand into mental health care, offering video-based psychology and psychiatry visits. **Doctor On Demand**'s Synapse platform enables doctors to maintain patient medical records and quickly refer patients to in-network specialists.

Remote patient monitoring devices: RPM devices have many applications and serve as a critical component of pandemic response systems. These devices can also improve patients' ability to monitor their own health We anticipate devices geared toward cardiovascular diseases to hold 19% of the total telehealth market share by 2025 due to an increasing prevalence of heart diseases such as congestive heart failure (CHF), which can be easily managed through RPM devices. BioIntelliSense's BioSticker wearable sensor monitors vital signs such as resting heart rate, respiratory rate, and skin temperature, as well as other biometrics including coughing, vomiting, and body position.

13: 2017 Telemedicine & Digital Health Survey Report, Foley & Lardner, November 8, 2017
14: "2020 Large Employers' Health Care Strategy and Plan Design Survey," National Business Group on Health, 2019
15: Ibid.
16: Ibid.

Considerations

Limited access to high-speed internet and smartphones hinders adoption in rural areas: According to the 2018 Broadband Deployment Report, only 69.3% of rural areas and 64.6% of tribal areas had access to high-speed broadband internet that met the minimum benchmark set by the Federal Communications Commission (FCC).[17] Furthermore, many mobile health and RPM systems require access to smartphone applications. However, rural populations are less likely to own smartphones when compared to other populations. In 2018, 71% of rural residents reported owning a smartphone, compared to 83% of suburban and urban residents.[18]

Telehealth adoption hurdles remain: Today's healthcare industry is the result of decades of regulation, complex stakeholder relationships, and legacy processes and procedures. Telemedicine will require stakeholders to work together to redefine existing regulations and payment structures, while consumers will need to learn to trust and be comfortable with virtual or AI-driven interactions. One significant challenge includes licensing doctors with local medical boards and complying with the complex regulations and licensing rules of each state. We expect demographics will play a large role in this shift as younger, digital-native generations adopt these technologies more quickly and demand their availability.

Risk of fraudulent telehealth providers: The reciprocation of numerous telehealth regulations in response to COVID-19 could inadvertently unleash a wave of billing fraud and abuse and risk patient safety as telehealth extends unscrupulous provider reach.

17: 2018 Broadband Deployment Report, Federal Communications Commission, February 2, 2018
18: "Mobile Fact Sheet," Pew Research Center, June 12, 2019

In September 2019, the Justice Department charged 35 people in connection with a telemedicine scheme that allegedly ripped off more than $2.1 billion from Medicare.[19]

Complicated implementation process in hospitals: Healthcare providers face significant RPM deployment challenges due to limited budgets and resources. Health systems and hospitals embarking on the virtual care journey often face obstacles when training physicians and nurses to become virtual care providers. Successful deployments are more likely for vendors that can establish a partnership with clinical teams rather than a more traditional vendor-client relationship. Over time, virtual health training could become more standardized. For example, medical students at Weill Cornell can now take a two-week telemedicine and digital health elective in which they learn to interview patients virtually, participate in telehealth visits and understand the legal and regulatory issues around telemedicine.

Hiring and patent risk: Given the high growth of the industry, startups may have difficulty sourcing talent for product and software development. Additionally, we believe the heavy reliance on technology devices to perform specific tasks increases patent risk.

Outlook

Large employers will launch their own telemedicine services: While we expect telehealth providers to increasingly target corporates, we also anticipate large corporations will launch their own services and partner directly with doctors and local hospitals. In September 2019, Amazon began piloting Amazon Care for its employees, a virtual primary care offering. Amazon Care will include telemedicine, online chat with a nurse, medication

19: "Coronavirus Fuels Explosive Growth in Telehealthand Concern About Fraud," Kaiser Health News, Fred Schulte, April 22, 2020.

delivery and app-enabled house calls to the employee's office or home. Amazon Care does not directly employ healthcare providers but contracts with local clinics.

More startups will focus on underserved populations and developing regions: Significant portions of the global population have limited access to healthcare services, and digital health technologies have the potential to close gaps where healthcare infrastructure and engagement are weakest. VC firm **StartUp Health** invests solely in digital health startups, and their portfolio includes 325 startups across 25 countries—one of which, access.mobile, focuses on traditionally hard-to-reach, high-risk and underserved populations.

Startups will expand services and distribute via legacy channels: We expect telehealth startups will continue to find ways to enhance and augment services to drive new adoption and market penetration. Emerging models and partnerships can expand services and add new distribution channels. For example, **MDLive** recently partnered with Walgreens to offer telehealth services in 25 states through the Walgreens' app. Providers are also adding new services to create holistic offerings, such as **Babylon Health**'s app, which includes a virtual assistant and health-mapping tools, as well as text and video consultations with doctors.

Future of elderly care to rely more heavily on technology: Technology will be critical in improving care for the elderly. Next-generation sensors can support home living (e.g. **CarePredict**'s AI bracelet) and robots can help provide physical care (e.g. **Embodied**). Improved data analysis services will combine personal genetic and wellness data with population data to design individual care plans.

SEGMENT DEEP DIVE

Mobile & digital health

Overview

Mobile & digital health startups are developing tools and apps that can help consumers monitor and improve personal health. In some cases, these tools may be recommended by health providers in conjunction with traditional care. Categories include:

Personal health tools & tracking: Consumer applications for monitoring and managing health concerns such as menstruation cycles, nutrition and sleep.

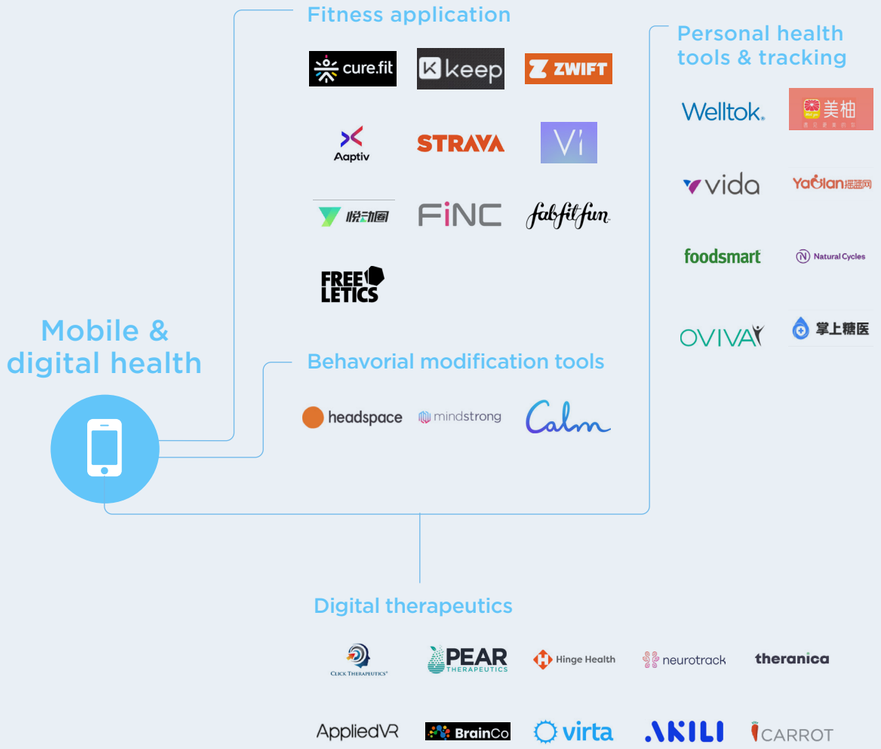
Fitness applications: Applications that enable users to work out anywhere by providing on-demand audio and/or video classes. This segment also includes "on-demand gyms" that allow consumers to access a network of gyms and pay per minute, as opposed to monthly memberships.

Behavior modification tools: Applications aimed at helping users improve critical brain functions, such as memory, attention, communication and ability to learn. This group also includes applications intended to help reduce stress through practices such as meditation, as well as encourage healthy behaviors.

Digital therapeutics: Software solutions designed to treat medical conditions that are used proactively by consumers or prescribed by doctors. For example, **Akili Interactive**'s AKL-T01 is used in place of or in tandem with traditional pharmaceutical therapies for ADHD.

Business model

Mobile & digital health products are generally sold direct to consumer and may be accessible through desktops and/or mobile applications. These companies generate revenue through subscriptions (freemium and premium), ads and selling user data. Some products are covered under insurance plans or paid for by employers as a workplace wellness benefit.



Market size

The global mobile health market is estimated to reach $173.8 billion by 2024, propelled by a 38.5% CAGR from a market size of approximately $34.1 billion in 2019.

Industry drivers

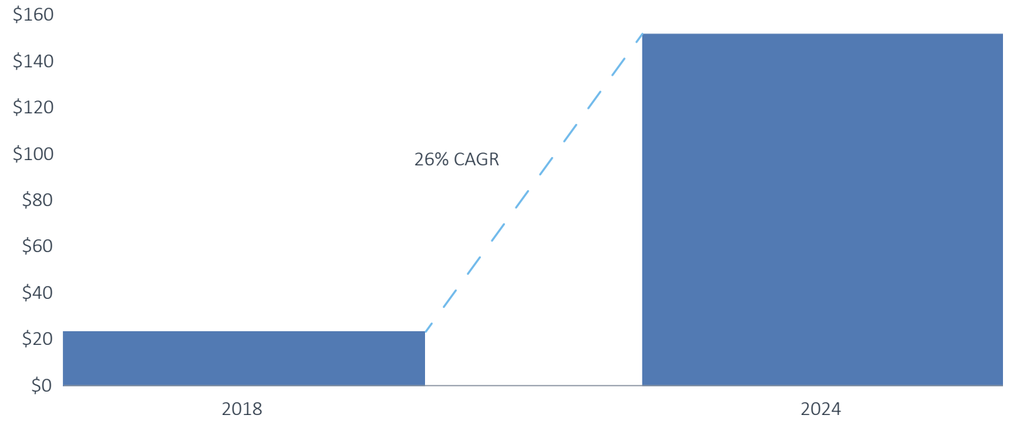
Enabling technologies accelerate adoption: The digital economy has paved the way for convenient, customizable consumer health tools accessible via smartphone apps. Improved connectivity speeds enable consumers to access solutions on-demand, share information instantly and stream high-quality videos. AR and VR technologies have the potential to create powerful new experiences, particularly AR as it applies to brain activity analysis.

Increased monetization opportunities for digital content providers: The monetization potential of streaming platforms such as YouTube provides financial incentives for new and existing content creators (e.g. instructors) to provide free workout video catalogs that can attract advertising dollars.

Destigmatization of mental illness: Declining stigma surrounding mental health disorders is likely to drive more willingness among consumers to seek treatment and technological solutions. Additionally, consumers may be drawn to the lower-cost and privacy of using app-based services that don't require in-person doctor visits.

Growing market for fertility products: The rise in dual income households and the trend among women to have children later in life is fueling demand for fertility tracking applications that can help with conception.

Figure 13. MOBILE & DIGITAL HEALTH MARKET SIZE ($B)



Source: PitchBook estimates | Geography: Global

COMMON INDUSTRY KPIS FOR MOBILE & DIGITAL HEALTH COMPANIES

- Customer retention
- Customer penetration
- Monthly recurring revenue (MRR)
- Churn rate
- Customer acquisition costs (CAC)
- Viability ratio (LTV/CAC)
- Seasonal retention
- Mobile apps: app downloads, app store ranking, active users, number of users who grant location permission, advertising partners
- User engagement metrics: number of users who improve their sleep quality, allow push notifications or log in daily/ weekly

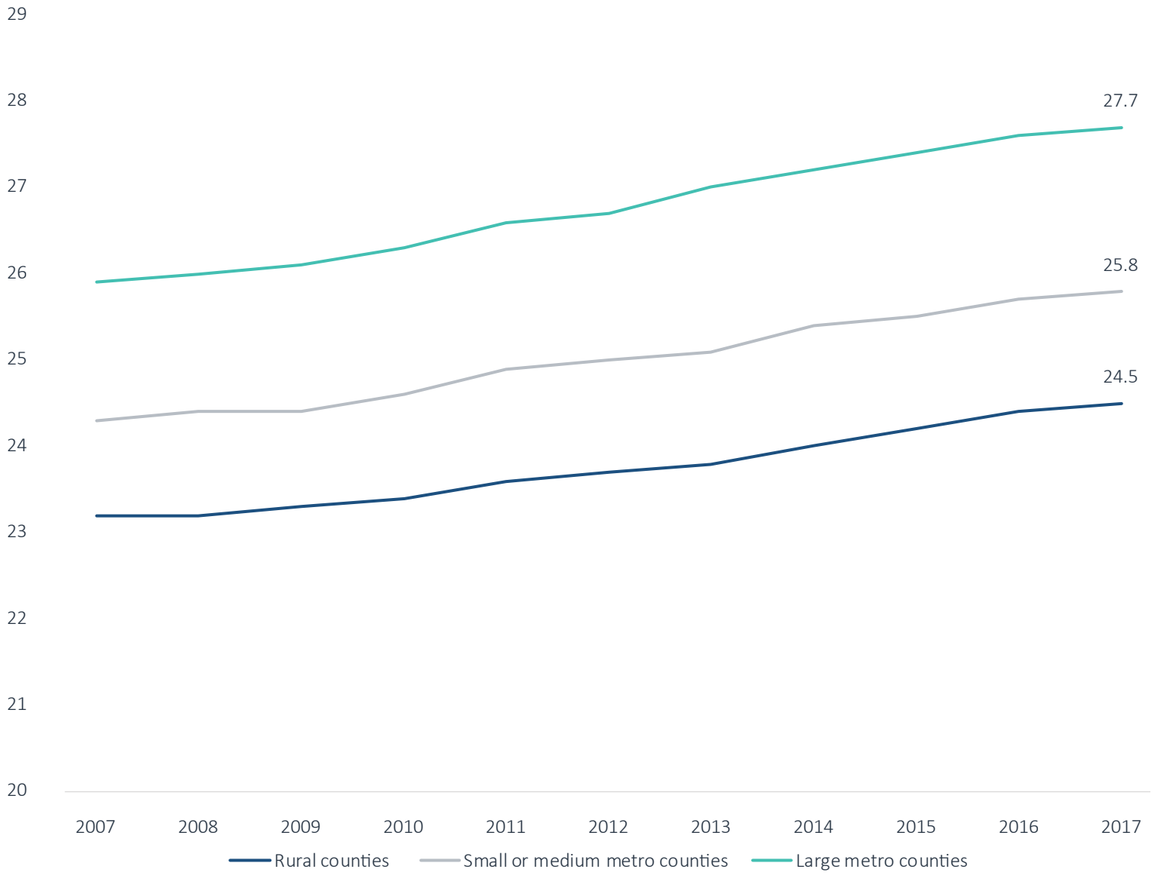
Digital alternatives can help fill traditional care gaps: As more studies indicate that digital health apps can result in similar outcomes where traditional care may be unavailable, we expect the market for digital alternatives to remain robust. Physicians can recommend digital weight loss apps for patients who cannot obtain personal trainers. Expensive psychotherapy inaccessible to low-income demographics or rural populations can be obtained at lower cost via digital apps. Sleep disorders can be diagnosed and treated digitally.

Pandemic-related demand spikes could signal longer-term shift: The COVID-19 pandemic has driven a surge in demand for mental health applications. For example, from December 29, 2019 to March 1, 2020, startup **Headspace** experienced double the average amount of inbound requests from members looking for content to help them cope with pandemic-related stress, as well as a 100% increase in corporate clients seeking support for their employees' mental wellbeing.[20] We expect the crisis could also drive longer-term interest among organizations seeking to make mental-health products available to their employees.

Social unrest drives demand for more targeted mental health support: The recent uprising of the Black Lives Matter movement exacted a disproportionate emotional and mental toll on Black and Asian Americans.[21] Black therapists, which currently compose only 4% of therapists nationwide,[22] have experienced an increase in demand. Individuals unable to find Black mental health providers are likely to utilize behavioral health applications to mitigate stress and anxiety. Furthermore, we anticipate behavioral health platforms to offer targeted programs for event specific causes that effect large groups (for example, a pandemic or political movements).

Figure 14.

Median age at first birth, by urbanization level



Source: NCHS, National Vital Statistics System | Geography: US

Note: County designation is based on mother's county of residence. County classification is based on the 2006 and 2013 NCHS Urban–Rural Classification Scheme for Counties. Age in years.

20: According to Megan Jones Bell, Headspace's Chief Science Officer
21: "Depression and Anxiety Spiked Among Black Americans After George Floyd's Death," Alyssa Fowers and William Wan June 12, 2020.
22: "How Diverse is the Psychology Workforce?" APA, Luona Lin, MPP, Karen Stamm, PhD, and Peggy Christidis, PhD, February 2018.

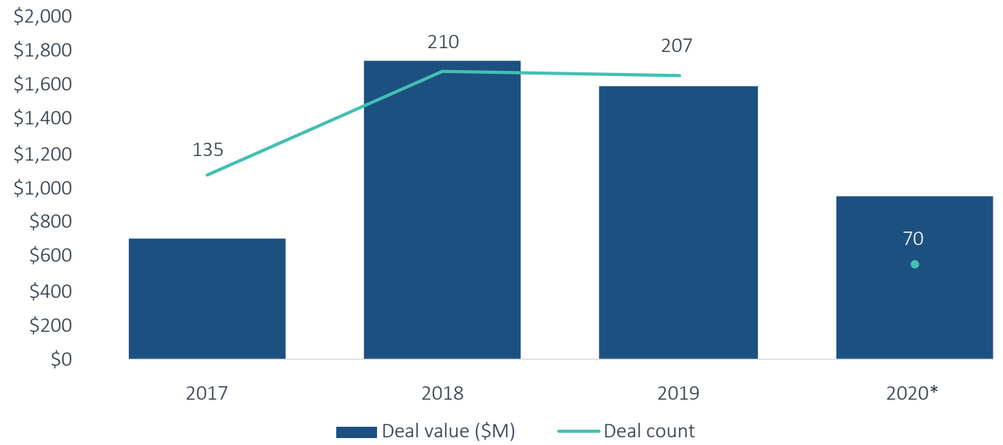
Governments globally have developed frameworks to adopt DTx products and expedite regulatory approval: In 2017, the FDA announced the creation of a Digital Health Software Precertification Program, a pilot for approving software-based medical devices. This program enables the FDA to approve the developer of a digital therapeutic instead of each individual software release, quickening product development. Nine companies were selected to participate in the program, which began in 2019. In Europe, multiple frameworks have emerged to increase DTx product adoption. For example, in Germany, the Federal Institute for Drugs and Medical Devices (BfArM) will provide assessments for access to national reimbursement, and in France, the Haute Autorité de santé (HAS) developed access pathways for priority DTx indications. In Asia, Singapore's Health Science Authority (HSA) approved a prescription-based digital therapeutic for the first time. In June, HSA approved **Pear Therapeutics**' reset product for the treatment of adults with substance abuse disorders.

VC activity

Companies tracked in the mobile & digital health segment raised $484.7 million across 35 VC deals in the second quarter of 2020, in line with Q1 2020. 2020 has notched a similar amount of VC fundraising in terms of value when compared to 2019 experienced a sharp decline in deal count.

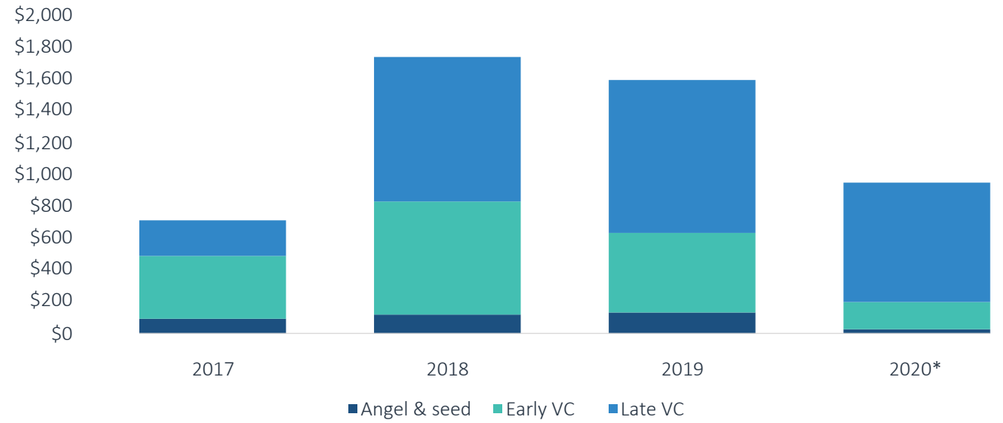
In Q2 2020, we saw three deals raise over $50 million dollars each. **Mindstrong**, **Hinge Health**, and **Omada** raised $100.0 million, $91.5 million, and $57.0 million, respectively. **Mindstrong** offers a digital therapeutic platform intended to enhance mental health. The platform's biomarker panel tracks smart phone usage measurements, allowing their telehealth clinicians to provide personalized therapy in a more accessible way. **Hinge Health** offers a digital

Figure 15. MOBILE & DIGITAL HEALTH VC DEAL ACTIVITY



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 16. MOBILE & DIGITAL HEALTH VC DEALS ($M) BY STAGE

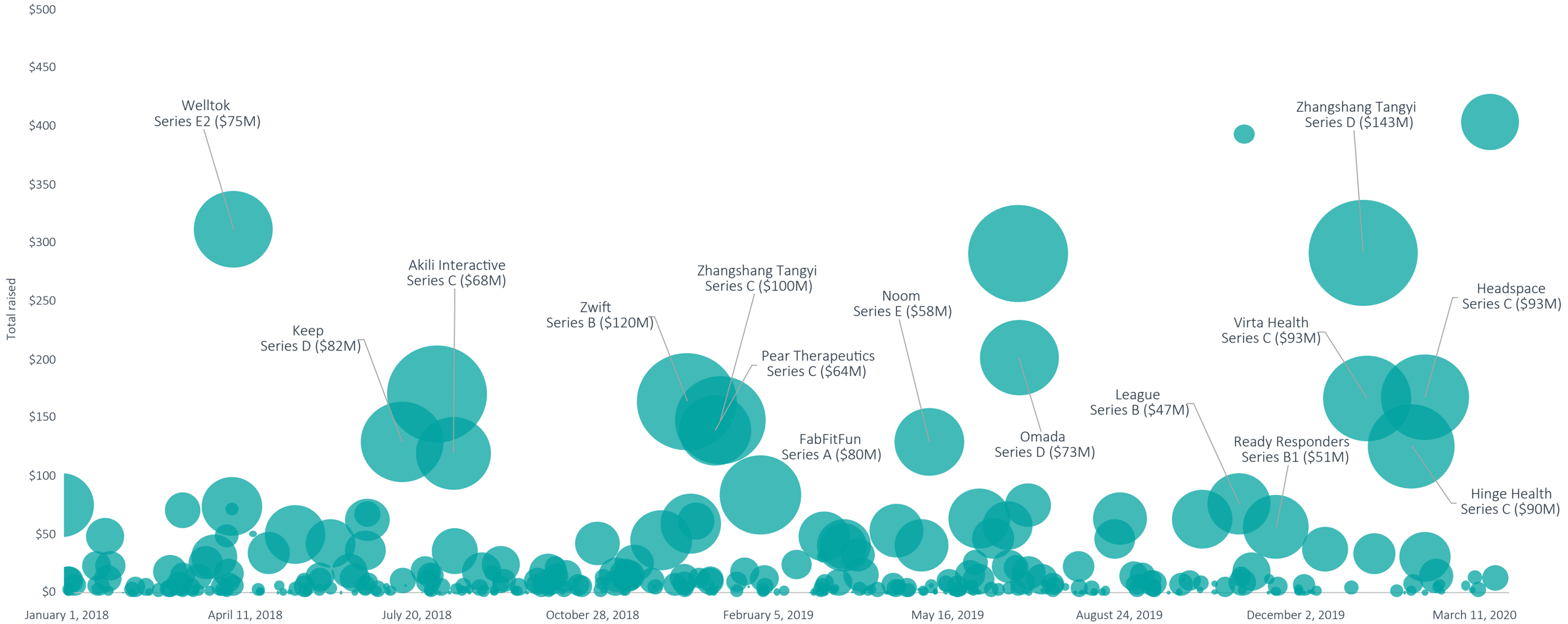


Source: PitchBook | Geography: Global
*As of June 30, 2020

therapeutics platform which enables patients to decrease musculoskeletal pain. **Hinge Health** offers their platform directly to the consumer in addition to businesses which provide the platform to their employees as a workplace benefit. **Omada**, a digital care platform provider, raised their round from Perceptive Advisors, a life sciences investment firm, to finance their acquisition of **Physera**, a virtual physical therapy provider, for $30 million.

Figure 17.

Current mobile & digital health VC landscape ($M)



Source: PitchBook

Note: The left axis indicates total VC raised as of deal date. Bubbles indicate amount raised.

Figure 18.

Notable mobile & digital health VC deals

COMPANY NAME	CLOSE DATE	SUBSEGMENT	DEAL SIZE ($M)	DEAL TYPE	LEAD INVESTOR(S)	VALUATION STEP-UP
掌上糖医 Zhangshang Tangyi	January 8, 2020	Personal health tools & tracking	$143	Series D	CMB International Capital, Susquehanna Asia Investments	N/A
virta	January 10, 2020	Digital therapeutics	$93	Series C	Caffeinated Capital	1.39x
cure.fit	March 20, 2020	Fitness applications	$120	Series D2	Temasek Holdings	N/A
Readi™ by FATIGUE SCIENCE	February 24, 2020	Personal health tools & tracking	$11	Series A	N/A	N/A
ASENSEI	March 18, 2020	Fitness applications	$4	Early-stage VC	N/A	N/A

Source: PitchBook

Figure 19.

Notable mobile & digital health VC exits

COMPANY NAME	CLOSE DATE	SUBSEGMENT	EXIT SIZE ($M)	EXIT TYPE	ACQUIRER OR TICKER	VALUATION STEP-UP
PHYSERA	May 19, 2020	Digital therapuetics	$30.0	M&A	Omada	1.20x
GIXO	July 22, 2019	Fitness application	$20.0	Buyout/LBO	Beachbody, The Raine Group	0.83x
Dr. Jud	June 3, 2020	Personalized health tools & tracking	N/A	M&A	Sharecare	N/A

Source: PitchBook

Figure 20.

Key VC-backed mobile & digital health companies

COMPANY	VC RAISED TO DATE ($M)	SUBSEGMENT	KEY PRODUCTS	PRODUCT DIFFERENTIATION
cure.fit	$411	Fitness application	Fitness Application	fitness-based online platform intended to address preventive healthcare techniques.
Welltok	$325	Personal Health tools & tracking	Consumer activation platform	Uses of proprietary data and advanced analytics to engage and motivate consumers
omada	$258	Personal health tools & tracking	Self-management platform for Type 2 diabetes, hypertension and behavioral health	Bills employers and health insurers, not individuals; real-time data and personalized coach feedback
keep	$258	Fitness application	Fitness Application	Complete video based training routines, tracks participant performance and enables users to share progress with friends
headspace	$216	Behavioral modification tools	Meditation application	Employer and individual subscription models

Source: PitchBook

Figure 21.

Key mobile & digital health incumbents

COMPANY	HOLDING STATUS	SUBSEGMENT	ENTERPRISE VALUE ($M)	KEY PRODUCTS
DAILY BURN	Corporation	Fitness application	N/A	1000+ classes, separate running and yoga-focused apps
	Acquired	Personalized health tools	N/A	Diet management application and calorie counter
	Public	Fitness application	$141,001	Training app with HIIT classes, run club app tracks and coaches runs
KINDARA	Acquired	Personalized health tools	N/A	Women's digital health platform; fertility tracking

Source: PitchBook

Opportunities

Over-the-counter family planning products: We believe a significant market exists for family planning products that can be sold over the counter at significant discounts to traditional methods. Birth control products allow women to more easily engage in family planning without visiting a doctor, while providing alternatives to traditional birth control methods, such as IUDs, pills and patches, that can be costly, time-consuming to retrieve and capable of causing severe side effects. Startups pursuing this opportunity include **Ava**, which sells a fertility bracelet alternative to mainstream fertility treatments; **Natural Cycles**, which sells an FDA-approved birth control app; and **Inne**, which manufactures a device that tracks hormones and analyzes chances of becoming pregnant.

Figure 22.

Key mobile & digital health incumbents

COMPANY/TREATMENT	PRICE
In vitro fertilization (IVF)	$11,500
Visit to reproductive endocrine fertility specialist	$200-$400
Ava	$259/device; app included
TempDrop	$159/device; app included
Natural Cycles	$89.99/year; $9.99/month

Sleep medicine alternatives: In April 2019, the FDA announced that commonly used over- the-counter sleeping pills must include a box warning to alert patients to serious or life- threatening risks associated with usage. We believe this could drive consumers to opt for non-prescription alternatives such as sleep trackers and coaches. For example, **Dreem**, which raised $35 million in June 2018, manufactures a headband that analyzes sleep stages and uses AI to provide personalized metrics and tips to improve sleep.

Fitness trackers: Fitness trackers include third-party apps that run on any device as well as proprietary fitness devices. Of the top 10 fitness apps as ranked by Verto Analytics (see Figure 22),[23] only **Fitbit** and **Garmin** Connect Mobile run on proprietary devices. The rest run on any device, such as a smartphone. The latter approach can reduce hardware development and ongoing manufacturing costs but increases the risk of connectivity glitches. Startups in the space include **Lose It**, which tracks calorie consumption, food intake, exercise habits and weight. **Fiit**, which raised a $9 million Series A in February 2019, tracks workouts instead of daily activity. Its device tracks heart rate, repetitions and calories, and it provides personalized training plans, on-demand workouts and leadership boards. Incumbents remain competitive, for example, **Fitbit** recently launched subscription offerings and a connected health platform for health plans and employers.

Flexible fitness applications: "Flexible fitness," or non-committal fitness subscriptions, represents a fast-growing trend that taps into the shifting preferences of consumers. These applications are modernizing how gyms and fitness studios are used. **FlexIt** allows consumers to use in-network gyms at per-minute rates. **ClassPass** gives members the ability to attend workout classes at reduced rates without having to become a member.

23: "Verto Index: Health & Fitness Apps," Verto Analytics, Connie Hwong, July 19, 2018.

Figure 23.

Top health & fitness apps for May 2018 by monthly average users

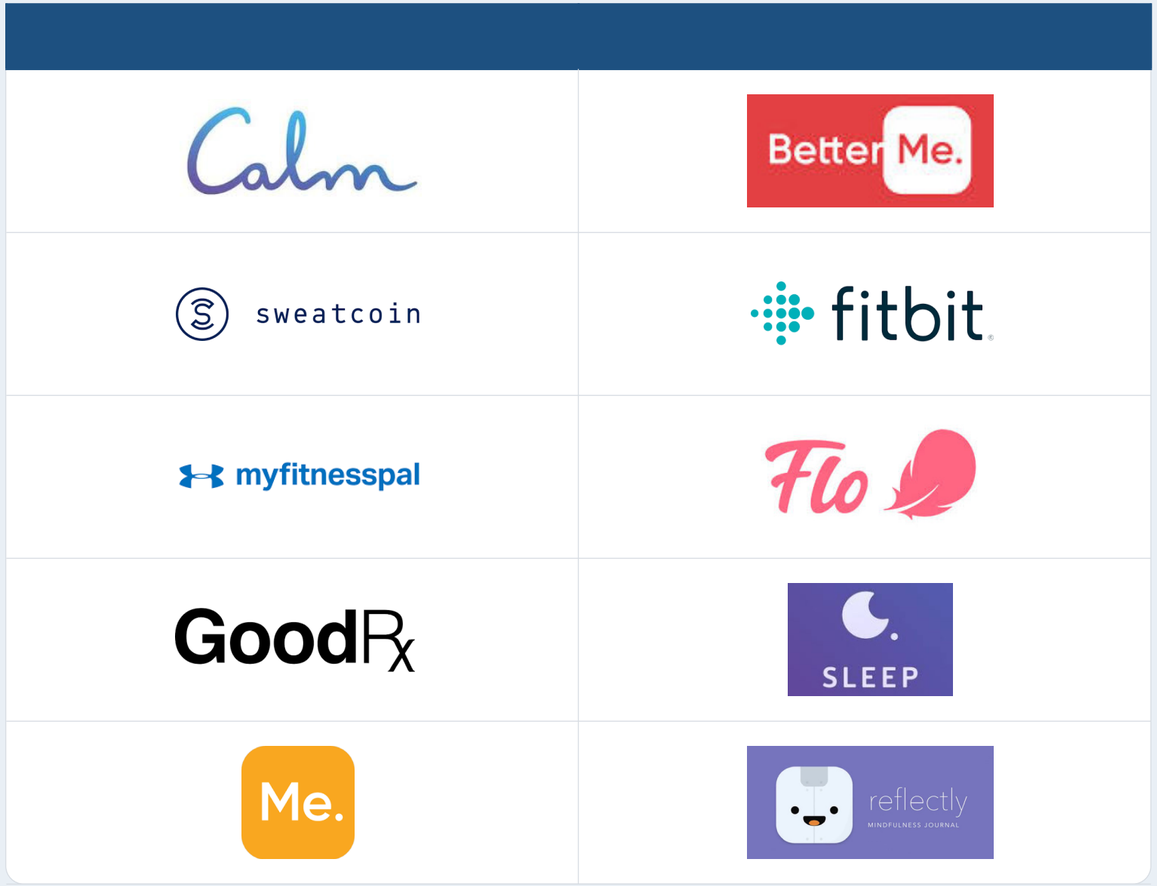
APP	MONTHLY AVERAGE USERS (M)	STICKINESS
fitbit	27.4	36%
myfitnesspal	19.1	22%
SAMSUNG Health	14.9	22%
WW	3.7	27%
Google Fit	2.6	17%
verto	1.9	21%
GARMIN connect mobile	1.7	20%
Sleep Cycle	1.4	31%
NRC	1.4	26%
WALK	1.4	32%

Source: **Verto Analytics**

Note: Stickiness represents average daily users (#) divided by monthly users (#). Users tracked are US adults aged 18 and above.

Figure 24.

Top health & fitness apps in the US for June 2019 by overall downloads



Source: **SensorTower**

Meditation apps with a wider variety of content: We have seen a surge in meditation and behavioral health platforms and believe content differentiation will become essential to retain market share. **Calm** offers a library of meditation, music, and sleep content for various wellness benefits. Its Sleep Stories features narration by well-known entertainment figures. In addition, InsightTimer provides guided meditations, courses, music, and inspirational talks. The company offers meditations from many different origins (e.g. Buddhism, Taoism) and practices (e.g. sound, movement).

Advertising and content creation models: The growth of digital fitness and nutrition applications has created an opportunity for influencers and content creators to leverage these distribution channels. **Octoly** is an influencer marketing platform that lets digital creators receive free products in exchange for publishing reviews on social media, helping brands directly market via influencer channels.

Corporate-sponsored health & wellness benefits: Several startups offer corporate plans that generally provide lower per-user prices. **Calm** offers a 15% discount on bulk purchases of five or more yearly subscriptions (regularly $59.99 a year). **Headspace** offers starter, premium and enterprise versions, which offer additional resources such as custom virtual events and scientific study partnership opportunities. **Noom** advertises that pricing for its personalized nutrition and exercise app is tied to outcomes, charging only if members participate in the program and experience results.

Senior-focused healthcare apps: According to the UN, the global population aged 60 and over is expected to double to nearly 2.1 billion by 2050.[24] This is expected to add significant stress to the healthcare system, driving strong demand for scalable care solutions. Apps catering to seniors with existing conditions or who may not be digital- native represent a compelling growth opportunity. Startups focused on this market include **CareMessage**, **Vesta Healthcare**, and **CarePredict**.

Monitoring noncommunicable diseases (NCDs): Environmental and inherited NCDs such as cancer, heart disease and diabetes are prevalent in wealthy countries and are on the rise in developing countries. Exposure to the primary risk factors for these diseases (i.e. tobacco and alcohol use, obesity, poor diet and inactivity) are prime candidates for digital monitoring. **ClouDr**'s smart medical ecosystem (device and application) provides customized disease management and professional services for patients with diabetes and related diseases. Pivot's suite of products (application, nicotine patch, carbon monoxide breath sensor, remote coaching, etc.) aims to help individuals quit smoking.

Considerations

Data accuracy and fraudulent science: Startups have a history of bad science. Theranos is the poster child for fraud having raised money based on incorrect claims about its capabilities. While government agencies such as the FDA and the FTC are closely watching for fraud, it is not always clear to outsiders if a company—especially a startup with little to no track record—can really do what it claims.

On-demand workout providers face strong competition: On-demand workout providers face competition from a myriad of mobile applications, online platforms and websites. Many of these sources provide workouts free of charge (e.g. YouTube) or as a free bonus (e.g. Amazon Prime). Additionally, the low cost to enter the market has led to a crowded

24: "2017 World Population Ageing," United Nations, 2017.

marketplace of providers. During the first quarter of 2019, there were over 37,000 health and fitness applications available on the Google Play store.

Minimal evidence proving effectiveness of digital mental health apps: A recent analysis of 73 top-rated mental health apps found that while 64% of apps claimed effectiveness at diagnosing mental health conditions and symptoms and improving mood or self-management, only one provider published literature as evidence for consumers.[25] While providers with clinical evidence supporting their products have clear competitive advantages, conducting such studies is costly and risks proving the app ineffective.

Mental health application consumer retention rate: A meta-analysis of clinical trials of smartphone apps intended to diagnose depressive symptoms showed drop-out rates approaching 50%.[26] High dropout rates reduce business performance and may dissuade insurance providers from covering digital therapeutics aimed at improving mental health.

Outlook

Personalization and convenience will drive consumer demand for fitness and wellness innovation: Biometric sensors, genetic testing and other data-collection technologies will help drive customized health and fitness products. For example, digital health startups iamYiam and **FitnessGenes** use genetic data to create custom workout and nutrition plans that best match genetic and lifestyle factors. We expect to see more investment in personalized health services that could prove more effective than one-size-fits-all products.

Increased data sharing among providers: While sharing health data has been fraught with privacy concerns and regulatory limitations, we expect consumers and regulators to grow more comfortable with the practice. Innovative privacy technologies can help ensure security, while health events such as COVID-19 underscore the importance of widespread data availability.

Workout providers will offer fitness gamification through VR and AR: VR and AR have contributed to the growth of "fitness gamification," which motivates consumers to exercise by creating fun, immersive fitness experiences. As VR technology advances rapidly, the "immersive fitness" space is expected to expand. With only a few startups focused on this space (e.g. **FitXR**), we expect increased attention from current on-demand fitness providers as the technology improves.

Consolidation of fertility-tracking application market: Thereare over 30 different types of multiphasic birth control pills. While each pill is slightly different and may affect one's body in various ways, fertility-tracking applications are side-effect free, which may make the industry easier to consolidate. **Natural Cycles** has first-mover advantage in terms of gaining FDA approval; however, providers such as Mira that integrate devices and simplify use may also be well positioned to gain share.

AI integration via chat bots to become more prominent: AI has the potential to enable unique solutions in the digital health industry. For example, chat bot nutritionists can provide personalized recommendations based on health and exercise habits. AI could also open the

25: "Using Science to Sell Apps: Evaluation of Mental Health App Store Quality Claims," npj Digital Medicine, Mark Erik Larsen, Kit Huckvale, Jennifer Nicholas, John Torous, Louise Birrell, Emily Li, and Bill Reda, Volume 2, Article 18, March 22, 2019
26: "Dropout Rates in Clinical Trials of Smartphone Apps for Depressive Symptoms: A Systematic Review and Meta-Analysis," Journal of Affective Disorders, Jon Torous, Jessica Lipschitz, Michelle Ng and Joseph Firth, December 2019

door for chat bots and robots to provide emotional and mental support tools with broad applicability across both consumer and corporate channels. Startups focused on AI-based solutions include **Woebot**, Forksy AI and Virtual Sports.

Femtech startups expected to pursue full lifecycle, endometriosis and menopause products: Most femtech companies remain single-product companies. As the industry matures, we expect product diversification potentially driven by M&A. Recently, we have seen pregnancy-focused apps begin tapping into the menopause market, suggesting an expanding opportunity for fertility startups. For example, Woom raised $2.2 million in May 2020 and plans to use the capital to develop products that target menstrual cycle tracking, conception, pregnancy and postpartum, and menopause. In addition, we foresee endometriosis and menopause to represent potentially lucrative yet underdeveloped opportunities within the femtech space. Founders have historically sidestepped menopause as it is affected by a complex mix of factors including hormones, and mental, metabolic, and heart health, among others. As these areas begin to be individually and collectively researched in relation to menopause, startups will be more likely to develop related products. Endometriosis affects one in every 10 women, equivalent to the number of people affected by diabetes. However, only around $1 of research funding is invested in endometriosis for every $200 invested in diabetes.[27] Recently, numerous endometriosis-focused startups have raised large Series A rounds. For example, **DotLab**, which develops a diagnostic platform to test for endometriosis, raised $10.0 million in June 2019, and **NextGen Jane**, which creates tampons aimed at diagnosing endometriosis, raised $9.0 million in March 2019.

Behavioral health startups to explore new distribution and payment models: Behavioral health applications traditionally charged consumers directly. However, we expect these startups to explore new payment and distribution models by partnering with corporate wellness programs and health insurers. We believe the corporate channel could prove to be a more effective distribution approach relative to consumer direct. While corporate distribution involves longer selling cycles, usage could be stickier, and customer acquisition costs are likely lower on a per-user basis. Corporate sales could also offer unique partnerships or product-development opportunities. **Headspace**, **ClassPass**, and **Calm** are each developing corporate-focused products. Many corporations have begun providing **Calm** subscriptions to their employees free of charge. **Headspace** specifically targets corporations and offers a starter, premium, and enterprise version. Furthermore, several behavioral health startups have begun partnering with insurance providers. Kaiser Permanente partnered with **Calm** to provide the service free to all its members. **Quartet** is partnering with Blue Cross and Blue Shield of **North** Carolina to roll out a value-based payment model for mental health care.[28]

27: "Femtech Moves Beyond the Fertility App," Sifted, Amy Barrett, March 18, 2020.

28: "Blue Cross NC, Quartet Roll Out Value-Based Payment Model for Mental Health," Fierce Healthcare, Heather Landi, January 28, 2020.

SEGMENT DEEP DIVE

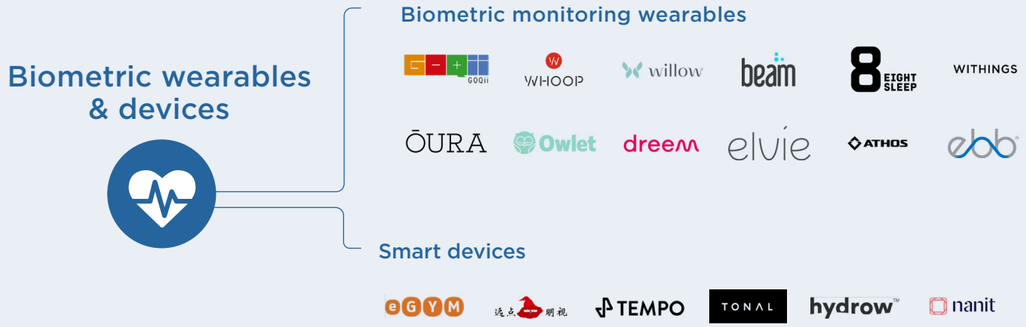
Biometric wearables & devices

Overview

Startups in this space integrate biometric technology into both wearable and non-wearable devices that can monitor and/or improve user health. The current segments within this category include:

Biometric monitoring wearables: Hardware worn by users that continuously monitors a multitude of data points (e.g. biometric indicators, physical activity, location) or performs a specific function (e.g. improve circulation). Wearables gained mainstream popularity in the mid-2000s with the launch of **Fitbit** and other fitness trackers. Since then, wearable technology has evolved to measure more sophisticated health & wellness indicators such as heart rate, fertility, blood sugar and more.

Smart devices: Hardware that is not worn by the consumer. This segment includes external hardware devices that track biometric signals. Large areas within this category include adaptive exercise equipment designed to enable a customized workout by dynamically adjusting to the user and/or providing tracking information and sleep monitors that provide sleep quality feedback.



Business model

Biometric wearables & devices startups primarily sell products and services to healthcare providers and payers (through a B2B2C model) or D2C. Both hardware and software could be sold through a one-time purchase or through a SaaS subscription model.

Market size

The biometric wearable & device technology market is expected to grow at a CAGR of 16.8% from $22.8 billion in 2019 to $70.9 billion in 2024. Biometric monitoring wearables represent most of the market, growing at a rate of 15.8%, while the smart fitness devices market is expected to grow at a rate of 24%.

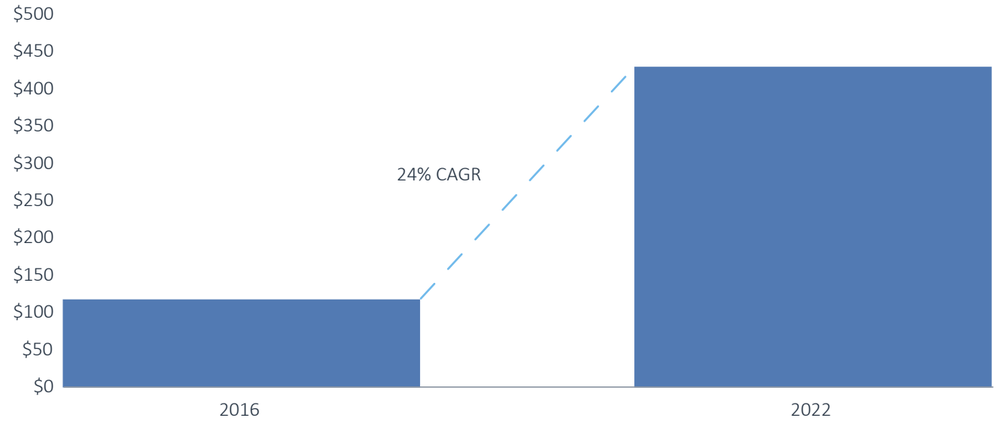
Industry drivers

COVID-19 driving more at-home workouts: Gym closures have driven demand for at-home workout equipment. Innovative providers, including **Peloton**, have experienced a surge in demand. In addition, several workout applications, such as **Down Dog**, are offering free trials in an effort to capitalize on the situation and attract new users. As consumers get used to at-home workouts and fear of infection lingers, a full return to gym exercise may not occur for several months or years.

Smart sensor innovation and IoT: Sensor technology continues to advance, enabling the widespread use of low-cost sensors with reduced power and hardware requirements. The expansion of connected devices and IoT permits real-time progress measurement and continual updating. For example, heart rate monitors were once single-purpose devices that were strapped to one's body. Today, they can be embedded in smart wearables that continually transmit data to the cloud. Biometric sensors in earbuds and posture monitoring T-shirts represent examples of ongoing innovation.

Insurers using data to encourage healthy lifestyles. As more insurers build policies based on customer data, this will drive more demand for data-capturing devices. For example, John Hancock, one of the nation's largest life insurers, announced that it will stop

Figure 25. BIOMETRIC WEARABLES & DEVICES MARKET SIZE ($B)



Source: PitchBook estimates | Geography: Global

COMMON INDUSTRY KPIS FOR BIOMETRIC WEARABLES & DEVICES COMPANIES

Revenue growth

- Customer acquisition cost
- Volume: Size of dataset per customer (e.g. 5GB)
- Variety: Number of data sources
- Velocity: Data volume analyze/ generated per period
- Gross profit margin
- Per unit manufacture cost
- COGS/unit sales
- Lifetime value of customer
- Customer retention/renewal rate

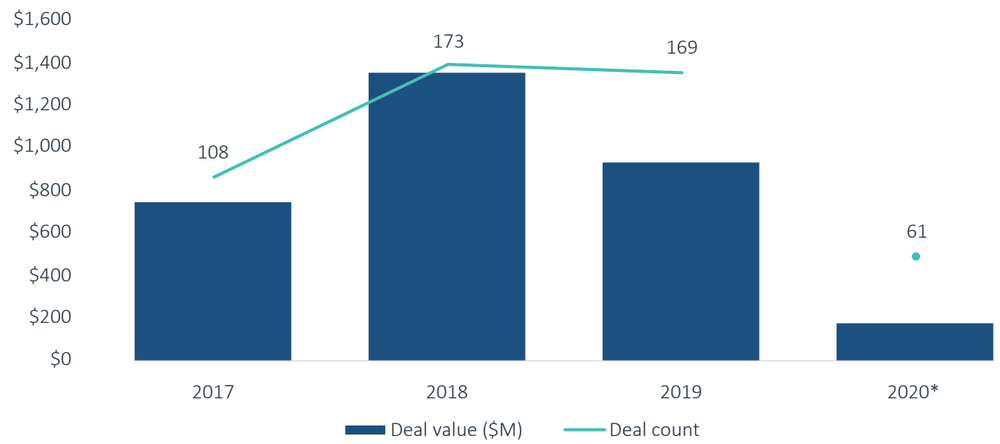
underwriting traditional life insurance and instead sell only interactive policies that track fitness and health data through wearable devices and smartphones.

VC activity

Companies tracked in the biometric wearables & devices segment raised roughly $88.20 million in venture funding in the second quarter of 2020, slightly above the $81.0 million in funding from Q1. However, H1 2020 investment flow is well below previous years. This trend is consistent across deals of all stages. In Q2 2020, **Hydrow** and **Nanit** raised rounds over $45 million. Both companies are smart hardware providers; **Hydrow** combines live outdoor reality technology with its rowing machine to provide dynamic at-home workouts, and **Nanit** developed an AI and computed vision-based monitoring device designed to track infant sleep behaviors.

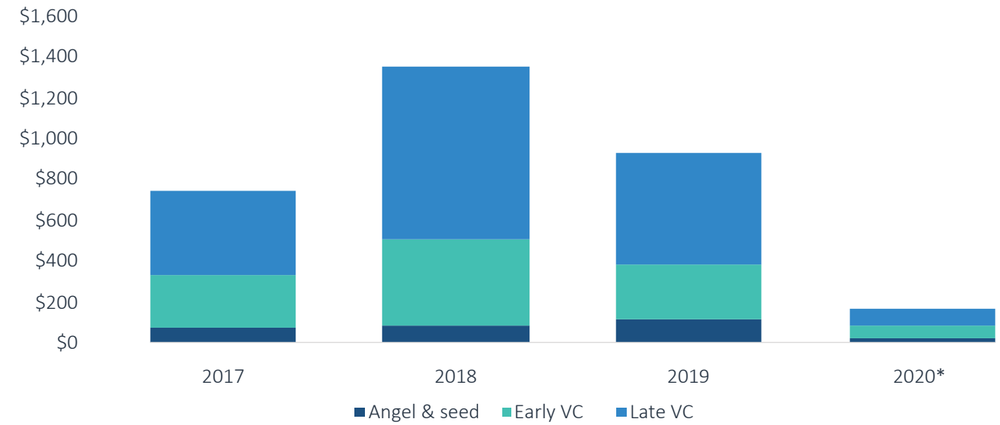
Three exits occurred in the biometric wearables & devices segment in Q2—a relatively high number considering only four exits occurred in the entirety of 2019. After the close of the quarter, **Lululemon Athletica** (NASDAQ: LULU) acquired **Mirror** for $500 million.

Figure 26. BIOMETRIC WEARABLES & DEVICES VC DEAL ACTIVITY



Source: PitchBook | Geography: Global
*As of June 30, 2020

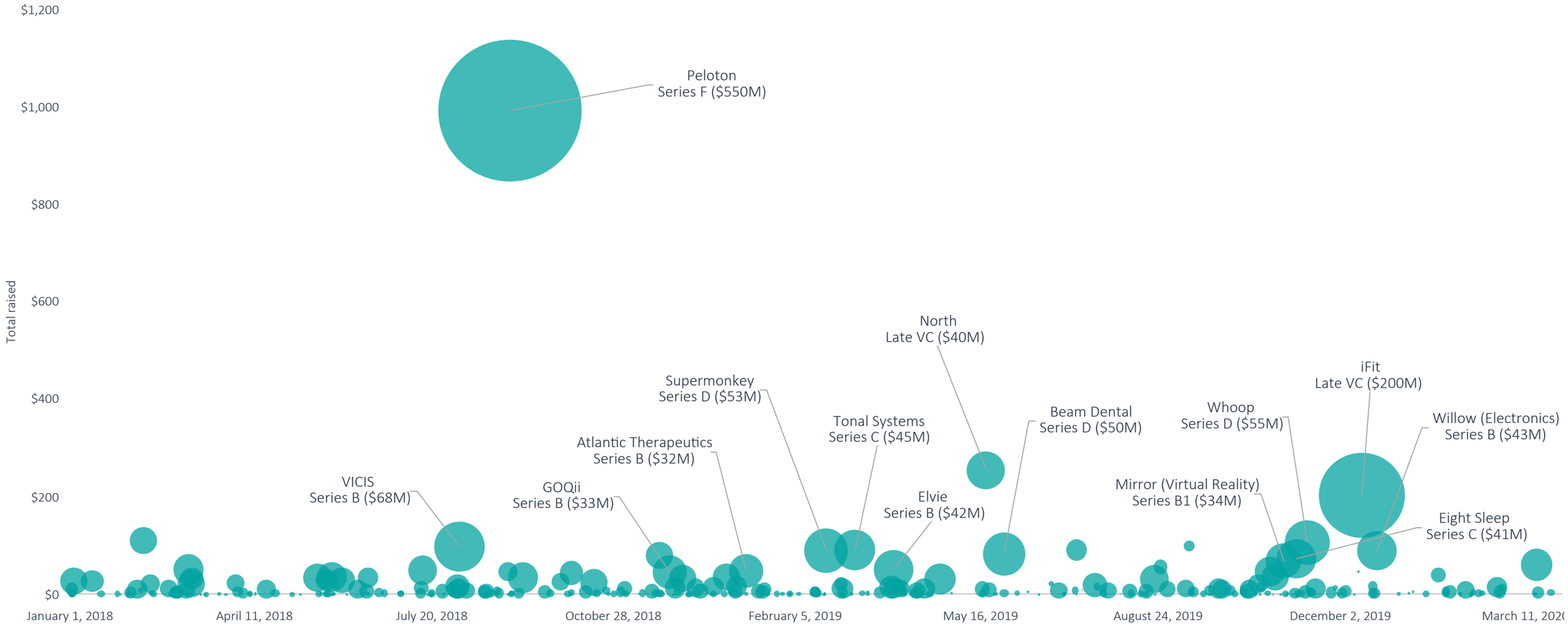
Figure 27. BIOMETRIC WEARABLES & DEVICES VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 28.

Current biometric wearables & devices VC landscape ($M)



Source: PitchBook

Note: The left axis indicates total VC raised as of deal date. Bubbles indicate amount raised.

Figure 29.

Notable biometric wearables & devices VC deals

COMPANY NAME	CLOSE DATE	SUBSEGMENT	DEAL SIZE ($M)	DEAL TYPE	LEAD INVESTOR(S)	VALUATION STEP-UP
ŌURA	March 17, 2020	Biometric monitoring wearables	$28	Series B	N/A	N/A
tended	February 14, 2020	Biometric monitoring wearables	$2	Seed	N/A	N/A
NURVV RUN	February 7, 2020	Biometric monitoring wearables	$9	Series A	Hiro Capital	N/A
VALENCELL	January 23, 2020	Biometric monitoring wearables	$6	Series F	Halma	1.45x
TATCH	February 26, 2020	Biometric monitoring wearables	$4	Seed	Spark Capital	N/A

Source: PitchBook

Figure 30.

Notable biometric wearables & devices VC exits

COMPANY NAME	CLOSE DATE	SUBSEGMENT	EXIT SIZE ($M)	EXIT TYPE	ACQUIRER OR TICKER	VALUATION STEP-UP
NORTH	June 30, 2020	Biometric wearables	$180	M&A	Alphabet	N/A
aira	February 14, 2020	Biometric wearables	N/A	M&A	Blue Diego Investment	N/A
wellinks MOTIVATING HEALTH	January 15, 2020	Biometric wearables	N/A	M&A	Wellinks	N/A

Source: PitchBook

Figure 31.

Key VC-backed biometric wearables & devices companies

COMPANY	VC RAISED TO DATE ($M)	SUBSEGMENT	KEY PRODUCTS	PRODUCT DIFFERENTIATION
TONAL	$91.7	Smart devices	At-home adaptive fitness training machine	All-in-one fitness system and virtual personal trainer
WHOOP	$105.7	Biometric monitoring wearables	Fitness tracker	Subscription-membership-based, provides sleep and fitness analytics
远点明视 Mofajing	$101.4	Smart devices	Smart glasses	smart glasses designed to help teenagers correct eye vision
willow	$90.8	Biometric monitoring wearables	Wearable breast pump	Spill-proof, in-bra breast pump
eGYM	$91.3	Smart devices	Adaptive strength training equipment, software-based training system	Holistic fitness software integrate smart equipment, fitness tools, wearables, gadgets and apps via its open cloud platform

Source: PitchBook

Figure 32.

Key biometric wearables & devices incumbents

COMPANY	HOLDING STATUS	SUBSEGMENT	ENTERPRISE VALUE ($M)	KEY PRODUCTS
PELOTON	Public	Biometric wearables	$9,683	Smart bike, live and on-demand classes
fitbit	Public	Biometric wearables/smart device	$1,401	Wearable activity trackers
GARMIN	Public	Biometric wearables	$13,651	GPS technology, wearables
PHILIPS	Public	Smart device	$42,924	Sleep monitoring headband
MOTOROLA SOLUTIONS	Public	Biometric wearables	$28,536	Baby monitors

Source: PitchBook

Opportunities

Biometric wearables: We see ample growth opportunity for the biometric wearable industry. However, we expect smart headphones and intelligent apparel to experience the largest CAGR over the coming years. This will drive demand for biometric sensor providers.

Smart rings: Smart rings have recently emerged as a key trend driving the growth of the biometric wearables market. For instance, **Oura** creates a smart wearable ring used to determine sleep quality and how your body recovers from exercise, stress, and fatigue.

Intelligent apparel: Connected apparel consists of implementing IoT technology into clothing to embed performance tracking features. Clim8 develops intelligent wearable technology designed to regulate body temperature, while **Sensoria** offers body-sensing apparel designed to track running technique and monitor heart rate. We expect athletic retail incumbents will also drive innovation in intelligent apparel. For example, **Nike**'s HYPERADAPT smart sneaker, which is priced at $350 retail, can self-tighten and track physical activity.

Stress trackers: Wearables can collect information related to mental wellbeing such as anxiety and stress. **Spire** defines an end-user's emotional state and tracks down their stress level via respiratory monitoring. **Feel** designs a motion-sensing wristband created to manage mental health and achieve emotional wellbeing goals.

Biometric sensor providers: wearable device suppliers purchase biometric sensor technology and hardware from third parties. Startup **Valencell**'s technology measures biometric and physiological data in real time and can be integrated with any wearable device. As technology improves, singular devices will be able to monitor myriad biometrics such as blood pressure, heart rate, velocity and others. For this reason, we believe companies that manufacture devices that track only one biometric will find it harder to succeed on their own, though these companies may be attractive acquisition targets.

Connected fitness products with subscription business models: Traditional workout equipment, such as treadmills, weights and ellipticals, has an average lifespan of seven to twelve years, which puts pressure on manufacturers to generate recurring revenue after selling their core product. Connected fitness products with paid subscriptions, such as **Peloton**, have emerged as potentially successful alternatives to the one-time sales model. Startups pursuing similar models include **Hydrow**, a row machine; **Tonal**, a full-body workout device; and **Mirror**, an instructor-led cardio device.

Figure 33.

Select connected fitness products with subscription business models

COMPANY	DEVICE FEE	SUBSCRIPTION FEE (MONTHLY)
Hydrow	$2,300	$38
Tonal	$2,995	$49
Mirror	$1,496	$39

Baby-monitoring devices: The interactive baby monitor market is expected to grow 13%, with cordless devices representing more than three-fourths of the market in 2018.[29] In addition to monitoring capabilities, these products provide platforms for content delivery related to parenting and childcare. N, a revenue-generating early-stage startup, develops AI-based baby-monitoring devices created to track sleep behavior and patterns.

Automatic ingestion monitors (AIM): Researchers are working to create devices that may help eating habits. The University of Alabama developed an AIM that attaches to a user's eyeglasses and monitors what kinds of foods are eaten, how much, how often and how fast. **HEALBE**, a PE-backed company, currently offers a wrist band that tracks calorie intake, body hydration, sleep level, stress level, heart rate, steps and distance. While accuracy levels of early beta models remain low, the market for such devices could be significant among consumers, doctors and researchers.

Fitness devices for athletes: The fitness-device market can be segmented by use cases including sports, medical treatment and diagnostics, with applications that track heart rate, measure sleep or glucose levels and track sporting activities. Sport-focused devices aimed at reducing injuries and/or enhancing workouts dominate the wearables market as athletes are the most driven toward performance-enhancing products. **VICIS** raised $3 million in VC funding in September 2019 to develop headgear designed to minimize the impact of sports-related head injuries. **Diamond Kinetics** provides a Bluetooth-powered sensor to help baseball players improve performance.

29: Interactive Baby Monitor Market - Global Outlook and Forecast 2019-2024, Arizton, July 2019.

Considerations

Baby-monitoring products may not work and could endanger babies: Baby-monitoring products may not work and could endanger babies: The FDA has not cleared or approved any baby technologies or products as being able to prevent or reduce the risk of sudden infant death syndrome. However, according to the FDA, some retail baby products have been marketed with false claims that they do. Companies that use false and deceptive marketing claims may face fines and class action lawsuits. In April 2019, **Owlet** Smart Sock baby monitors became the subject of a proposed class-action lawsuit alleging the devices do not monitor babies' heart rates and oxygen levels as promised and can burn infants' feet even when used properly. An article published in the Journal of the American Medical Association in January 2019 noted, "There is no evidence that consumer infant physiologic monitors are life-saving, and there is potential harm if parents choose to use them."[30] Furthermore, many researchers advise against placing any wireless device on or near infants due to the potential risks of EMF radiation, which include, but are not limited to, autism, speech disorders and asthma.[31] Wired devices also pose a risk as babies could become entangled in the wires.

Recession will shake out lesser capitalized startups: While the pandemic has accelerated demand for at-home fitness products and services, a prolonged recession is likely to drive decreased demand over time for more discretionary goods. Providers that manufacture hardware and that have low margins will struggle to survive the downturn, especially if they are overdue to raise an additional round of capital.

30**:** "Smartphone-Integrated Infant Physiologic Monitors," Journal of the American Medical Association, Volume 317, Issue 4, Christopher P. Bonafide, et al., January 24, 2018.
31**:** "Safe Wireless Baby Monitors? 2019 Review for EMF Radiation," Tech Wellness, August Brice, n.d.

Temporary nature of baby device customer base: One of the complications of providing services that cater to childbirth is that most parents only need the service for a short period of time, and parents who have multiple children can often reuse technology from their first born. This reduces customer retention rate and lifetime value. While providers can expand their products to offer ongoing services targeted at different phases of a child's growth, the temporal nature of the customer base puts more emphasis on discrete transactions as opposed to long-term subscriptions. Furthermore, with the rise of "recommerce," it is becoming easier and "trendier" to buy second-hand goods such as baby monitors.

Home equipment requires adequate space and large upfront expenditure: Obstacles such as price and space restrictions are likely to limit the size of the market. Music licensing fees and lawsuits: Gyms and workout video providers must ensure they have proper rights to play music or to synchronize it during classes. **Peloton** was sued by the National Music Publishers Association (NMPA) in 2019 for failing to obtain a synchronization license (where music is synced to the video) to use certain music in their exercise videos. The company was fined $300 million and faced considerable disruption as they changed the music played during classes to minimize costs. Workout providers that allow users to select their music, such as **Freeletics**, do not have to acquire synchronization rights.

Retention and "fad" risk: Fitness is a historically faddish consumer product with significant customer retention headwinds. The Association of Fitness Studios cites a 75.9% customer retention rate at fitness studios (i.e. boutiques),[32] while the International Health, Racquet & Sports club Association cites a 71.4% retention rate at its traditional health studios (i.e. gyms). High price-variability among products also adds risk that customers may select cheaper alternatives. For example, Concept2's Model D model Indoor rower ($900) is priced $1,400 below the **Hydrow** indoor rower.

Consumer neurotechnology lacks scientific support and regulatory oversight: Many neurotechnology devices are categorized as "low-risk" and fall outside of FDA jurisdiction, which provides an easy path to market and amplifies investor interest. However, we believe lack of FDA oversight and insufficient scientific conclusions may keep consumers on the sidelines until the benefits of these products are better understood.

Outlook

New incentive and partnership programs will focus on "closed-loop" fitness products: We believe devices that track numerous data points (e.g. nutrition, cardio, strength, sleep, menstrual cycle) and that can use this data to provide personalized workout and nutrition advice will win market share relative to devices and applications that provide only data or content. **Apple** recently announced a new **Apple** Watch Connected partnership program to incentivize use of the **Apple** Watch. Their "Earn with Watch" incentive program aims to "close the loop" by providing monetary rewards for reaching personalized goals curated through watch-collected data. **Orange Theory** users receive gift cards for hitting specific goals.

Employer/insurer partnership programs will integrate wellness incentives: Wearables, health applications and other data sources will increasingly be used in partnership with insurance companies to help employers incentivize healthy behavior (e.g. stand up every

32: "2019 Fitness Studio Operating and Financial Benchmarking Report," Association of Fitness Studios, 2019.

BIOMETRIC WEARABLES & DEVICES

hour and reduce your insurance premium). **Kazoo**, an employee engagement platform, features a behavior bonus feature that integrates wellness incentives with other employee engagement activities and awards points redeemable for prizes. **Garmin** recently partnered with Blue365, a health & wellness program available to Blue Cross Blue Shield subscribers, to provide **Garmin** devices at up to a 35% discount.

Sleep technology will focus on decreasing quantity of sleep needed: Some sleep experts predict that within 20 years, sleep technology developers will create devices and chemicals that can reduce the amount of sleep needed. This technology could include chips implanted in the brain capable of providing stimulation or introducing chemicals that can increase metabolism or alter regular body chemistry.

Motion detector sensors will enable full-body health and movement tracking: Motion sensing and intelligent vision technology will permit more accurate workout feedback (e.g. form, calories burned). **Naked**'s smart mirror scans bodies in 3D to provide data regarding body fat, weight, lean mass, etc. but does not have the ability to track movements. **Mirror**'s at-home fitness device provides feedback based off the user's heart rate. We expect this technology to improve to the point that it can compete with personal trainers.

Wearable tech to break into wider healthcare market: The numerous instant benefits that can be reaped from having access to real-time information (for example, the ability to immediately adapt daily routines) currently drives consumers to purchase biometric tracking devices. However, the biometric data gathered can also be used to create longer-term risk profiles. We foresee expansion of apps that utilize algorithms to compare an individual's data to medical research and determine an individual's risk of developing medical conditions. We foresee participation from physicians and insurance providers in this data. Furthermore, we believe one day data collected from biometric devices will be made directly accessible to healthcare providers and integrated into patient management platforms such as EHRs. **HealthyHealth** already uses digital data to calculate the risk of diagnosis for over 800 conditions. The data is used to calculate a risk profile which facilitates health and life insurance underwriting.

SEGMENT DEEP DIVE

Dietary supplements

Overview

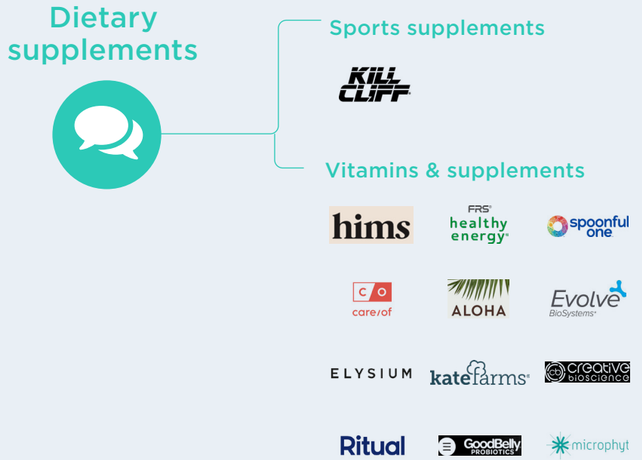
Consumer health products are intended to support the immune system and enable individuals to enhance fitness performance, improve cognitive functions and maintain or achieve a healthy weight. Products in this space include multivitamins, sports nutrition products, herbal supplements and other medicinal goods that can be purchased over the counter. In our analysis, we do not include the sale of natural and organic food products, granola bars, beauty and personal care products, which are often sold alongside dietary supplements.

Vitamins & supplements: In addition to vitamins, dietary supplements can contain minerals, herbs or other botanicals, amino acids, enzymes and many other ingredients. Dietary supplements come in a variety of forms, including tablets, capsules and gummies. This segment includes all providers of dietary supplements that do not focus primarily on athletes.

Sports supplements: This segment includes nutritional products developed primarily for athletes and bodybuilders to improve their overall health, performance and muscle growth. Major categories in this segment include protein and weight gain powders, sport drinks and pre- and post-workout supplements to either lend energy before exercise or enhance recovery after. Sports supplements products are offered in many forms such as powders, tablets, capsules, soft gels and liquids.

Business model

Startups in this space either manufacture unfinished products that are used to increase the nutritional value of other foods or produce finished products which are then sold to third-party marketplaces or D2C. Revenues are acquired through subscription-based memberships and direct one-time sales.

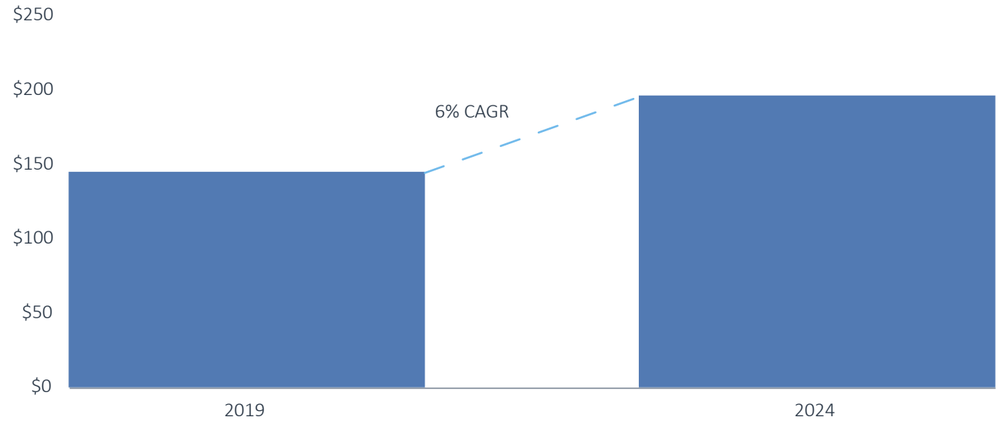


Market size

The global mobile health market is estimated to grow from $135.3 billion in 2019 at 6% CAGR to reach $186.8 billion by 2024. This segment is expected to experience the slowest growth rate compared to the other four segments within the retail health & wellness tech industry.

China expected to drive supplement market growth: We expect China to drive about 30% of the growth in the supplement market. The US and Canada are expected to grow at a smaller rate but drive a similar amount of the total growth, 25.8%, due to their larger starting market size.

Figure 34. DIETARY SUPPLEMENTS MARKET SIZE ($B)



Source: PitchBook estimates | Geography: Global

COMMON INDUSTRY KPIS FOR DIETARY SUPPLEMENTS COMPANIES

- Churn—revenue & client
- Customer acquisition costs (CAC) & CAC/ lifetime value
- Return on research capital (RORC)
- Ecommerce conversion rate
  - Average order value (AOV)
  - Customer lifetime value (LTV)
  - Gross merchandise volume (GMV)
  - Monthly active users (MAU)
- Churn—revenue & client
  - Gross merchandise volume (GMV)
  - Payback period/sales efficiency
- CAC recovery time (months to recover CAC)
- Upsell potential (ARPU)
  - Food cost percentage

Figure 35.

Dietary supplements market size ($B) by region

COMPANY/ TREATMENT	SUPPLEMENT MARKET 2018	2018-2023 CAGR (%)	2024
US & Canada	$46	5%	$61
China	$25	9%	$42
Europe	$22	6%	$31
Japan	$12	2%	$13
Latin America	$7	8%	$11
Other APAC	$23	7%	$34
Middle East & Africa	$2	11%	$4
Total	$137	6%	$196

Source: GNC's Jefferies Fitness and Wellness Summit presentation
*As of September 12, 2019

Industry drivers

Rising interest in nutrition as a means to improve health: Increases in chronic illnesses coupled with rising healthcare expenses, particularly pharmaceutical drug prices, is stimulating demand for dietary supplements to help prevent or alleviate common health complications. According to a 2019 poll sponsored by the Council for Responsible Nutrition, 71% of dietary supplement users exercise regularly, 86% try to eat a balanced diet and 80% visit the doctors regularly.[33]

Technology-driven supplement research: Vitamins and supplement manufacturers rely on technology to discover new ways to extract nutrients from natural ingredients and create new synergistic combinations.

Internet and ecommerce advent: Digital commerce has created multiple sales channels for providers relative to traditional methods. These channels increase the opportunity for providers to develop targeted marketing and content campaigns along with personalized offerings that appeal directly to consumers as opposed to selling through traditional nutritionist or doctor channels.

Growing sports participation: As more people exercise and play sports, demand for sports nutritionals and meal replacements is expected to increase.

Rapid pace of urbanization: Urbanization fuels the demand for sports nutrition products globally. It is characterized by change in lifestyle, the growing pool of working women, and heightened consumption of ready-made and fast food. These factors result in increased consumption of junk foods that may lead to health disorders, such as obesity,

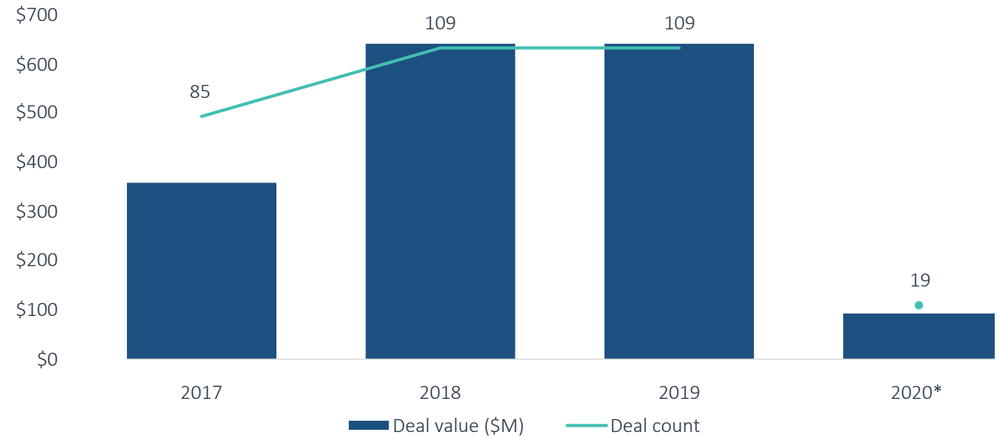
33: "2019 CRN Consumer Survey on Dietary Supplements," Council for Responsible Nutrition, 2019.

which compels some individuals to turn to supplements. At the same time, these factors also lead to increased health awareness, which drives the market.

VC activity

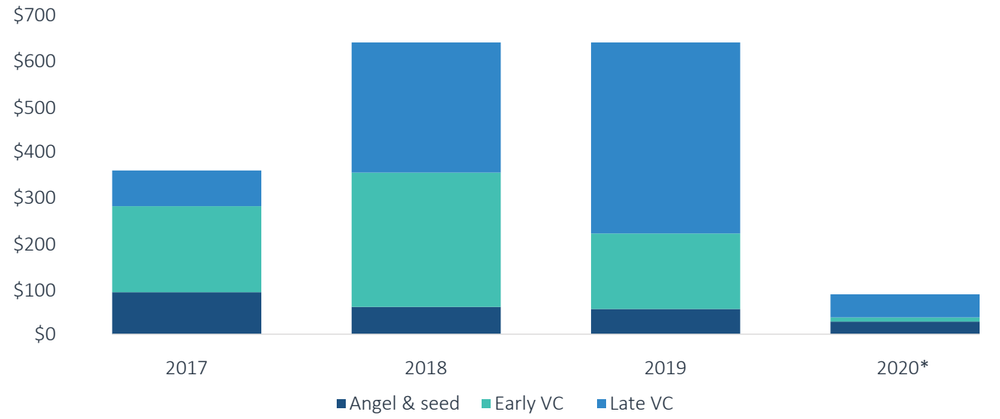
Companies tracked in this segment raised roughly $35 million in venture funding in the second quarter of 2020, down from $56 million in Q1 2020. Only five deals closed in Q2 2020: two at the late stage, one at the early stage and two at the angel & seed stage. **Kate Farms**, the angel deal, brought in $23 million while the rest of the deals to close in the quarter were each under $7 million. **Kate Farms** provides plant-based nutrition supplements, proteins and formulas intended to treat children with health deficiencies. There have been no exits thus far in 2020.

Figure 36. DIETARY SUPPLEMENTS VC DEAL ACTIVITY



Source: PitchBook | Geography: Global
*As of June 30, 2020

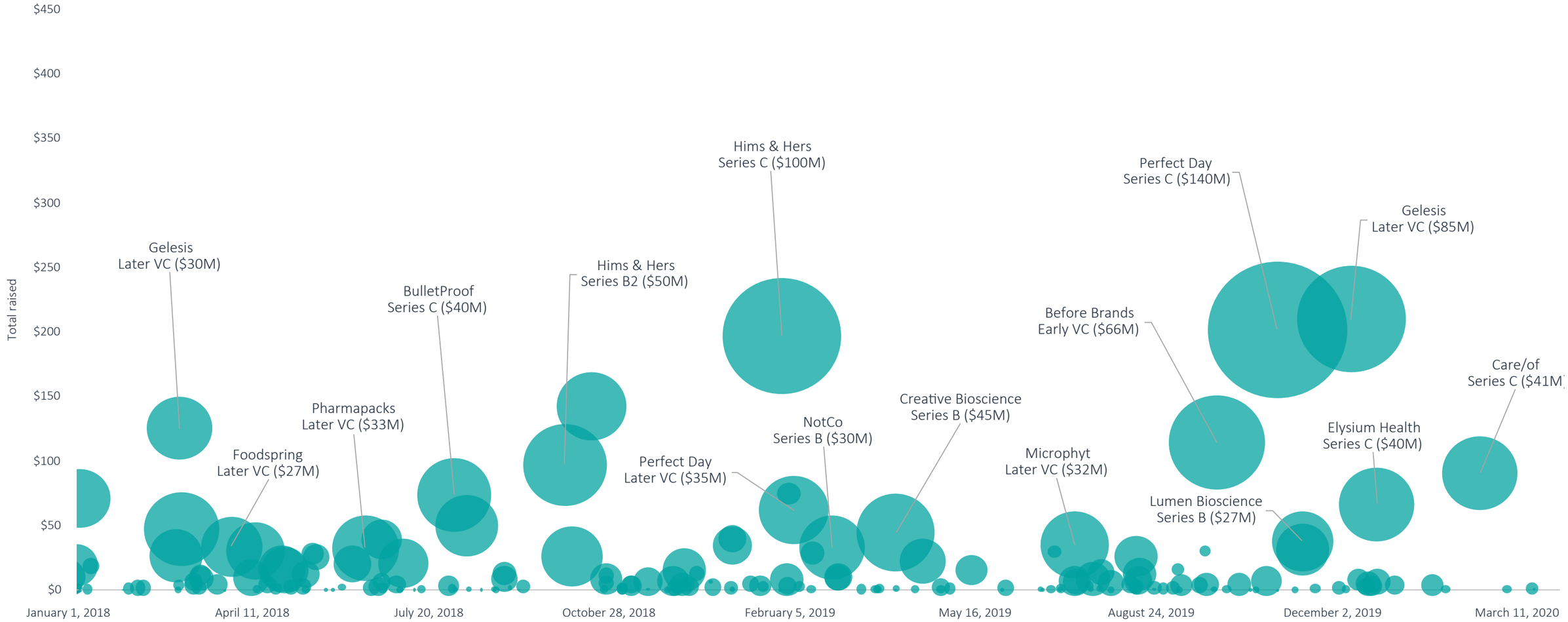
Figure 37. DIETARY SUPPLEMENTS VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 38.

Current dietary supplements VC landscape ($M)



Source: PitchBook

Note: The left axis indicates total VC raised as of deal date. Bubbles indicate amount raised.

Figure 39.

Notable dietary supplements VC deals

COMPANY NAME	CLOSE DATE	SUBSEGMENT	DEAL SIZE ($M)	DEAL TYPE	LEAD INVESTOR(S)	VALUATION STEP-UP
care/of	February 18, 2020	Vitamins & supplements	$41.0	Series C	N/A	1.37x
emerald HEALTH BIOCEUTICALS	March 19, 2020	Vitamins & supplements	$0.1	Angel	N/A	N/A
POWER GUMMIES	January 15, 2020	Vitamins & supplements	N/A	Early-stage VC	DSG Consumer Partners	N/A

Source: PitchBook

Figure 40.

Notable dietary supplements VC exits

COMPANY NAME	CLOSE DATE	SUBSEGMENT	EXIT SIZE ($M)	EXIT TYPE	ACQUIRER OR TICKER	VALUATION STEP-UP
LABOMAR	January 12, 2018	Vitamins & supplements	N/A	M&A	Lab Holdings	N/A
foodspring®	June 28, 2019	Sports supplements	N/A	M&A	Mars	N/A
OLLY	May 21, 2019	Vitamins & supplements	N/A	M&A	Unilever United States	N/A

Source: PitchBook

Figure 41.

Key VC-backed dietary supplements companies

COMPANY	VC RAISED TO DATE ($M)	SUBSEGMENT	KEY PRODUCTS	PRODUCT DIFFERENTIATION
care/of	$91	Vitamin & supplements	Personalized vitamin	Vitamins delivered to doorsteps; vitamin-tracking application
hims	$197	Vitamin & supplements	Vitamins, primary care and behavioral health teletherapy	Skin, sex, hair and well-being focused
FRS HEALTHY ENERGY	$144	Sports supplements	Athlete-focused supplements	Patented formulas backed by science
ALOHA	$75	Vitamin & supplements	Plant-based protein drinks, bars and powders	Uses minimally processed, sustainably sourced ingredients
before brands	$114	Vitamin & supplements	Food allergy prevention products	Products designed for children to decrease food allergy risk

Source: PitchBook

Figure 42.

Key dietary supplements incumbents

COMPANY	HOLDING STATUS	SUBSEGMENT	ENTERPRISE VALUE ($M)
GNC LIVE WELL.	Public	Sports supplements	$1,444
HOLLAND & BARRETT	PE-backed	Vitamins & supplements	N/A
Glam Fairy NJ	Corporation	Vitamins & supplements	N/A
Nutraceutical	Public	Vitamins & supplements	N/A

Source: PitchBook

Opportunities

Targeted supplements: While most established companies sell a range of supplements, early-stage startups often target specific niches. We see strong revenue, acquisition and fundraising opportunities for startups that specialize in providing the following types of supplements:

- **Pregnancy:** Ingredients such as folate, vitamin D3 and magnesium are widely used in prenatal supplements, an industry we expect to grow in the high single digits over the mid-term. VC-backed companies targeting this market include **Mumkind**, which provides nutraceutical food products intended to be used by pregnant women, and Mommi, which produces a protein shake enriched with prenatal nutrition.
- **Botanical:** Herbal supplements focused on the prevention of mental and physical illnesses have experienced increased demand. Consumers have come to view them as potentially safer alternatives to conventional medicines. **Feel Holdings** manufactures multivitamins using only natural ingredients such as turmeric and citrus bioflavonoids. The company sells monthly subscription packages.
- **Protein:** New research regarding protein's role in maintaining muscle mass and sustaining optimum nutrition levels has created a surge in demand for protein supplements among middle-aged adults in developed countries. Increased strength training among women has also increased protein-fortified food consumption. **Fitbody** produces and distributes protein supplements that target female sport enthusiasts.
- **Vegan:** Cardiovascular hazards associated with animal-based food products have raised concerns that could drive more investment in vegan protein alternatives. Supernaturals produces natural and vegan food supplements intended to cover the daily vitamin requirement of the human body. **Ladder** was founded in 2018 to provide 100% vegan nutritional food supplements that can be customized.
- **Elderly:** There are over 50 million Americans over the age of 65, representing about 16% of the total US population.[34] According to a survey conducted by the Council for Responsible Nutrition, 79% of adults over the age of 55 took dietary supplements on a regular basis, in contrast to a national average of 77% of consumers.[35]

Probiotic supplements: New research indicates a direct interaction between the nervous system and gut. This "'gut-brain axes' have been shown to modulate the development of neurodegenerative diseases such as Alzheimer's, Autism Spectrum Disorder and Parkinson's disease."[36] We believe growing knowledge surrounding the importance of the gut will drive demand for probiotic supplements.

Breast milk providers: Researchers calculate that 800,000 formula-fed infants who die worldwide yearly could have been saved by breastfeeding. **Prolacta Bioscience** and **Medolac Laboratories** are working to provide breast milk to preterm babies.

Alternative and novel delivery formats for taking vitamins: According to Nutrition Business Journal estimates comparing 2013 to 2018, alternative and novel delivery formats—including powders, effervescent products, and gummies—are up 12%.[37] We believe gummy vitamins will continue to gain traction as manufacturing becomes more

34: "Age and Sex: American Community," U.S. Census Bureau, 2018 (accessed May 13, 2020)
35: 2019 CRN Consumer Survey on Dietary Supplements, Council for Responsible Nutrition, 2019
36: "How Trusting Your Gut Could Help You," Forbes Africa, Tiana Cline, August 24, 2020.
37: Summit State of the Industry Presentation, July 2019.

consistent, lead times become more manageable, and consumer demand for this dose form continues to rise. Furthermore, chewable soft gels are often able to deliver higher dosages than traditional capsules and tablets. However, the high cost of chewables may mitigate growth as the recession drives consumers to select low-cost options.

Products with clean labels and sustainable packaging: New FDA labeling guidelines which took effect January 1, 2020 increase ingredient transparency, enabling consumers to better understand and differentiate products. Consumers are seeking products that utilize natural and organic ingredients and minimal excipients and are leaning toward companies that prioritize sustainability.

Supplement providers integrate with and develop digital health apps: We foresee increased demand for supplement providers offering consumers the ability to better track and understand their supplement intake through applications. Applications that integrate other health information such as medical records and lifestyle or provide health coaching expertise are expected to perform exceptionally well. Proper combines expert sleep coaching with natural, safe, and effective sleep supplements to help individuals achieve better long-term sleep health. **Remrise** offers personalized, plant-based formulas, combined with a dynamic suite of tools including sleep tracking and meditation to help people develop a healthy sleep practice through personalized, natural aids and behavior

Considerations

Faddish nature of industry drives volatility: Widely recognized media celebrities and influencers such as Dr. Oz, Deepak Chopra, and Jillian Michaels can have a significant impact on vitamin and supplement sales via the products they promote. While we expect aggregate industry revenues will remain stable, single-product providers will likely experience more volatility driven by the ebbs and flows of short-term consumer fads. These companies must also consider how to run an effective social strategy as they compete with influencers and other celebrities for consumers' attention.

Increasing regulatory scrutiny: Between 2004 and 2012, over 50% of all Class 1 recalls by the FDA were dietary supplements.[38] Sexual enhancement, bodybuilding and weight loss products were the top three problem categories. As a result, there has been a noted increase in FDA enforcement actions pertaining to violations in labeling food and dietary supplements. There has also been a heightened focus on potential FDA bans of certain vitamins and supplements that may be harmful, such as a form of vitamin B6 and certain energy supplements. An increasing number of clinical research trials are testing the efficacy and long-term health benefits of taking vitamins. Some have suggested that large doses of certain vitamins may increase the risk of cardiac events in elderly people or those with heart disease. While tighter regulations add complexity for manufacturers, they can also help improve business for providers that meet stricter requirements.

Consumer trust in safety: 52% of consumers stated that they are concerned about that dietary supplements are "harmful to you/your family," according to a National Science Foundation survey.[39]

Consumer packaged goods (CPG) expansion into vitamin and supplements: We have seen several CPG companies enter the dietary supplement space either through acquisition or major investments. This may pose a threat to startups as CPG companies bring

38: "The Frequency and Characteristics of Dietary Supplement Recalls in the United States," Journal of the American Medical Association, Volume 173, Issue 10, Ziv Harel, Shai Harel, Ron Wald, Muhammad Mamdani and Chaim M. Bell, May 27, 2013.
39: NSF International Consumer Product Concerns Survey, NSF International, April 2019.

marketing expertise, category management best practices and deep consumer insights that can help them align products with consumer demand and develop innovative delivery and packaging methods. Recent activity includes **Procter & Gamble**'s $4.2 billion purchase of **Merck**'s Consumer Health Unit, Johnson & Johnson's acquisition of **Zarbee's Naturals**, for an undisclosed amount, General Mill's $12 million investment in **GoodBelly** and **The Clorox Company**'s acquisition of **Nutranext** for $700 million.

Outlook

AI in supplements: Providers are increasingly using AI to help formulate vitamins. Life Extension claims AI will be the future of dietary supplement creation, helping companies not only formulate products and bring them to market more quickly, but also determine which ingredients to study and how to study them. In January 2017, BASF, in partnership with **Nuritas**, a VC-backed startup, launched PeptAIde, a sports nutrition ingredient containing a unique set of plant-based peptides identified using AI.

Loyalty- and subscription-based revenue models to dominate market: Loyalty and membership strategies can help increase sales and ensure recurring purchases. **GNC** claims its loyalty program captures 80% of sales and its Tier 2 loyalty members spend 3.5x as much per year compared to a typical shopper.[40] **Care/of** helps consumers create a personalized health plan via its app and ships supplements monthly. The growth of subscription box enablement services, such as **Bulu Box**, enables vitamin and supplement providers to outsource subscription box fulfillments and easily offer this option to consumers.

I**ncreasing demand for personalized vitamins:** As DNA and microbiome testing technology grows, we expect to see more companies offering "personalized" vitamins and supplements based off one's genomics, microbiomics or other biomarker and vital indicators. **Vitl** offers supplements tailored according to a consumer's answers to an online survey. For $119, consumers can take a DNA nutrition test that returns a report on 46 genes alongside personalized dietary and lifestyle recommendations.

Biohacking will be hard to scale: Biohacking is the process of employing various techniques to alter the body's chemistry and physiology to achieve desired health- related outcomes. Examples include diet regimens, light therapy and cryogenic therapy. This space is also where various antiaging technologies can be found. While we expect the number of biohacking providers to increase, we believe barriers to entry for related services are relatively low and fad-risk is particularly high. Biohacking startups include **Zero Fasting**, which helps people select fasting methods and track fasting activity; Bulletproof Labs, which offers biohacking equipment such as REDcharger (i.e. light therapy) and virtual float tanks; and **Elevian**, which designs therapeutics that incorporate blood transfusions to restore regenerative capacity.

Incumbents to more aggressively pursue online distribution: We expect to see more companies create an omnichannel experience for their clients. **GNC**, a traditional brick-n-mortar store, now offers "auto deliver and save (ADAS)" and "**GNC** delivers." The company claims ADAS drives higher than average EBITDA margins and expects subscriptions to rise from 285,000 in 2019 to 500,000 in 2020, though this may have changed due to the COVID-19 epidemic.

40: GNC Company Update, July 2019

SEGMENT DEEP DIVE

Personalized medicine & testing

Overview

Personalized medicine is an approach to patient care that allows doctors to select treatments that are most likely to help patients based on a genetic understanding of their disease. Startups in this segment provide personalized recommendations or treatments based on genomics, microbiomics or other biomarkers and vital indicators, using proprietary biological data analysis platforms to devise new diagnostic and medication methodologies. Product categories include:

Genomic testing: The collection and/or interpretation of DNA samples to determine health implications.

Bioinformatics: The analysis of biological information in order to devise new diagnostic and medication methodologies for patients. Companies in this space focus on analyzing genotypic and phenotypic data to determine the potential effectiveness of medications and prevent adverse drug reactions. Biotechnology companies focused on using genetic data to create new medicines, primarily for cancer, are also included in this category.

Ad-hoc personalized testing: Providing personalized health recommendation through testing and analyzing biomarkers, the microbiome and vital indicators (e.g. blood sugar levels). Microbiome samples can be collected from an individual's gut, skin, blood or other places.

Business model

Providers in this space seek to obtain the molecular data of customers or other individuals in order to derive health solutions. Some providers offer individual analysis for consumers, and others maintain data platforms intended to provide genomic data insights for therapeutic discovery and treatment. Revenue is derived through the sale of D2C analysis services and the

sale of aggregated data to third parties such as pharmaceutical companies, healthcare providers and consumer-packaged goods providers for the development of personalized products and holistic health planning services (SAAS or fee for service).

Market size

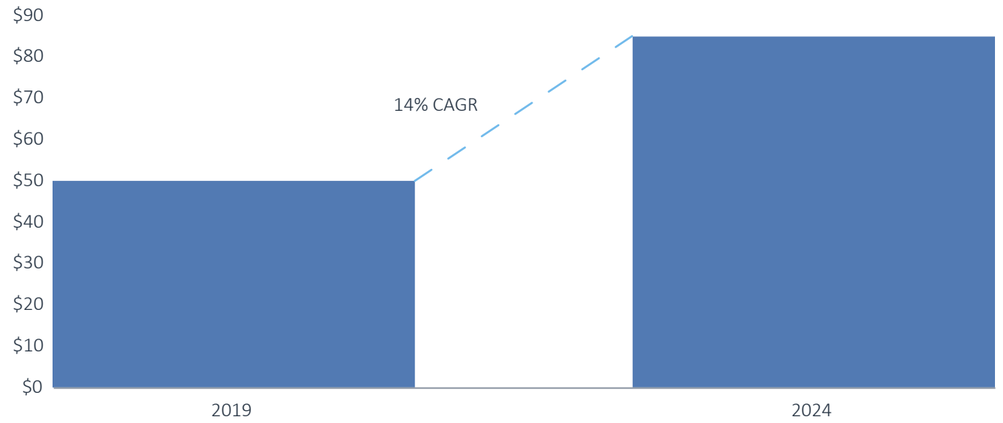
The personalized medicine & testing market is expected to grow at a CAGR of about 11% from $50.0 billion in 2019 to $85.0 billion in 2024.

Bioinformatics: The bioinformatics category, which can be segmented into knowledge management tools, bioinformatics platforms and services, is expected to grow to about $20 billion in 2024. We expect bioinformatics platforms to grow the fastest owing to increased usage related to genomics, proteomics and drug discovery.

Microbiome: North America dominates the global human microbiome market due to high funding and R&D activity by companies and research institutes. Asia-Pacific is anticipated to be the fastest-growing region for microbiome-related products, driven by increased government funding for personalized medicine and numerous initiatives to develop human microbiome products in countries such as China and Japan. These initiatives aim to create standardized methods for assessing what impact the gut microbiome has on human health. Currently, global investment concentrates in US (70%) and Europe (25%).

D2C genetic tests: The global direct-to-consumer genetic test market comprises more than 400 products from approximately 300 companies and includes substantial investments made by conglomerates and small-medium enterprises. Online sales are expected to be a major driver of growth, fueling low 20% industry growth over the next several years.

Figure 43. PERSONALIZED MEDICINE & TESTING MARKET SIZE ($B)



Source: PitchBook estimates | Geography: Global

COMMON INDUSTRY KPIS FOR PERSONALIZED MEDICINE & TESTING COMPANIES

- Lifetime value
- Customer acquisition cost
- Revenue or profit per customer
- Revenue generation methods
- Growth rate
- Volume: Size of dataset per customer
- Number of genomes sequenced
- Cost of conducting test/ gathering specimen

Industry drivers

Coronavirus and future pandemics drive need for testing: Major testing delays and shortages of testing supplies have hindered the US's ability to track the pandemic. Startups focused on testing services (e.g. DNA and HIV testing), quickly pivoted toward the coronavirus. However, the opportunity has largely been put on hold as the FDA has sought to regulate these testing services given safety and accuracy concerns. We expect some providers will eventually gain FDA approval, causing a spike in demand as the need for testing could extend for several months, if not years. Longer term, at-home testing could emerge as a more normalized consumer activity, especially for the uninsured, causing significant market expansion.

Growing acceptance and awareness of genetic tests: D2C genetic tests provide a new window into individual health. 80% of consumers cited curiosity as their primary purchase motivator.[41] This trend heavily influences marketing strategies as providers seek to leverage emotional appeal and growing public awareness of their products.[42]

Technological advancements reduce gene decoding lead time and cost: The decreasing cost to perform genetic tests makes the product more widely accessible to consumers. According to one study, costs per genome have decreased rapidly as the technology has improved (see Figure 44).[43] Common D2C genetic tests use genotyping, not sequencing, to analyze DNA because sequencing technology has not yet progressed to the point where it can be done quickly and at a cost low enough for general consumption.

Growth of Big Data technology: The ability to analyze large quantities of data has been critical to the evolution of genetic analysis. Analytical techniques that include AI and neural networks can incorporate a broad range of human genetic and molecular data to help understand the potential impacts of certain treatments and medications.

Government support for research: In 2015, President Obama launched the Precision Medicine Initiative (PMI). This long-term research endeavor involves the National Institutes of Health (NIH) and multiple other research centers and focuses on developing novel solutions for chronic diseases, such as cancer, based on genetics, environment and lifestyle. This initiative has increased funding toward precision medicine, driving research and industry growth. Furthermore, the government seeks to make bioinformation research and development profitable by offering incentives, including tax exemptions and grants. The National Human Genome Institute, ran by the NIH, supports research to advance the field of genomics and improve human health. The Small Business Innovation Research (SBRIR) and Small Business Technology Transfer (STTR) funds allow small businesses owned and operated in the US to engage in federal R&D that has a potential for commercialization.

Deeper understanding of microbiome's effect on health: New research shows there is a direct interaction between the nervous system and gut. This "'gut-brain axes' have been shown to modulate the development of neurodegenerative diseases such as Alzheimer's, Autism Spectrum Disorder and Parkinson's disease."[44] We believe growing knowledge surrounding the importance of the gut will drive individuals to purchase tests to gain insight into their gut microbiome.

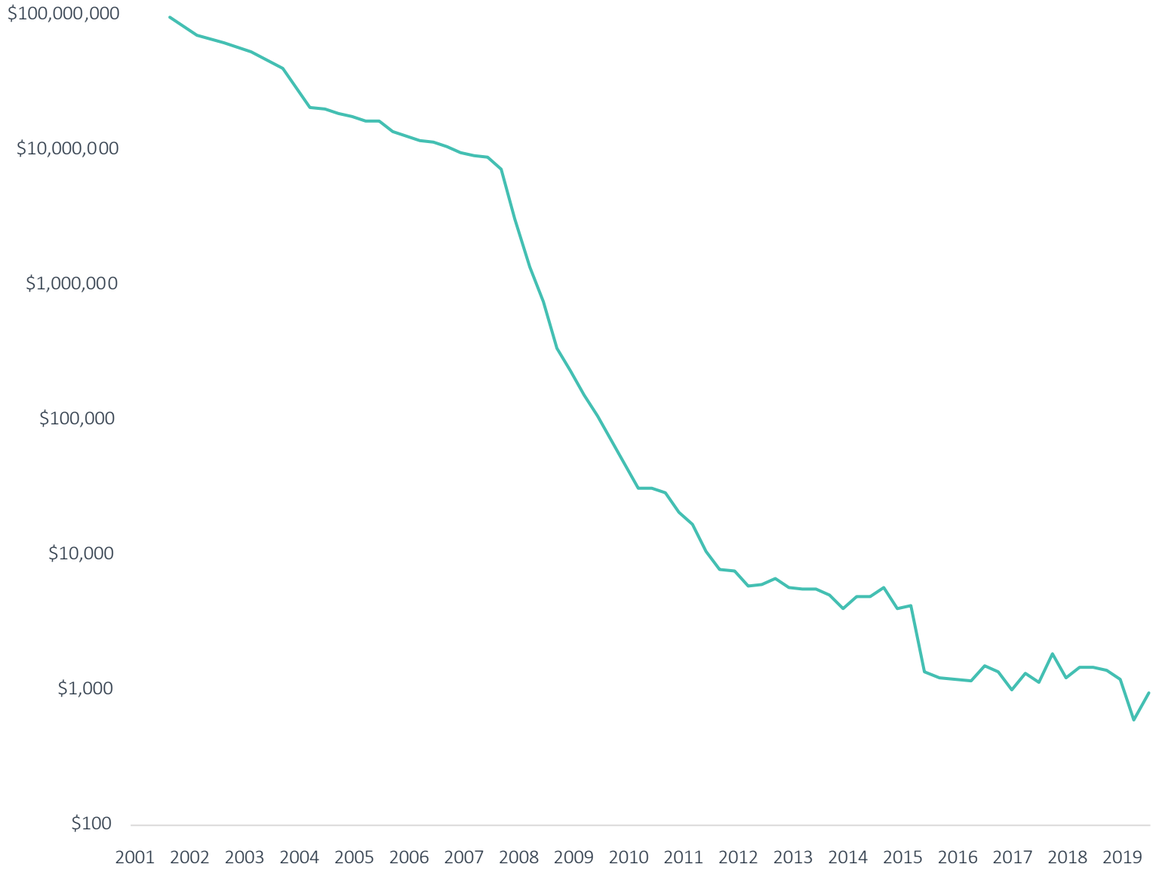
Ongoing emergence of rare disease: Over 300 million people globally live with a rare disease. To motivate pharmaceutical development several federal incentives such as tax exemptions, grants for accelerating and testing potential therapies, and an exclusivity period of seven years to enhance marketing have been deployed. Bioinformatics can help process the large amount of data analytics required for diagnosis and medication creation.

41: "Internet-Based Direct-to-Consumer Genetic Testing: A Systematic Review," Journal of Medical Internet Research, Loredana Covolo, et al., December 14, 2015.
42: "Direct-to-Consumer Marketing of Predictive Medical Genetic Tests: Assessment of Current Practices and Policy Recommendations," Journal of Public Policy & Marketing, Volume 27, Issue 2, Yuping Liu-Thompkins and Yvette E. Pearson, November 2008.
43: "DNA Sequencing Costs: Data," National Human Genome Research Institute, n.d.Pearson, November 2008

44: "How Trusting Your Gut Could Help You," Forbes Africa, Tiana Cline, August 24, 2020.

Figure 44.

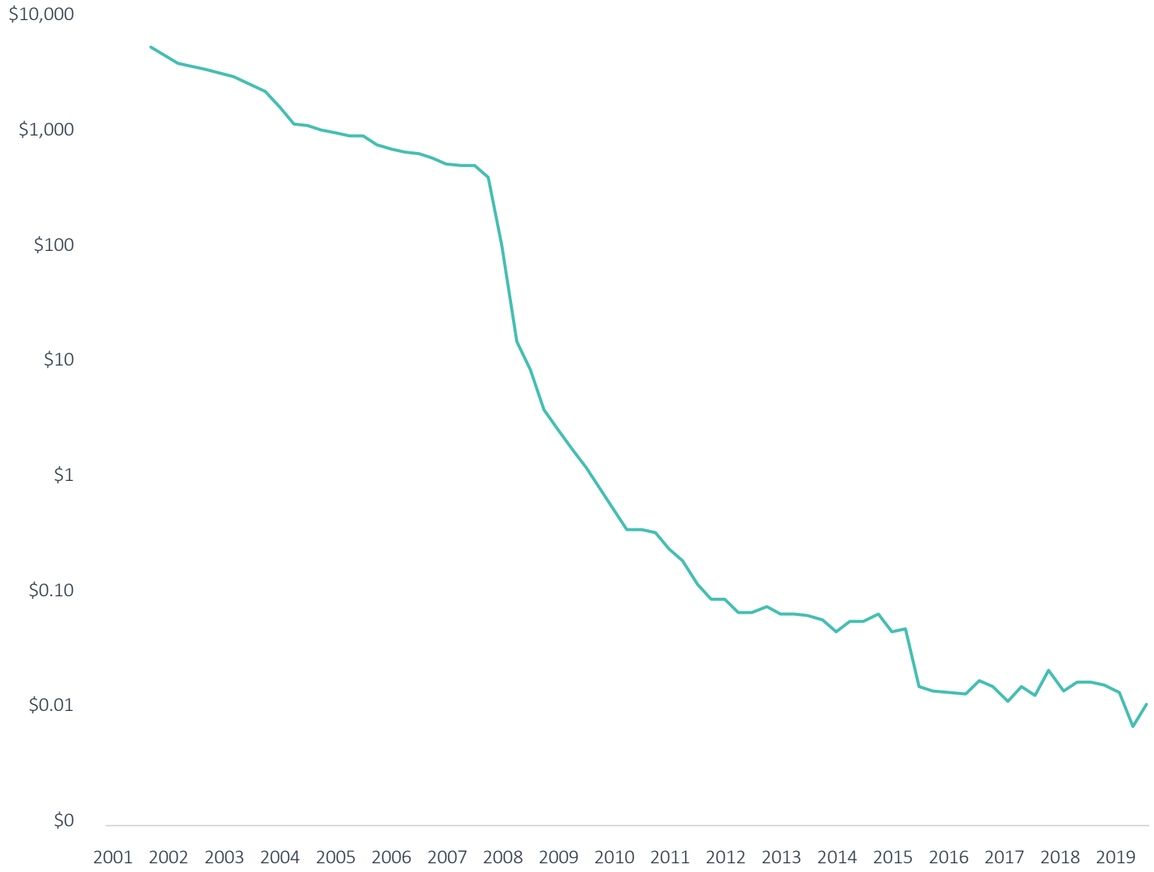
Cost per human genome



Source: Wetterstrand KA. DNA Sequencing Costs: Data from the NHGRI Genome Sequencing Program (GSP) Available at: **www.genome.gov/sequencingcostsdata**. Accessed March 10, 2020.

Figure 45.

Cost per raw megabase of DNA sequence

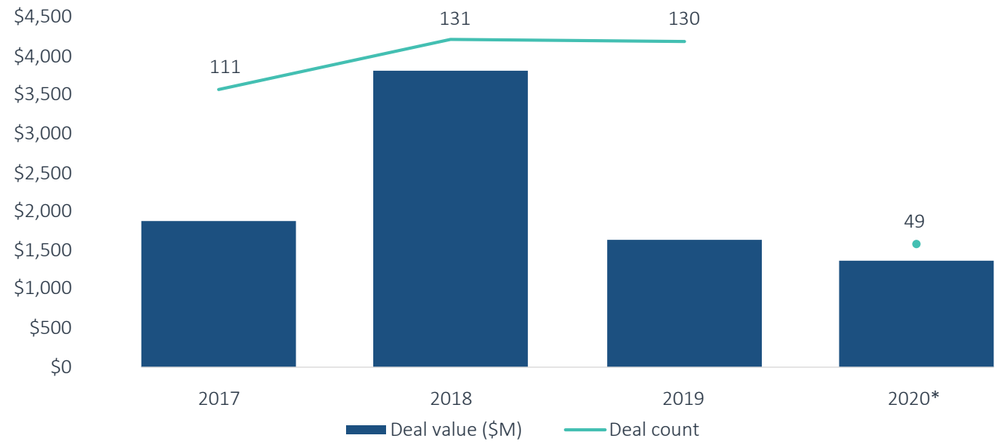


Source: Wetterstrand KA. DNA Sequencing Costs: Data from the NHGRI Genome Sequencing Program (GSP) Available at: **www.genome.gov/sequencingcostsdata**. Accessed March 10, 2020.

VC activity

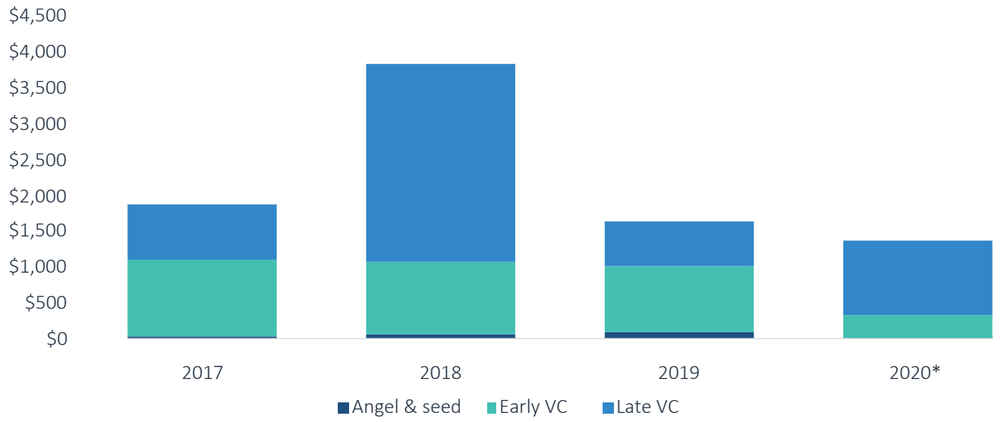
Companies tracked in the personalized medicine segment raised $733.6 million in venture funding in the second quarter of 2020, up from $629.3 million in Q1 2020. 28 late-stage VC deals accounted for 57% of H1 2020 total deal value, up from 28% for full-year 2019 and 32% in 2018, signaling industry maturity. Angel & seed deal activity dropped significantly in the first half of 2020, with only $9.4 million in VC raised. Overall, quarterly deal count has remained consistent throughout the past year. Notable raises include **Insitro**'s $143.2 Series B, **DNAnexus**' $100 million Series H and **Cue**'s $100 million Series C. **Insitro** operates a data-driven drug discovery and development platform, which uses ML to enhance prescription predictions throughout the pharmaceutical value chain. **DNAnexus** provides a cloud-based data analysis and management platform for DNA-sequenced data. In addition, the company's global network enables scientific collaboration for accelerated genomic and precision medicine discovery. **Cue** operates in the ad-hoc personalized testing space. It offers at-home genomic testing and a health monitoring system which delivers results to mobile devices.

Figure 46. PERSONALIZED MEDICINE & TESTING VC DEAL ACTIVITY



Source: PitchBook | Geography: Global
*As of June 30, 2020

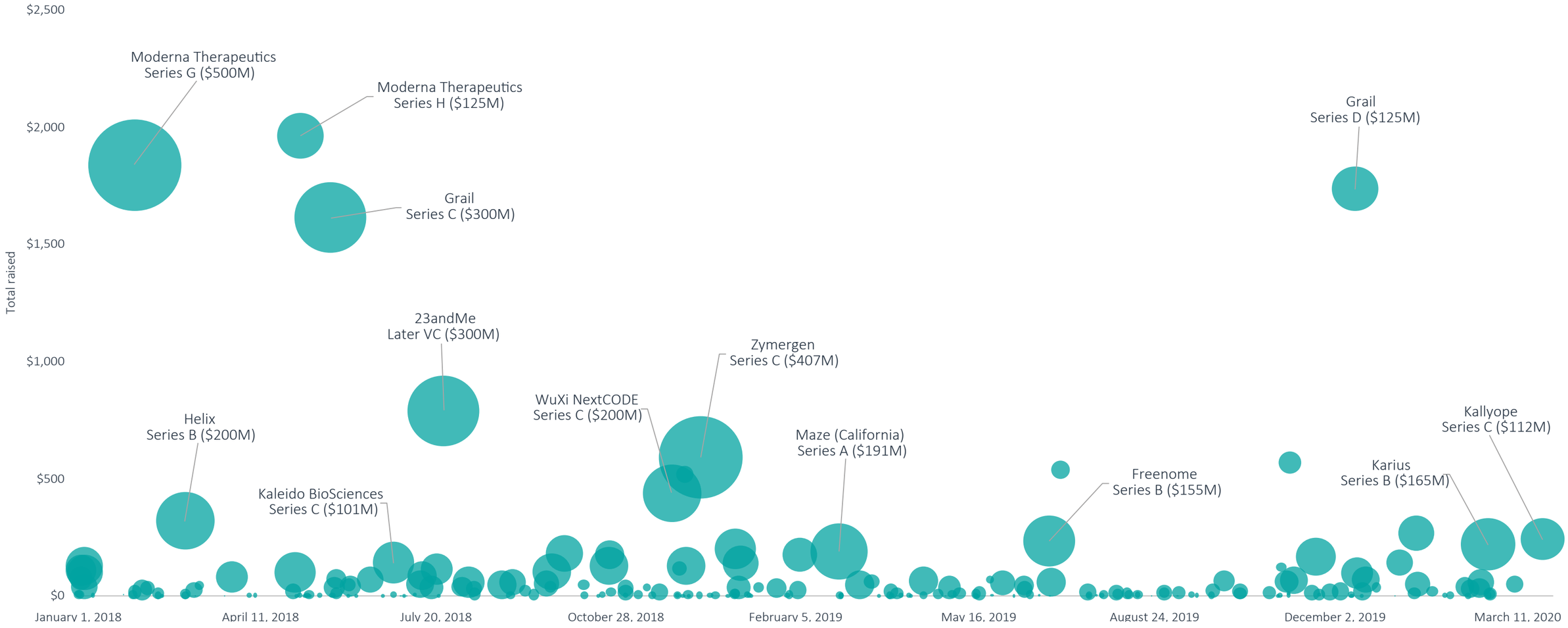
Figure 47. PERSONALIZED MEDICINE & TESTING VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 48.

Current personalized medicine & testing VC landscape ($M)



Source: PitchBook

Note: The left axis indicates total VC raised as of deal date. Bubbles indicate amount raised.

Figure 49.

Notable personalized medicine & testing VC deals

COMPANY NAME	CLOSE DATE	SUBSEGMENT	DEAL SIZE ($M)	DEAL TYPE	LEAD INVESTOR(S)	VALUATION STEP-UP
KALLYOPE	March 25, 2020	Bioinformatics	$112	Series C	N/A	N/A
color	January 15, 2020	Genomic testing	$75	Series D	T. Rowe Price, Viking Global Investors	N/A
bio	February 20, 2020	Bioinformatics	$40	Series B	Andreessen Horowitz	2.44x
LUCIRA HEALTH	January 16, 2020	Genomic testing	$36	Series B	Seraph Group	2.10x
scipher MEDICINE	February 19, 2020	Bioinformatics	$25	Series B	Northpond Ventures	2.39x

Source: PitchBook

Figure 50.

Notable personalized medicine & testing VC exits

COMPANY NAME	CLOSE DATE	SUBSEGMENT	EXIT SIZE ($M)	EXIT TYPE	ACQUIRER OR TICKER	VALUATION STEP-UP
Blueprint Genetics	January 21, 2020	Genomic testing	$108.0	M&A	Quest Diagnostics	2.26x
BlueBee	June 17, 2020	Bioinformatics	N/A	M&A	Illumina	N/A
CHUNLAB Microbiome for you	December 26, 2019	Ad-hoc personalized testing	$114.9	IPO	N/A	N/A
GenePreDiT	January 10, 2020	Bioinformatics	N/A	M&A	N/A	N/A

Source: PitchBook

Figure 51.

Key VC-backed personalized medicine & testing companies

COMPANY	VC RAISED TO DATE ($M)	SUBSEGMENT	KEY PRODUCTS	PRODUCT DIFFERENTIATION
23andMe	$791	Genomic testing	DNA test	Only DNA tests to meet FDA standards
DNAnexus	$276	Bioinformatics	Cloud platform	Connects researchers globally to enable precision medicine research
HUMAN LONGEVITY, INC.	$568	Genomic testing	Whole genome sequencing	Aims to build a large database of sequences genomes and phenotypic data in hopes of uncovering unprecedented preventative health insights
genuity science	$440	Bioinformatics	Analytics platform	Platform offers study design, sequencing, storage and interpretation, secondary analysis and scalable analytics
color	$265	Ad-hoc personalized testing	Data-driven platform for population health	COVID-19 and gentic testing capabilities coupled with population health management data and insights.

Source: PitchBook

Figure 52.

Key personalized medicine & testing incumbents

COMPANY	HOLDING STATUS	SUBSEGMENT	ENTERPRISE VALUE ($M)
ancestry	PE-backed	DNA test	$25,349
Agilent	Corporation	Bioinformatics	N/A
EasyDNA	Public	DNA test	N/A
BIOVIA	Acquired	Bioinformatics	N/A

Source: PitchBook

Opportunities

Creating a large genome sequencing database: Genome sequencing is still in its early days, and the ability to provide better insights depends on expanding the dataset over time. Some startups incentivize consumers to share their genetic data with industry researchers by offering a share in any profits generated through monetization. For example, **LunaPBC** awards shares to data contributors with dividends tied to revenue generated from selling access to its database. **Nebula Genomics** gives users credits (i.e. "rewards") that can be exchanged for other **Nebula** products, such as genome-related information. Both companies had proposed to integrate crypto payments into their platforms, but these efforts appear to have fizzled.

Personalized tests the mitigate need to visit a doctor and offer results quickly: In the age of consumer convenience, individuals are demanding immediate results. We expect at-home personalized testing providers that offer faster turnaround times to gain market share over others. QRfertile offers an at-home test for male fertility, with results appearing on its app within 15 minutes. Not all at-home testing providers need to offer 15-minute turnaround times to compete. Those that offer clinically valid results and mitigate the need to visit a physician will also gain consumer interest. **Natalist** provides clinical-grade at-home testing for ovulation, sperm analysis, and pregnancy.

Personalized treatment platforms: Startups are developing treatment platforms and modalities that are flexible and adapt to the unique needs of a patient. **GenomiCare** has developed a precision cancer medicine service that provides personalized clinical solutions. The company's platform integrates world-class technologies to provide personalized precision medicine solutions and global medical resources for cancer patients and doctors. **Scipher Medicine** has developed a suite of products that can determine which drug will work best for patients diagnosed with autoimmune diseases.

Genetic counseling and analytic services: Genetic counseling has traditionally focused on helping families understand risks for inheriting hereditary medical conditions. The expansion of genetic testing will create more opportunities for experts and analytic software providers to help interpret genetic data and provide consultations for patients.

Consumers can pursue these counseling services through independent genetic counselors or companies offering DNA sampling, sequencing and storage services; healthcare providers; and/or insurers. Emerging providers that offer genetic testing management and consumer consulting services include **InformedDNA**, which has raised $19 million, and **Clear Genetics**, which, after raising $2.5 million in seed funding, announced in November 2019 that it would be acquired by **Invitae** (NYSE: NVTA) for $50 million.

Continual testing services: Genetic testing companies currently operate on a one- and-done business model, limiting the ability to derive ongoing revenue from existing customers. Several startups are seeking models that allow them to continually sell into their existing customer base. **GoodCell** combines genetics and health test offering with continual testing and biobanking. The company charges $14.99 a month to store a customer's blood and perform continual tests on it, which may provide insights as new tests and cell therapies become available.

Genomic medicine could drive improved health outcomes: Genomic testing and personalized medicine have the potential to revolutionize healthcare by providing patients with detailed information about health and risk factors. For this reason, we expect genetics to become an integral component of medical diagnostics and therapeutics,

driving growth opportunities among ancillary service providers. While there are many questions related to the value of genomic analysis, the science could unlock new ways to treat illness and improve wellness.

Considerations

Pandemic funding could divert funding from genomic research: In the near term, we believe government organizations and NGOs will be most interested in funding biopharma companies with coronavirus-focused solutions. This may deter finding from genome-focused research. Heightened awareness surrounding the importance of continued epidemiology-focused biopharma innovation (i.e. virus-focused) may divert future public investment activity from genome- and oncology-focused research.

Limited validity of predictive genetic tests: Many healthcare providers do not recommend using genetic tests to detect potential diseases as the validity rates of these tests are often too low to provide real insights. Genetic tests look for single nucleotide polymorphisms (SNPs) to detect an individual's risk of disease. However, having a disease-associated SNP is not a diagnosis, and certain SNP variants could lead to false positives. Furthermore, DNA information on several populations is limited.

Privacy and security of genetic tests: Consumer hesitancy toward at-home testing services stems from the view that data may be shared with third parties such as consumer health, pharmaceutical and insurance companies. As genetic test providers, such as **23andMe**, are not legally considered medical providers, these companies are not subject to the same regulations and privacy policies regarding DNA profiles, and this could prevent mass adoption. For example, the Pentagon has warned armed forces members that taking DNA tests could potentially expose sensitive genetic information to outside parties that could pose personal and operational risks to service members.

Big Food entering nutrigenomics: Nutrigenomic startups, which focus on the scientific relationship between genomes, nutrition and health, will face increased competition from Big Food. **Nestle** piloted a "wellness ambassador" program in Japan in September 2018. The program combined AI, DNA testing and meal analysis to collect consumer health data and provide personally formulated beverage capsules. In 2016, **Campbell** invested in **Habit**, a DNA-based nutrition startup. However, after failing to gain traction, **Habit** was sold to **Viome** in February 2019.

D2C genomic test market saturation coupled with one-and-done business model: The market for at-home DNA testing may be saturated. While only 30 million people globally have taken an at-home DNA test according to public statements, **23andMe** and **Ancestry**.com appear to be facing growth headwinds and recently announced they will lay off 14% and 6% of their staff, respectively. We believe providers struggle to convey to users the value of the test beyond purely satisfying curiosity, thus limiting the growth potential, given the $100+ cost.

Bioinformatics data management is complicated: Bioinformatics research derives genetic information, which results in massive data quantities; bioinformatics data management providers efficiently store this data in ways that allow for quick access and analysis when necessary. This extends processing time and results in lengthy research times that have a negative impact on the business case.

Outlook

Increased partnerships with employers and genetic testing providers: As consumers come to understand the benefits of genomic sequencing tests, we expect employers to offer them as part of their health benefits packages. **Genome Medical** offers customizable and scalable programs designed to help employees make use of genetic information.

Microbiome testing and tracking to become common medical approach: New studies show that ongoing microbiome tracking can help indicate potential illnesses. Three BIH funded studies tracked microbiome related health conditions to discover the relationship between microbiome and certain illnesses. For example, researchers discovered that women who delivered preterm tended to have lower than normal levels of a type of Lactobacillus bacteria as early as the first trimester.[45] We anticipate the microbiome-testing industry to become a more prominent tool used in hospitals for ill and at-risk patients.

Traditional D2C testing providers to conduct research and develop drugs: Many firms traditionally focused on selling omics and vital tests D2C are expected to increase their research and drug development efforts. D2C testing providers had accumulated a large repository of genetic information. Furthermore, many testing providers ask their customers to answer a health questionnaire. Analyzing genetics alongside data on individual's overall health provides clues on the interplay between genetics and ailments, creating advantageous routes to drug discovery. **Nightingale**'s blood test and app provide a three-tier view of customers' health, helping them find a lifestyle that promotes lifelong health. **Nightingale** sells this data to research companies, as it can be used to discover novel associations between different areas of health, as well as evaluate the effects of drug and lifestyle interventions. **23andMe** has launched its own drug development processes and licensed the rights to its first in-house developed drug to Almirall, a pharmaceutical company based in Spain.

Growth of pharmacogenomics: Pharmacogenomics is the study of how genes affect a person's response to drugs. This relatively new field combines pharmacology and genomics to develop effective, safe medications and doses that will be tailored to a person's genetic makeup. While more research is still needed before pharmacogenetics can be integrated into primary healthcare practices, we anticipate pharmacogenomics will eventually be used by pharmaceutical companies to develop personalized medications. Genetic testing providers could partner with researchers and pharmaceutical companies to help grow this field.

Prenatal testing to experience substantial growth: Prenatal tests screen for metabolic and chromosomal disorders and can determine the baby's sex earlier on. Advancements in prenatal screening, rising prevalence of genetic disorders, and increasing birth rate is expected to boost adoption rate. This segment was valued at $3.9 billion in 2019.[46]

45: "The Vaginal Microbiome and Preterm Birth," Nature Medicine, Volume 25, Issue 6, Jennifer M. Fettweis, Myrna Serrano, J. Paul Brooks, May 29, 2019.

46: "Genetic Testing Market Size by Test Type (Predictive Testing, Carrier Testing, Prenatal and New-born Testing, Diagnostic Testing, Pharmacogenomic Testing, Nutrigenomic Testing), By Application (Cancer, Genetic Disease, Cardiovascular Disease), Industry Analysis Report, Regional Outlook, Application Potential, Competitive Market Share & Forecast, 2020 – 2026," GM Insights, Sumant Ugalmugle and Rupali Swain, February 2020.

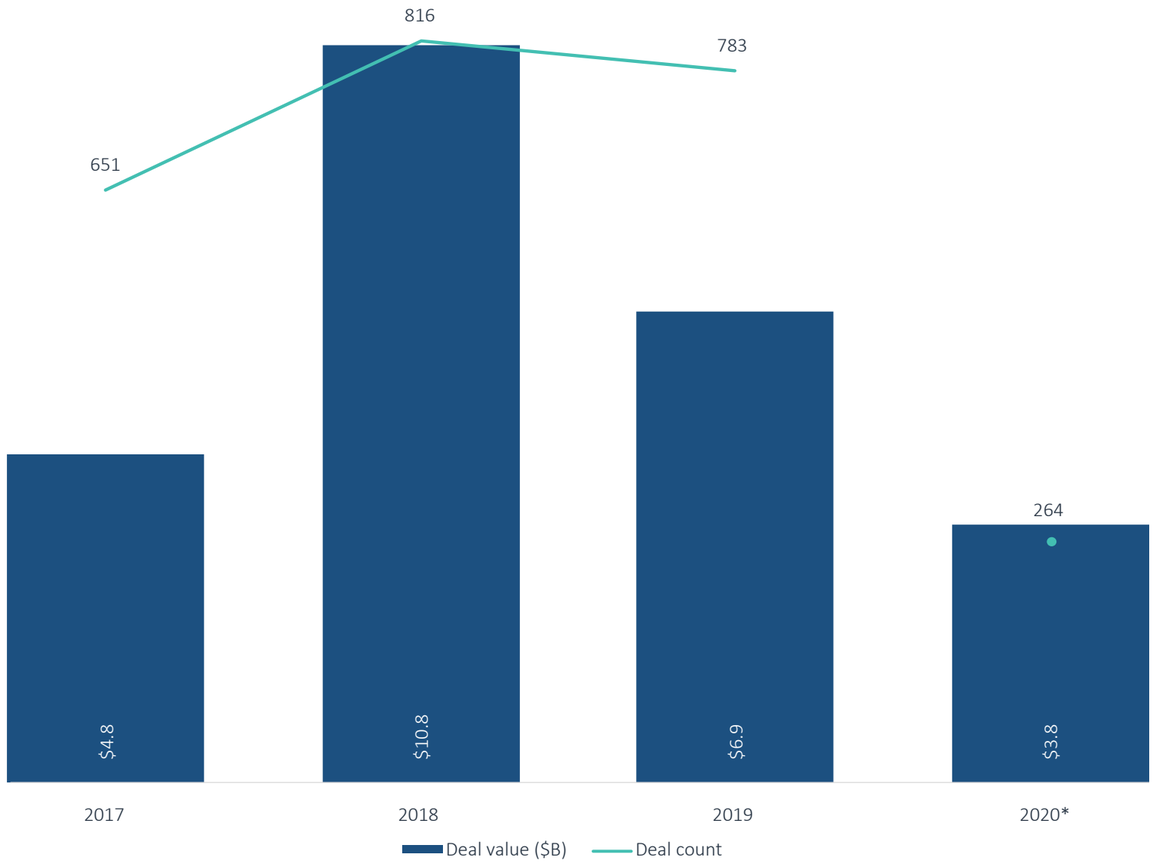
Supplemental materials

SUPPLEMENTAL MATERIALS

Additional VC data

Figure 53.

Retail health & wellness tech VC deal activity



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 54.

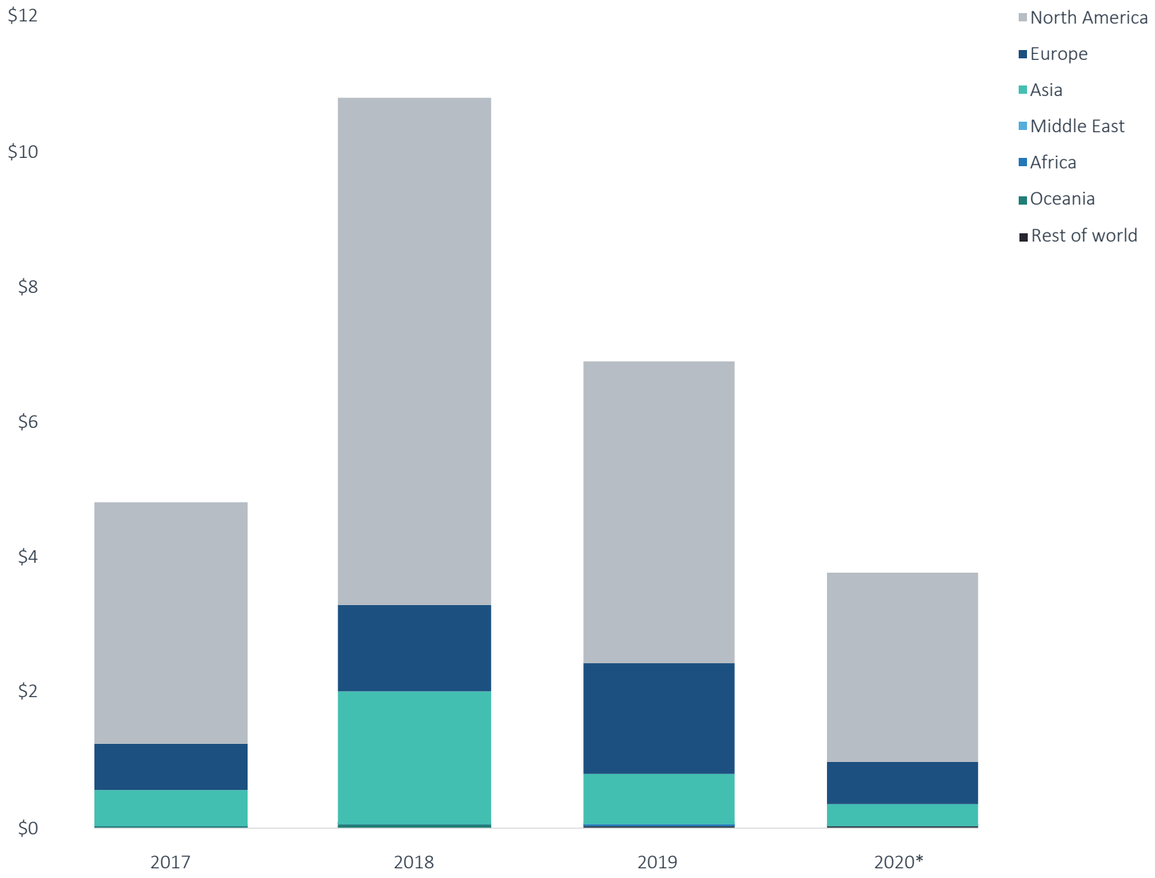
Top 10 retail health & wellness tech VC deals in Q2 2020

COMPANY	CLOSE DATE	DEAL SIZE ($M)	POST-MONEY VALUE ($M)
Amwell	May 20, 2020	$194	N/A
Tyto Care	April 7, 2020	$50	$120
98point6	April 3, 2020	$43	N/A
Hazel Health	May 19, 2020	$35	$135
Peerbridge Health	April 2, 2020	$32	N/A
Higi	May 27, 2020	$30	N/A
Medable	April 28, 2020	$26	N/A
Medici	April 27, 2020	$24	N/A
H4D	June 1, 2020	$16	N/A
100Plus	April 24, 2020	$15	N/A

Source: PitchBook

Figure 55.

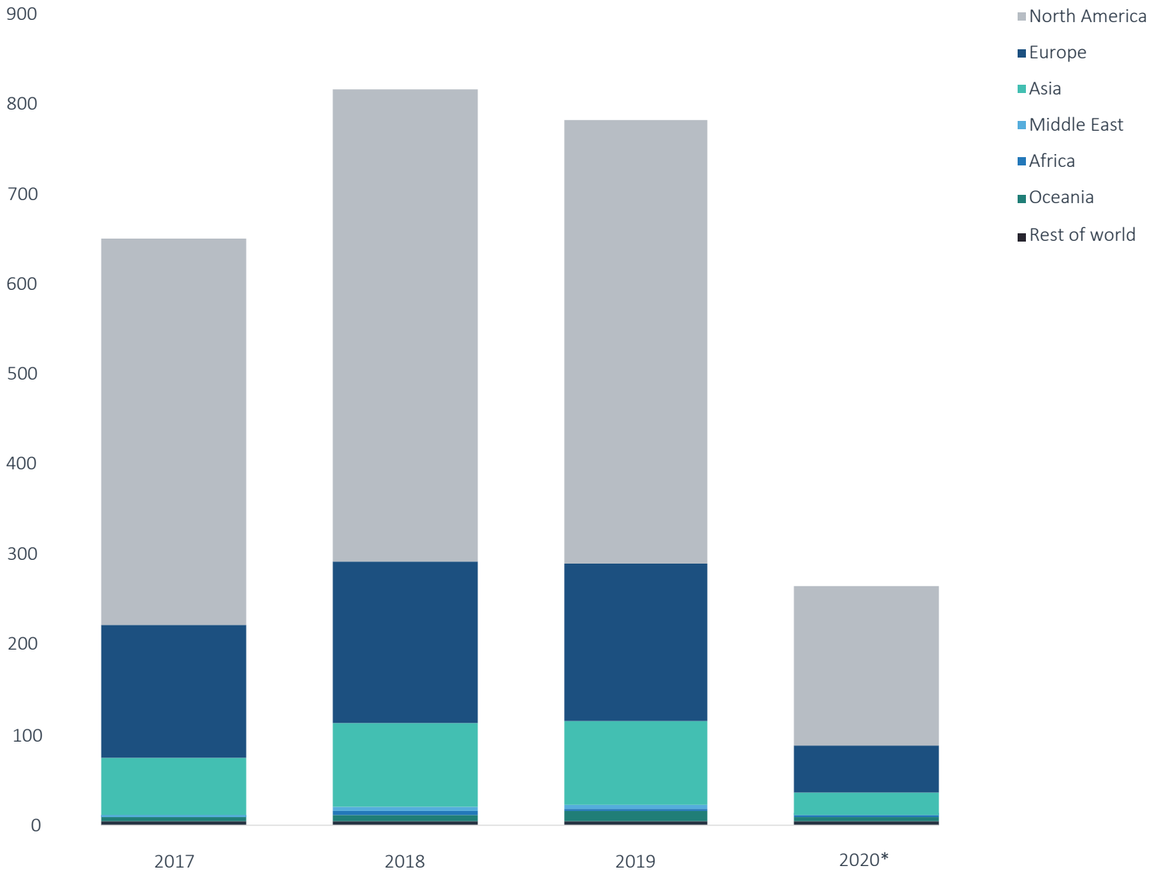
Retail health & wellness tech VC deals ($B) by region



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 56.

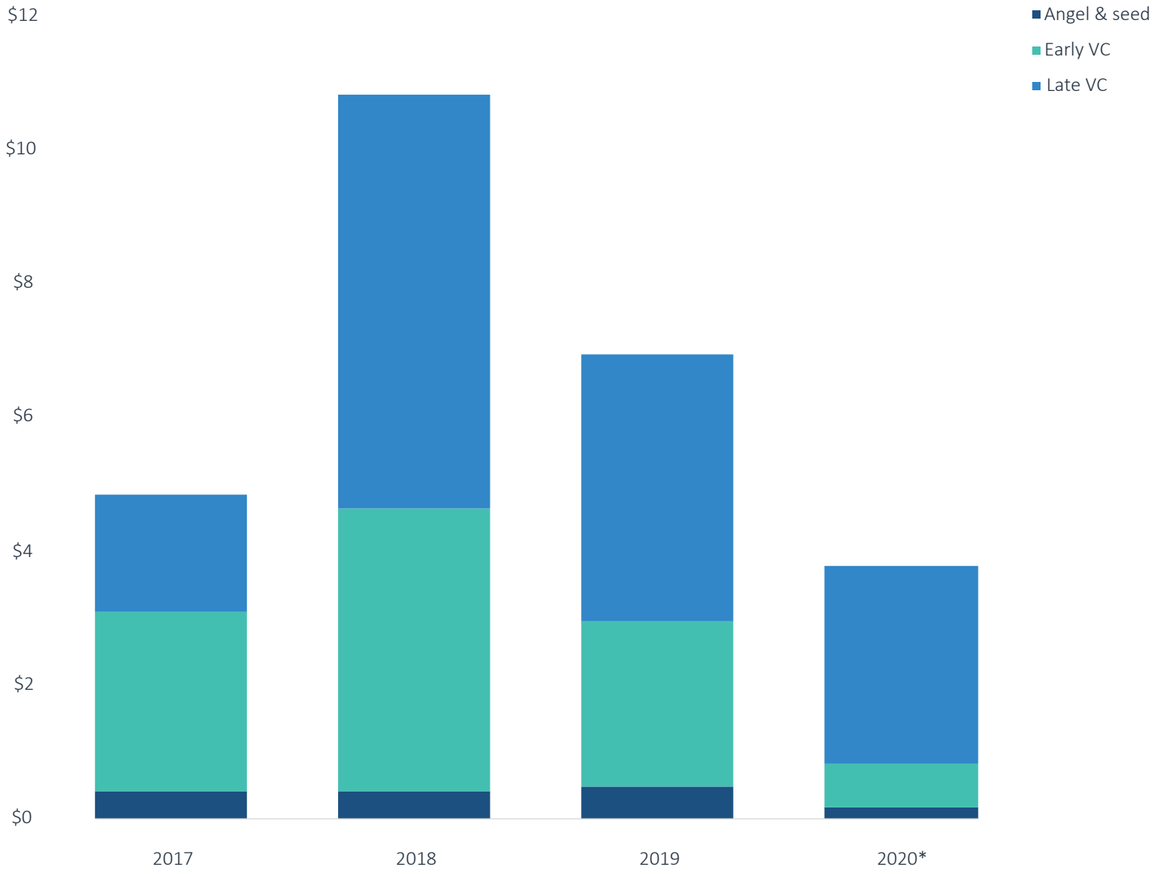
Retail health & wellness tech VC deals (#) by region



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 57.

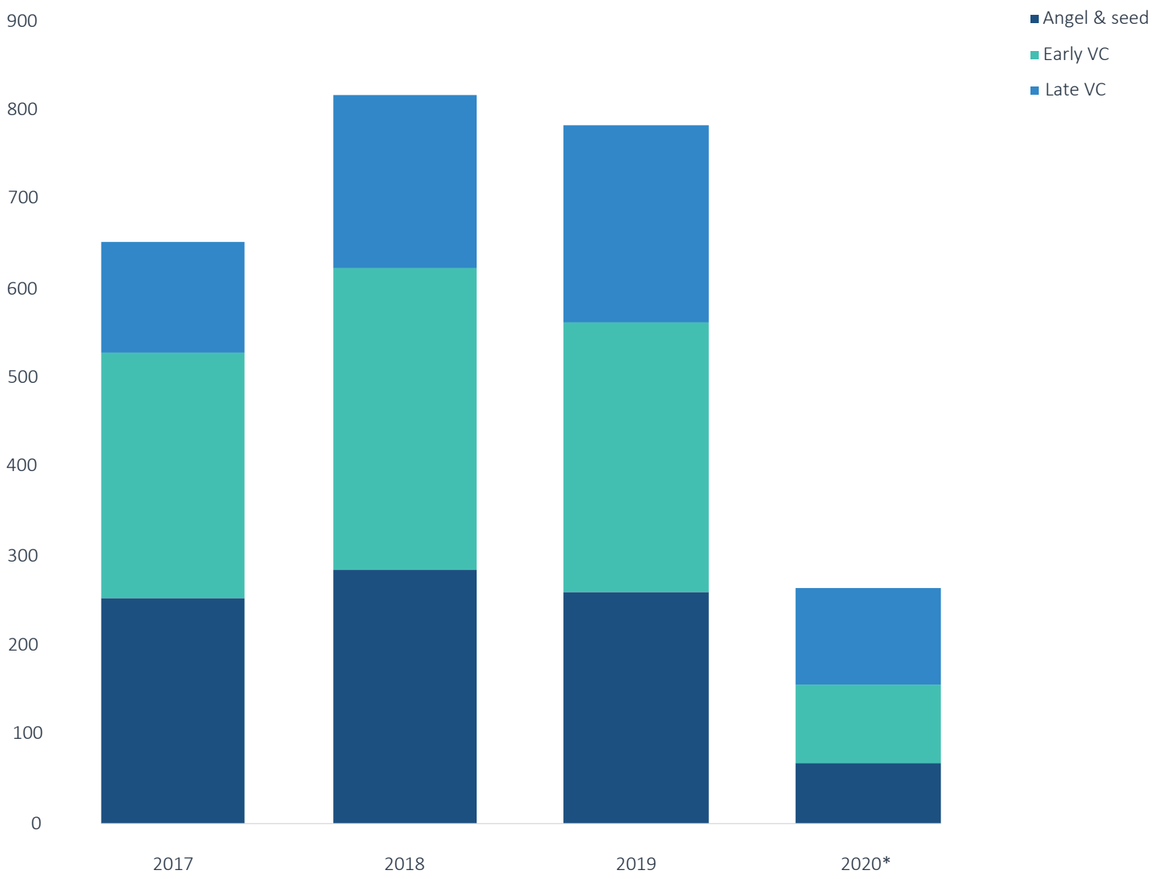
Retail health & wellness tech VC deals ($B) by stage



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 58.

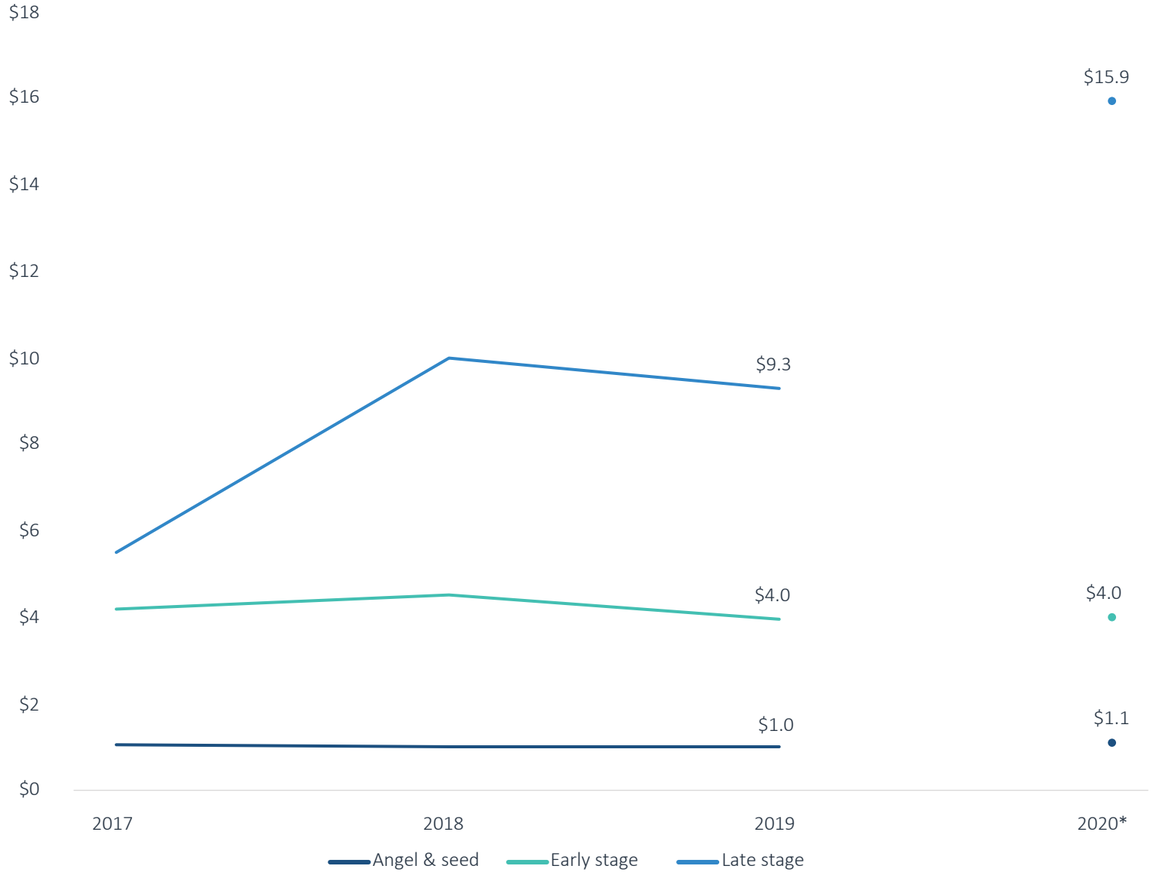
Retail health & wellness tech VC deals (#) by stage



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 59.

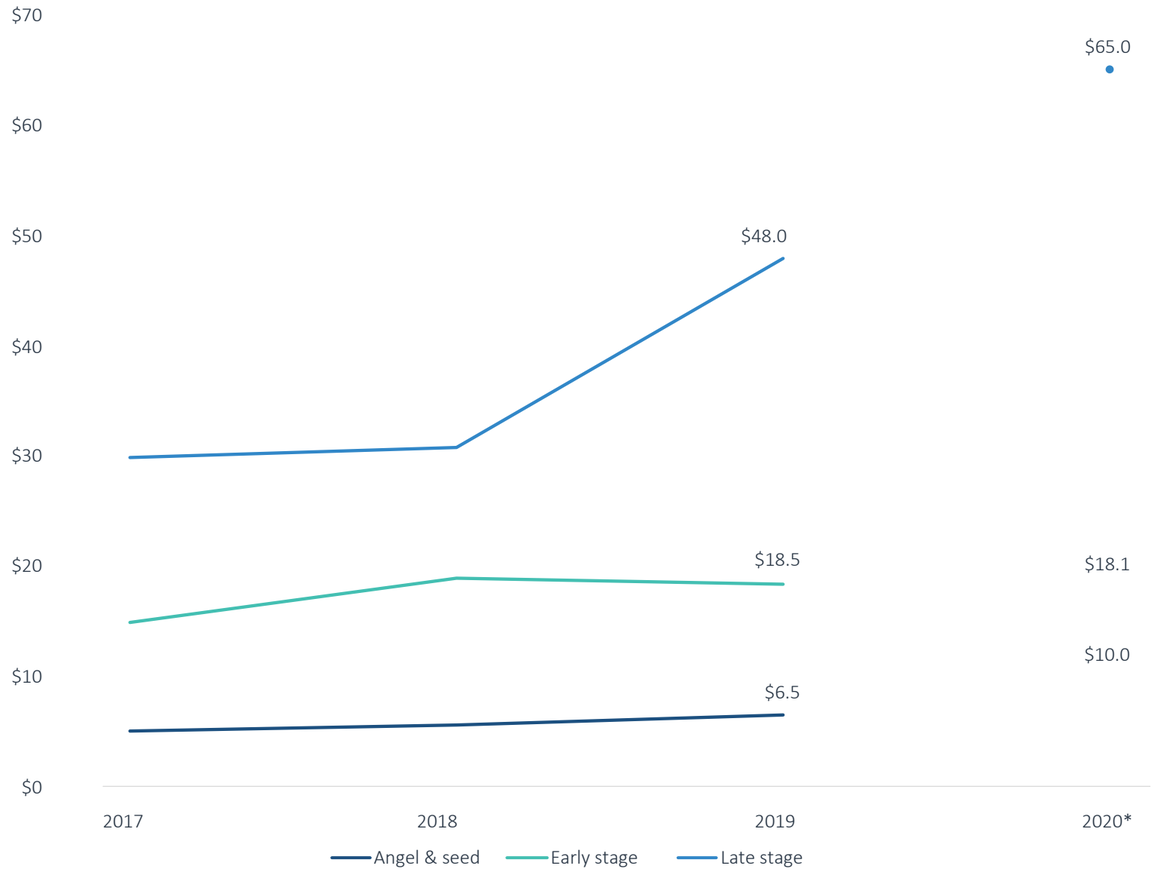
Median retail health & wellness tech VC deal size ($M) by stage



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 60.

Median retail health & wellness tech VC pre-money valuation ($M) by stage



Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 61.

Top 10 VC investors in retail health & wellness tech by deal count

INVESTOR	DEAL COUNT
Khosla Ventures	25
Alumni Ventures Group	22
Social Starts	18
StartUp Health	17
Keiretsu Forum	16
Founders Fund	15
Lerer Hippeau	13
True Ventures	13
Connecticut Innovations	13
GV	12
Right Side Capital Management	12

Source: PitchBook | Geography: Global
Note: This includes investors who made investments from 2018 through Q1 2020.

Figure 62.

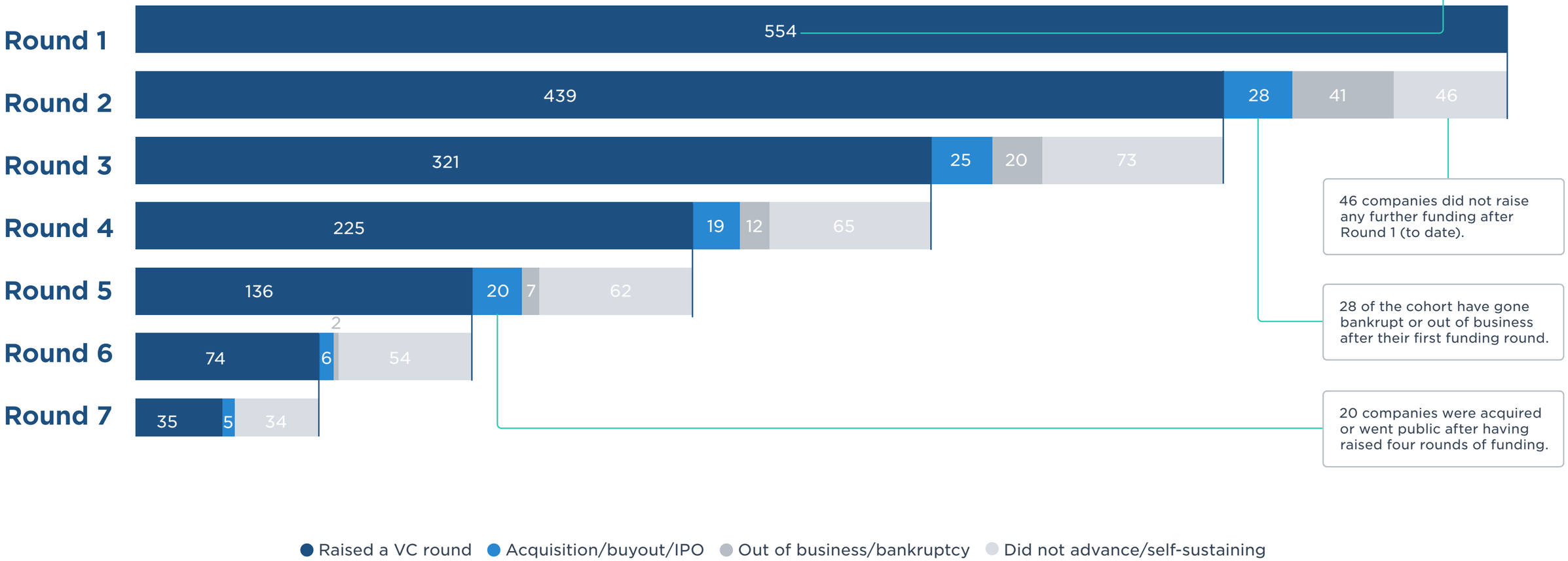
Current VC-backed retail health & wellness tech companies by VC raised

COMPANY	VC RAISED ($M)
Ping An Medical and Healthcare Management	$1,150
Amwell	$685
Babylon Health	$635
CureFit	$411
Welltok	$325
Omada	$258
Keep	$258
KRY	$251
SaiKeWang	$233
ZocDoc	$227

Source: PitchBook | Geography: Global

Retail health & wellness tech VC funnel

This VC funnel uses PitchBook data to analyze the VC funding life cycle by highlighting, by round, the number of firms that successfully raised a subsequent round, exited (through acquisition or IPO), went out of business or did not have a further liquidity event.



Buyers list

Figure 63.

Strategic buyers (corporations, holding companies & private companies)

STRATEGIC BUYERS	DEAL COUNT (2010-2020*)
Philips	2
Invitae	2
InTouch Health	2
Kerry Group	2
Teladoc Health	2
Amwell	2
Telus Health	1
Better Choice Company	1
MyRx365	1
Merck	1
CarePredict	1
Smith & Nephew	1

Source: PitchBook | Geography: Global
*As of June 30, 2020

Figure 64.

Financial buyers (PE groups)

STRATEGIC BUYERS	DEAL COUNT (2010-2020*)
Cedarlake Capital	2
K1 Investment Management	2
Vitruvian Partners	2
BPEA Private Equity	1
Consonance Capital	1
H.I.G. Growth Partners	1
Vestar Capital Partners	1
Audax Group	1
Foresite Capital Management	1
Marlin Equity Partners	1

Source: PitchBook | Geography: Global
*As of June 30, 2020

About PitchBook Emerging Tech Research

Independent, objective and timely market intel

As the private markets continue to grow in complexity and competition, it's essential for investors to understand the industries, sectors and companies driving the asset class.

Our Emerging Tech Research provides detailed analysis of nascent tech sectors so you can better navigate the changing markets you operate in—and pursue new opportunities with confidence.

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