



# Charting Disruption

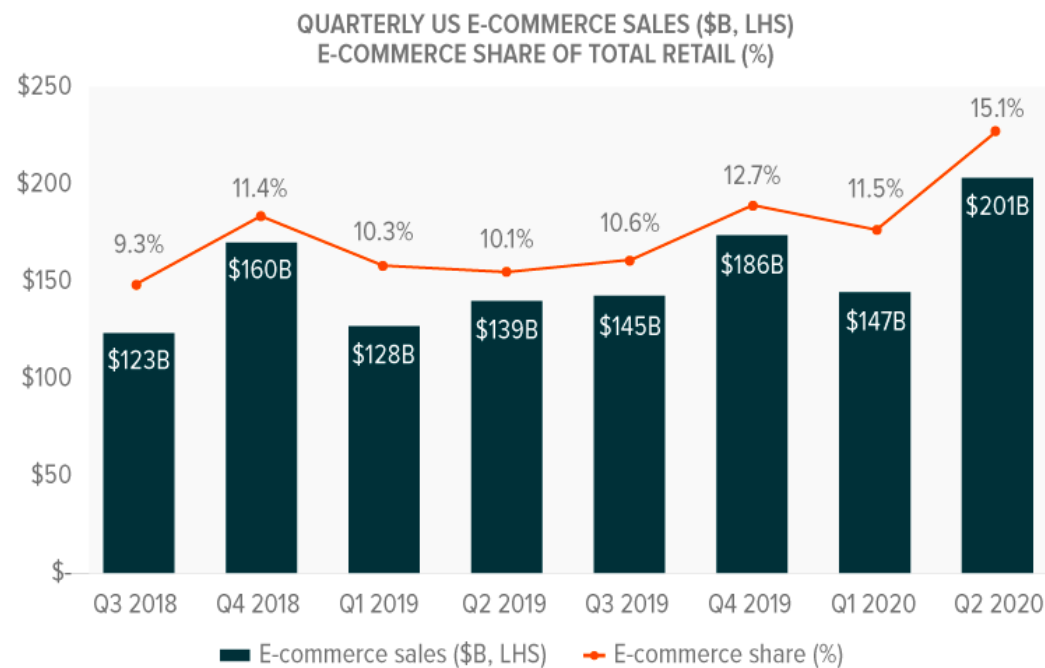
Insights into the World's Most Powerful Disruptive Themes

—  
Q3 2020

## E-Commerce: Rethinking Retail in the Reopening Economy

E-commerce became the keystone of retail sales and consumption at the height of the pandemic and stay-at-home economy. Faced with closed physical store fronts, consumers and retailers turned to digital commerce channels with many embracing the technology as an enhancement. Early signs show e-commerce could sustain and grow its newly acquired market share even as reopening continues, as the safety and convenience offered by e-commerce remains in favor.

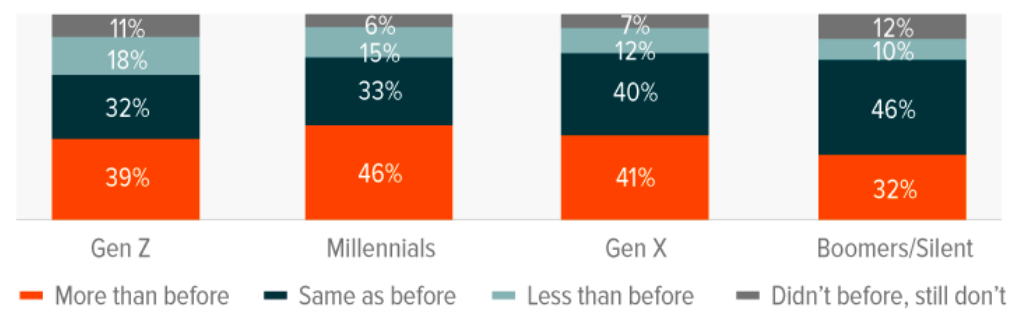
### E-COMMERCE CONTINUES TO GAIN RETAIL MARKET SHARE AMID PANDEMIC



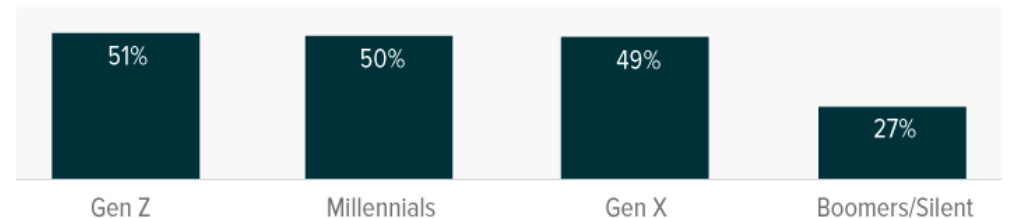
Note: Using unadjusted data, adjusted figures can be found on quarterly US Census E-commerce report.  
Source: Global X ETFs, US Census, August 2020.

### MANY INDIVIDUALS ARE SHOPPING ONLINE MORE DURING THE PANDEMIC, EXPECT TO SHOP ONLINE MORE FOLLOWING

#### SURVEY: RESPONDENTS' INDICATED ONLINE SHOPPING BEHAVIORS DURING PANDEMIC (%)



#### SURVEY: RESPONDENTS INDICATING MORE FREQUENT ONLINE SHOPPING POST-PANDEMIC (%)

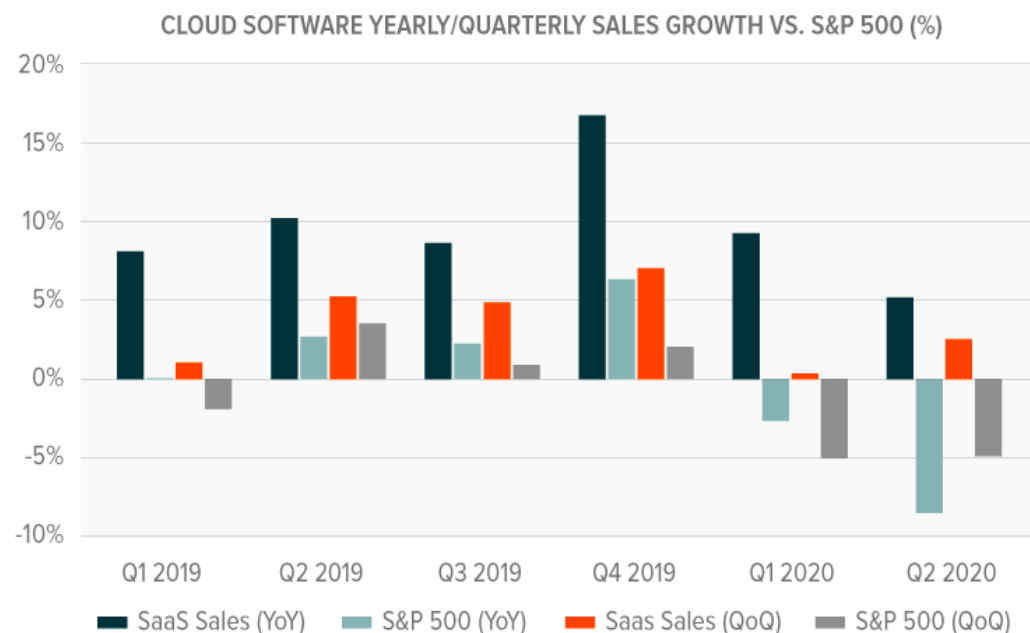


Note: N = 4,045 globally surveyed by Salesforce (Top); N = 15,271 globally surveyed by GWI (Bottom).  
Source(s): Salesforce, Aug 2020 (Top); Global Web Index, July 2020 (Bottom).

## Cloud Computing: The Engine Behind Work-From-Home & Remote Work

Businesses around the world quickly embraced cloud-based work-from-home (WFH) technologies to facilitate continuing operations amid the pandemic. Looking to reopening and beyond, cloud computing's importance to facilitating remote operations should remain extremely relevant amid changing attitudes towards work-from-home, reduced density in offices, and the potential for reinstated lockdown orders.

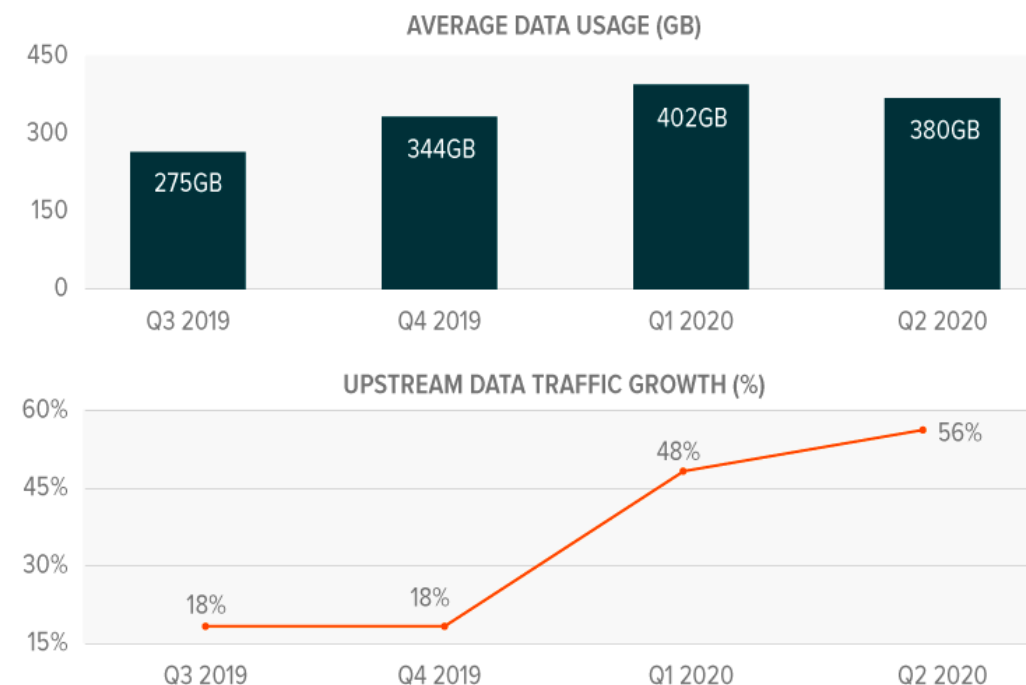
### REMOTE WORK DRIVES CONTINUED CLOUD-BASED SOFTWARE REVENUE GROWTH DESPITE S&P 500 SALES SLUMP



Note: Including 142/163 of GX Research's public SaaS universe & 498/505 S&P 500 members that reported Q2020 earnings as of 9/1/20.

Source: Global X ETFs, Factset, September 2020

### DATA USAGE REMAINS HIGH AS BUSINESSES EMBRACE HYBRID REMOTE/ON-PREMISE APPROACHES



Source: Global X ETFs, OpenVault, June 2020.

## Internet of Things: Connected Tech Can Help Reopening Efforts

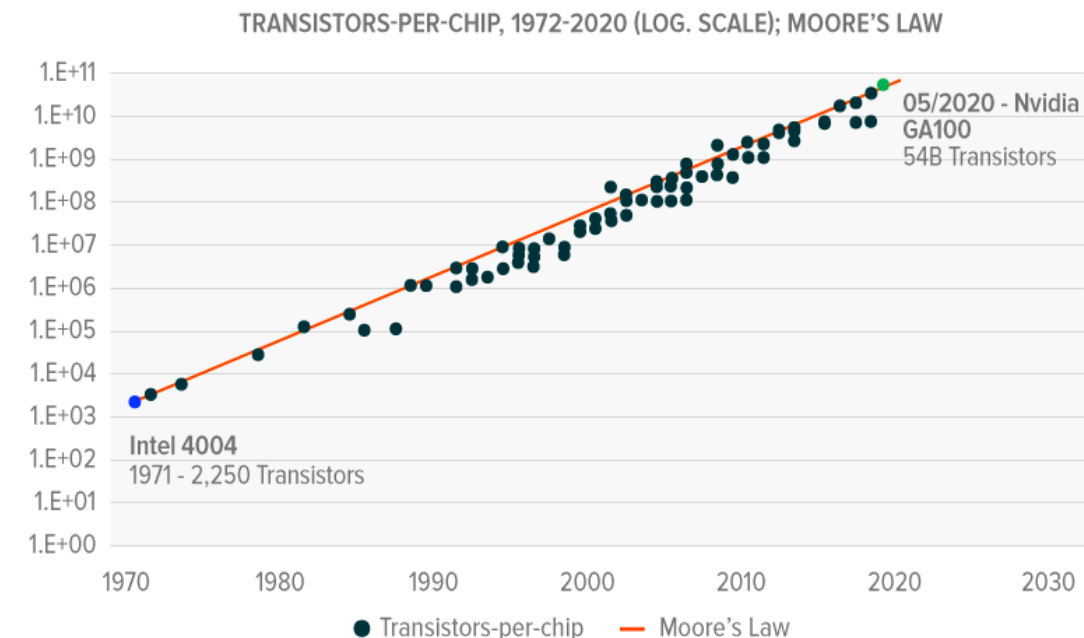
Connected sensors and wearables are likely to play an important role in the reopening economy as they are used to measure occupancy/density, take temperature readings, and even detect early signs of COVID-19 infection.

### MEANINGFUL IoT USE-CASES COME TO LIGHT DURING PANDEMIC, SUPPORTING FUTURE ADOPTION ACROSS MYRIAD SETTINGS

TECHNOLOGY	DESCRIPTION	PANDEMIC RELEVANCE	REOPENING APPLICATION	EXAMPLE
Sensors	Connected sensors transmit data about local environment.	<ul style="list-style-type: none"> <li>Proximity sensors</li> <li>Occupancy sensors</li> <li>Thermal imaging</li> </ul>	Proximity/occupancy sensors can ensure employees remain distant, thermal imaging can track symptoms.	<a href="#">Proximity sensors in Australia</a>
Wearables	Connected devices worn by individuals that transmit/process data about health & surroundings.	<ul style="list-style-type: none"> <li>Smart thermometers</li> <li>Connected oximeters</li> <li>Contact tracing wearables</li> </ul>	Connected wearables can help track general health and symptoms, also helping wearers contact trace.	<a href="#">Wearable thermometers in Irish hospitals</a>
Drones	Connected aircraft that use sensors, cameras, GPS to navigate & transmit/process data.	<ul style="list-style-type: none"> <li>Medical delivery drone</li> <li>Surveillance drone</li> <li>Disinfectant drone</li> </ul>	Connected drones can deliver medical supplies/samples, reducing human contact.	<a href="#">Chinese medical drones in action</a>
Robots	Programmable connected machines that receive instructions via data transmission and act on them.	<ul style="list-style-type: none"> <li>Medical robots</li> <li>Disinfectant robots</li> <li>Collaborative robots</li> <li>Public health robots</li> </ul>	Medical robots can autonomously monitor patients and disinfect hospitals. Robots can limit human interaction across industries.	<a href="#">Use of connected robots during COVID-19</a>

Source: Global X ETFs, August 2020.

### MOORE'S LAW PERSISTS IN 2020 AS GPU TRANSISTOR COUNTS CONTINUE TO RISE

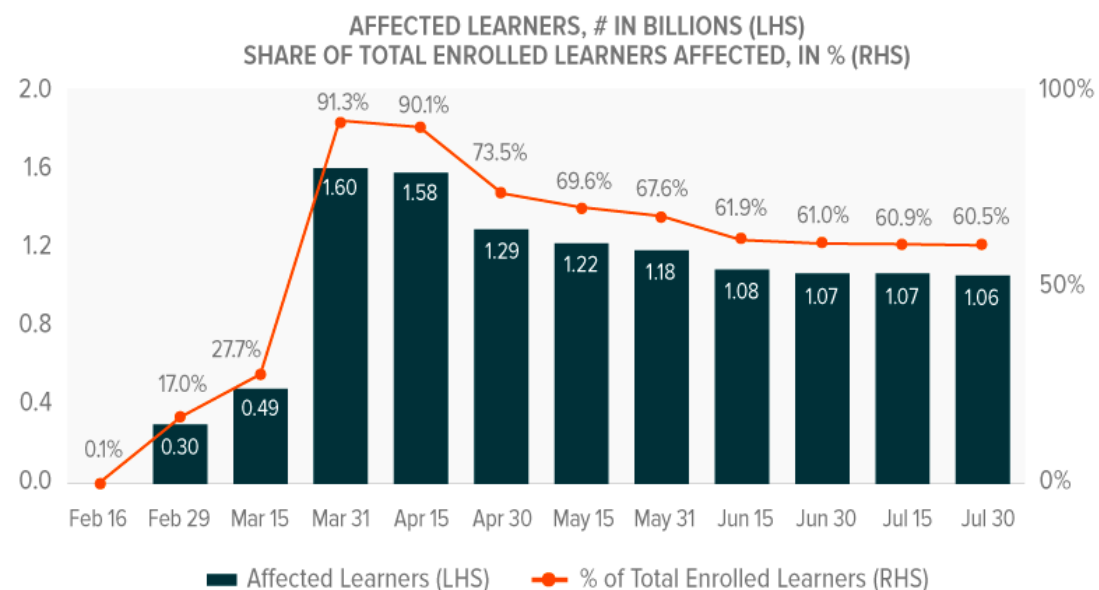


Source: Karl Rupp (2011-2019 data), M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten (1971-2010 data), Global X ETFs, 2020.

## Education: An Industry Ripe for Tech Transformation

With reopening coinciding with the start of the 2020/21 school year, educators, students and parents alike are seeking effective and safe ways to continue education efforts. Many are looking to leverage digital mediums as the world strives to reduce in-person interactions.

### COVID-INDUCED SCHOOL CLOSURES MAKE A CASE FOR VIRTUAL LEARNING AS SCHOOL YEAR COMMENCES

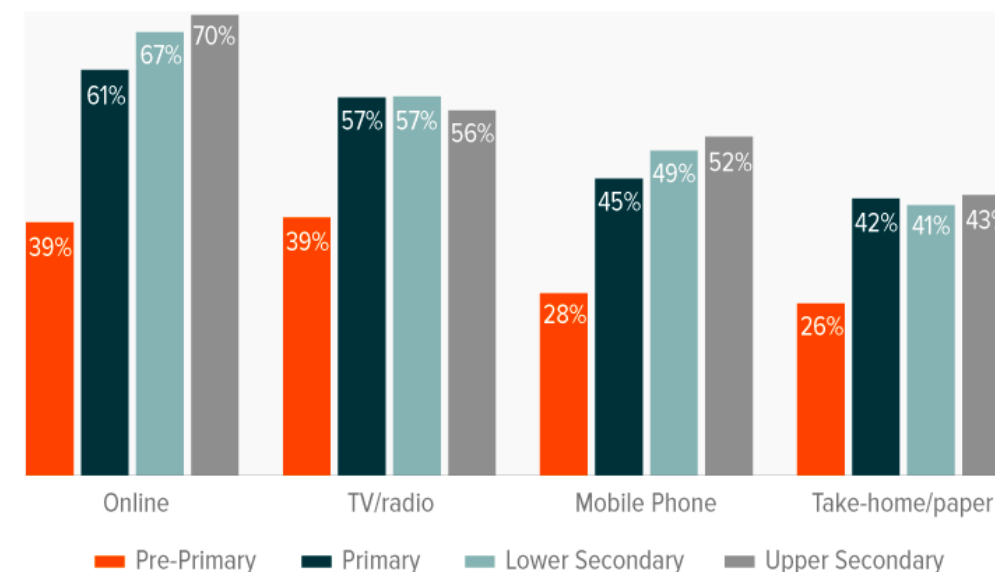


Note: Figures correspond to number of learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education [ISCED levels 0 to 3], as well as tertiary education levels [ISCED levels 5 to 8] (per UNESCO Data) cross referenced with school closure data.

Source: Global X ETFs, UNESCO, August 2020.

### VIRTUAL EDUCATION TECHNOLOGIES HAVE BEEN EMPLOYED ACROSS THE GLOBE AT SIGNIFICANT SCALE

% OF COUNTRIES ENGAGED IN DISTANCE LEARNING BY METHOD/EDUCATION LEVEL



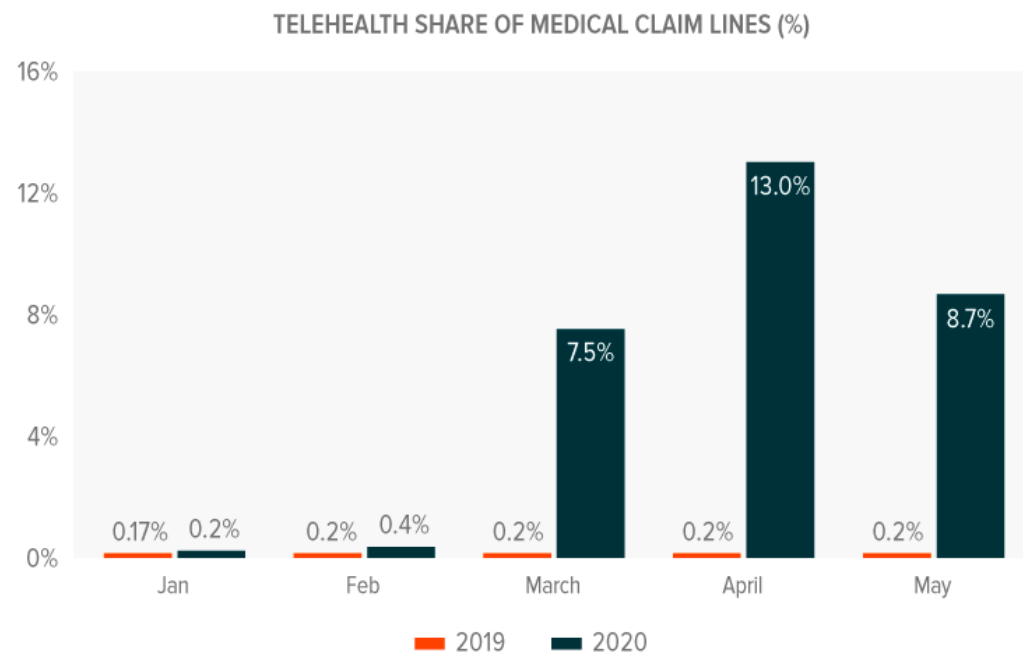
Note: Global X analysis of COVID education survey database hosted by United Nations.

Source: Global X ETFs, UNESCO, UNICEF, World Bank, June 2020.

## Telemedicine & Digital Health: COVID-19 Set Disruption In Motion

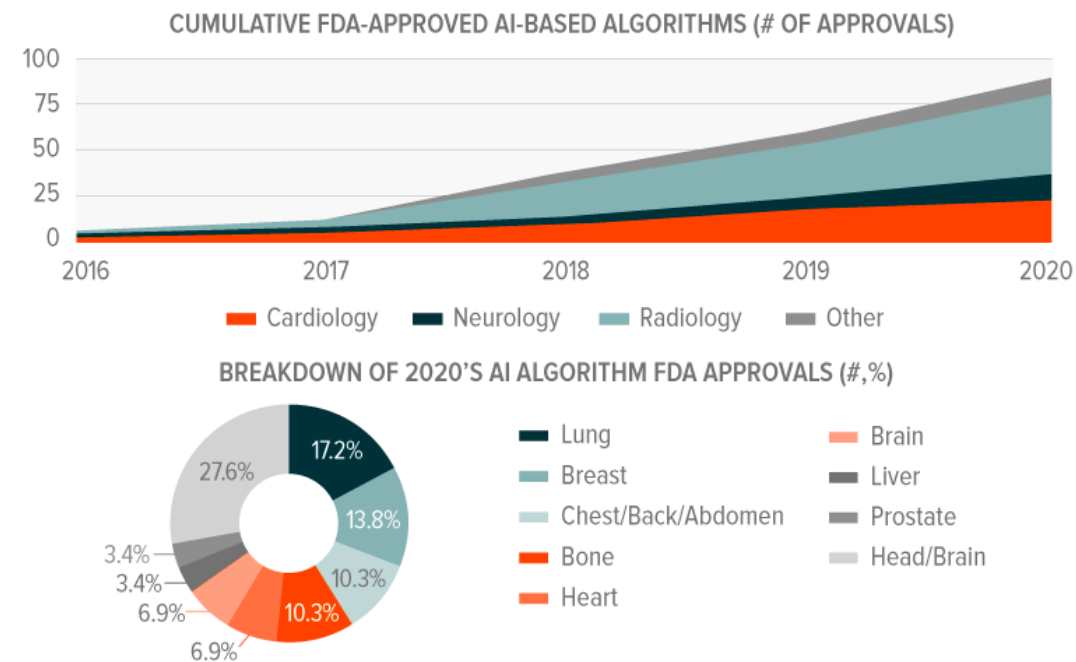
During stay-at-home orders, technology-based tools that facilitate remote communication with doctors and enable patient monitoring became critical. As we move beyond the pandemic, we expect many of these technologies to see continued adoption across global health care systems due to their cost efficiencies and improved patient outcomes.

### PANDEMIC DRIVES RAPID ADOPTION AND FREQUENT USE OF VIRTUAL HEALTH CARE SERVICES



Source: Global X ETFs, Fair Health, August 2020.

### DIGITAL TRANSFORMATION IN HEALTH CARE EXTENDS BEYOND VIRTUAL APPOINTMENTS TO DIAGNOSES & TREATMENTS



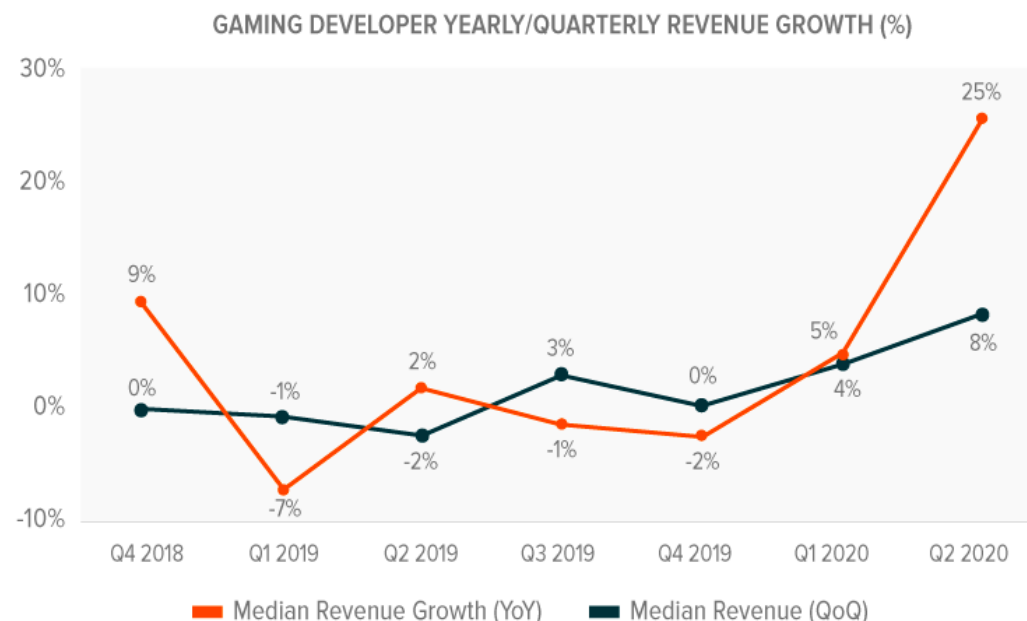
Note: 2020 approvals are as of 7/30/2020.

Source: Global X ETFs, Medical Futuris, American College of Radiology, 2020.

## Video Games & Esports: Gaming Sales Soar

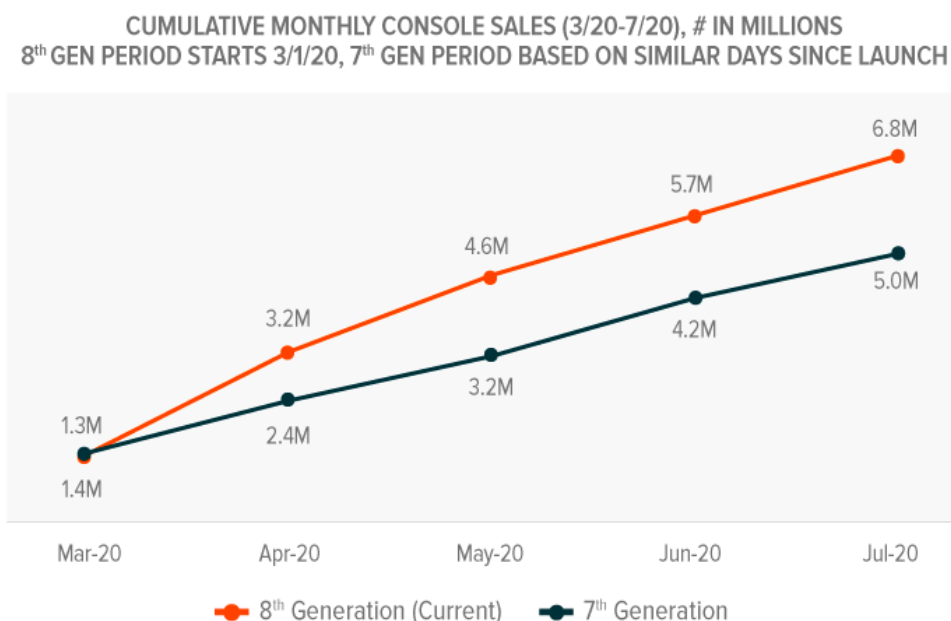
Stuck at home and without their accustomed entertainment mediums, individuals across the world and generations turned to gaming to fill the void. Sales of video games and consoles reflect how the environment served as a tailwind for the space. We expect these pandemic-trends to continue through and after reopening...(next slide)

### GAMING DEVELOPER EARNINGS REFLECT DRASTIC UPTICK IN VIDEO GAME ACTIVITY AND SPENDING



Note: Universe of global companies with gaming software revenue exposure > 50%, market cap > \$100M, only including 50 names that reported CY 2Q earnings as of 8/17/20. YoY = Year-over-Year; QoQ = Quarter-over-Quarter  
Source: Global X ETFs, Factset, August 2020.

### MANY YEARS AFTER LAUNCHING, 8<sup>TH</sup> GENERATION CONSOLE SALES REMAINED ROBUST RELATIVE TO PAST GENERATIONS

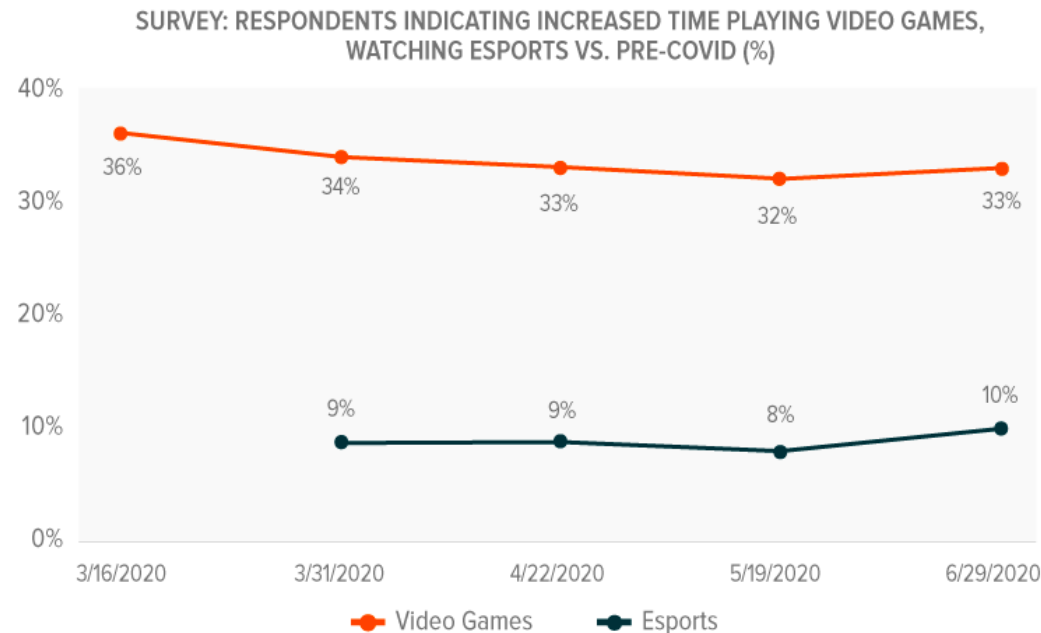


Note: 8th gen limited to PS4/Xbox One, 7th gen limited to PS3/Xbox 360. 7th gen period starts 2,298 days from launch (Xbox 360 3/8/2012; PS3 2/25/2013).  
Source: Global X ETFs, VGChartz, 2020.

## Video Games & Esports: Audiences Remain Above Pre-Pandemic Levels

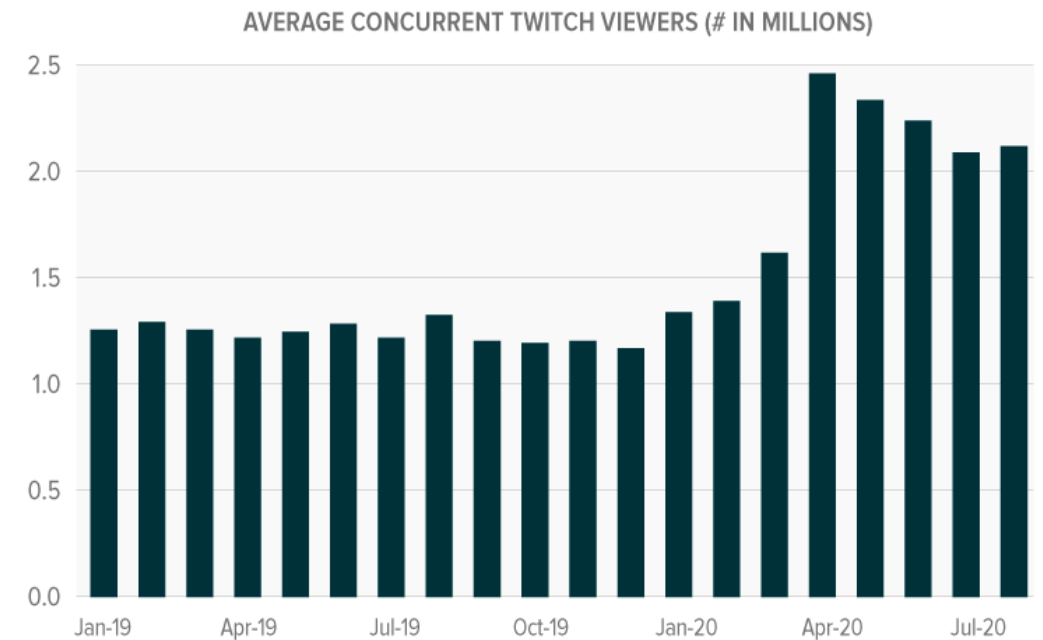
Even as reopening expands which leisure activities are permissible and as increasing employment means more time spent at work, individuals still indicate that they are spending more time playing video games and watching esports than before the pandemic. This likely reflects increased interest among casual/new audiences that re-engaged with gaming during stay-at-home orders and is illustrative of how the space has become an environment for socialization.

### VIDEO GAMES & ESPORTS ENGAGEMENT REMAINS STICKY AND ABOVE PRE-COVID LEVELS AS ECONOMIES REOPEN



Note: Composite analysis of 5 iterations of Global Web Index surveys. For most recent survey, N = 15,271 global internet users.  
Source: Global X ETFs, Global Web Index, August 2020.

### SIZE OF VIDEO GAME STREAMING AUDIENCES CONTINUES TO ECLIPSE PRE-COVID LEVELS



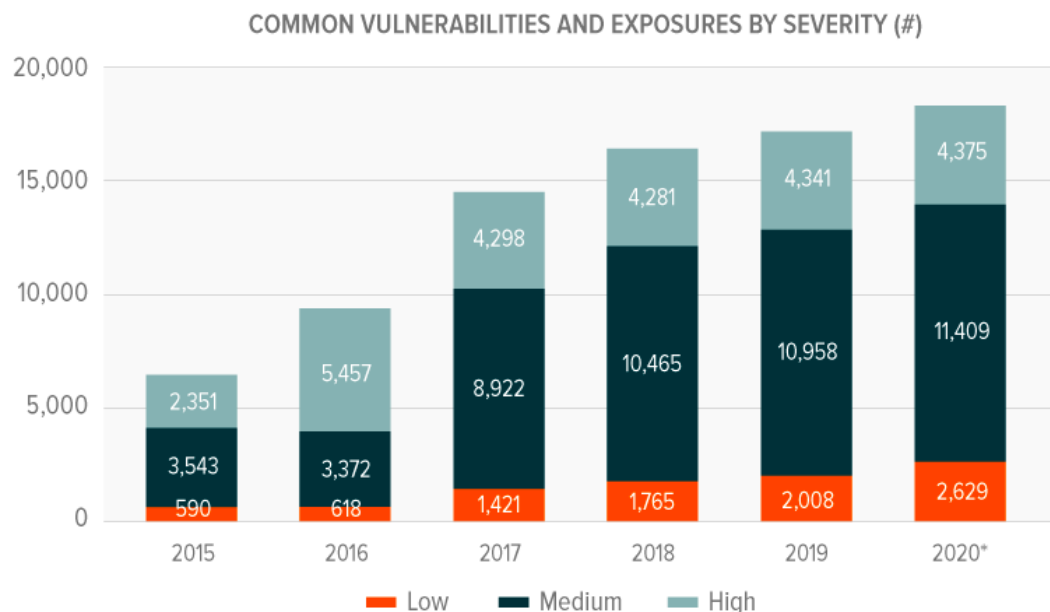
Source: Twitch Tracker, August 2020.



## Cybersecurity: Securing Technology Critical to Reopening

Cyber-attacks are increasing, and with dispersed work forces amid work-from-home and/or hybrid remote work arrangements, there are more points of entry for cyber-criminals. Growth in distance learning, telemedicine, digital health, and the internet of things creates additional challenges that cybersecurity seeks to address.

### GROWING NUMBER OF SYSTEM VULNERABILITIES ILLUSTRATES CURRENT ENVIRONMENT'S HEIGHTENED CYBER-RISK



Note: 2020 data up to 8/16/2020, projected out to end of year. Severity determined by CVSS V2 base score.  
Source: Global X ETFs, National Vulnerability Database, August 2020.

### RANSOMWARE IMPACTS MANY SECTORS CRITICAL TO NAVIGATING REOPENING ECONOMY

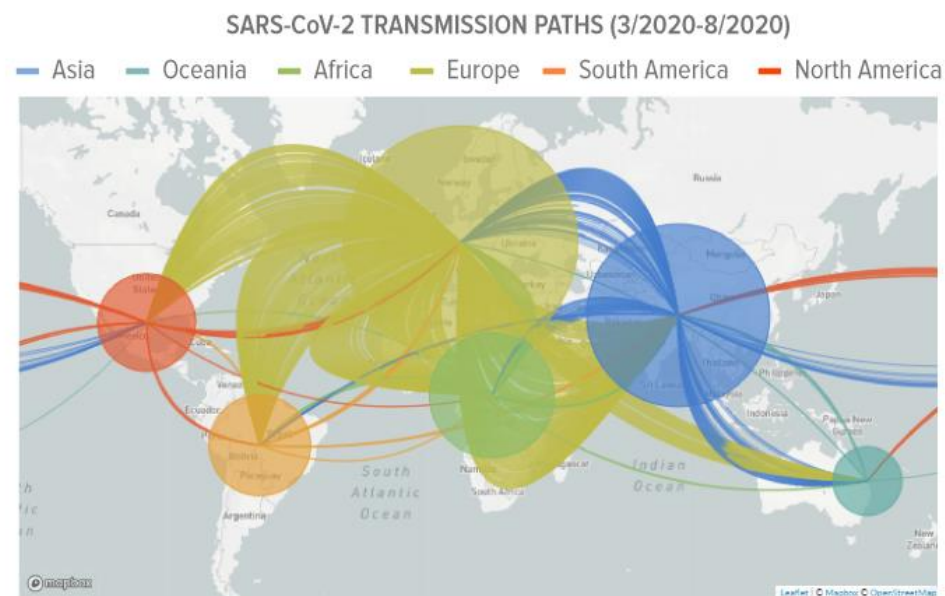


Source: Fortinet, August 2020.

## Genomics: Genome Sequencing Key to Surveillance, Diagnostics

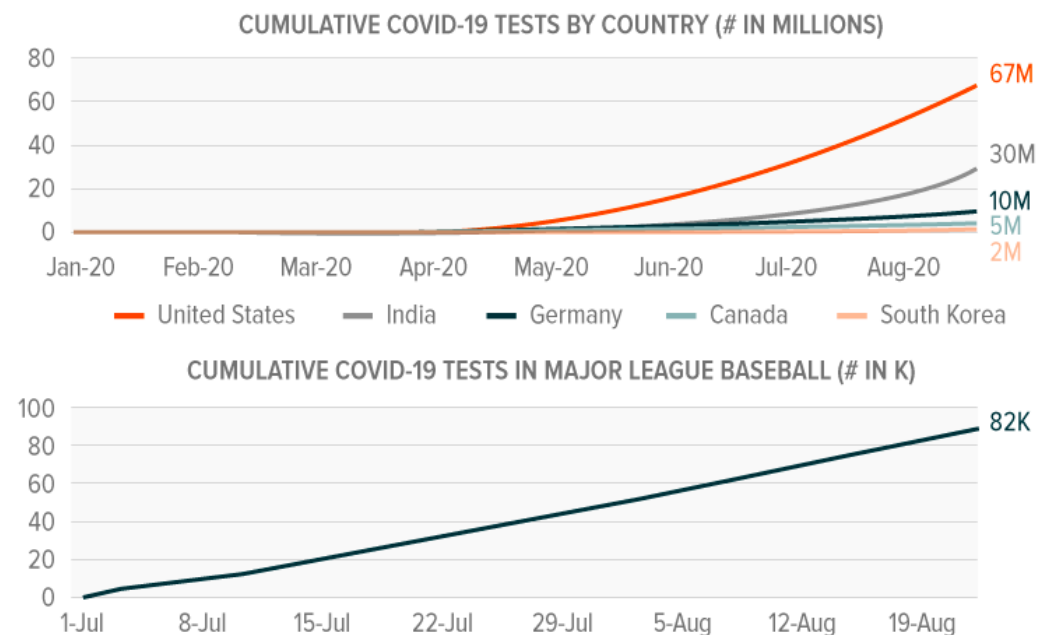
Genomic subspecies like genomic sequencing and computational genomics are foundational to COVID-19 surveillance and diagnostics. Equipped with viral genomes and patient testing data, governments, businesses, and organizations can understand the virus and track the way it spreads and mutates to inform their mitigation efforts.

### SURVEILLANCE TESTING VIA NEXT GENERATION SEQUENCING ENABLES MAPPING OF SARS-CoV-2 TRANSMISSION PATHS



Note: Showing 4046 genomes sampled between 3/1/2020 and 8/1/2020. The data presented here is intended to rapidly disseminate analysis of important pathogens. Unpublished data is included with permission of the data generators, and does not impact their right to publish. A full list of sequence authors is available via [nextstrain.org](https://nextstrain.org). Licensed under CC-BY. Source: Hadfield et al., Nextstrain: real time tracking of pathogen evolution, Bioinformatics (2018); NextStrain.org, Aug 2020.

### COUNTRIES & ORGANIZATIONS RAMP UP COVID-19 TESTING TO LIMIT SPREAD & ENABLE REOPENING THROUGH EARLY DETECTION



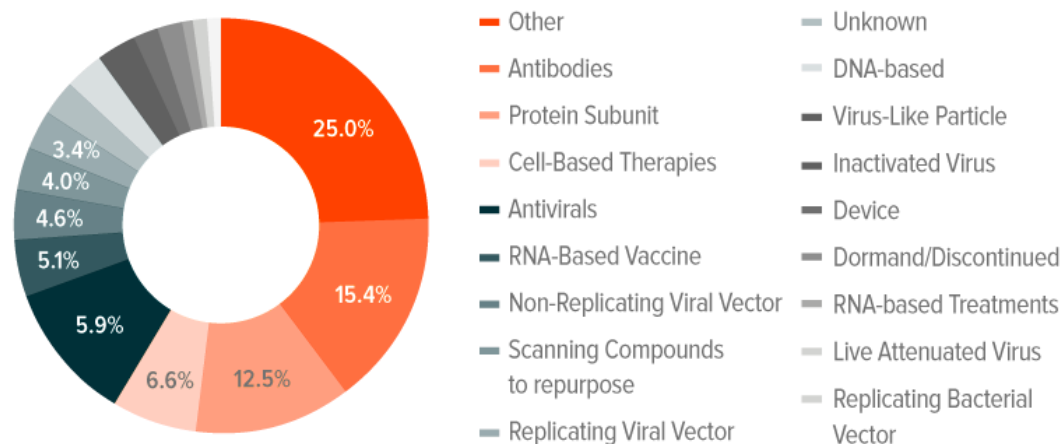
Note: Countries report testing across various testing methods with varying accuracy. Chart is best effort representation of testing (Top); Data from weekly MLB/MLBPA press releases (Bottom). Source: Global X ETFs, Our World in Data, MLB, Aug 2020.

# Genomics: Developing Potential Treatments & Vaccines for COVID-19

COVID-19 mobilized the global medical community to collaborate and pool resources to limit the devastating impacts and loss of life caused by the disease. Treatments and vaccines derived from genomic data could present our most immediate hopes of treating those afflicted, making reopening successful and thwarting future outbreaks.

## GLOBAL EFFORTS TO TREAT AND CURE COVID-19 SPAN DIVERSE APPROACHES AND METHODS RELATED TO GENOMICS

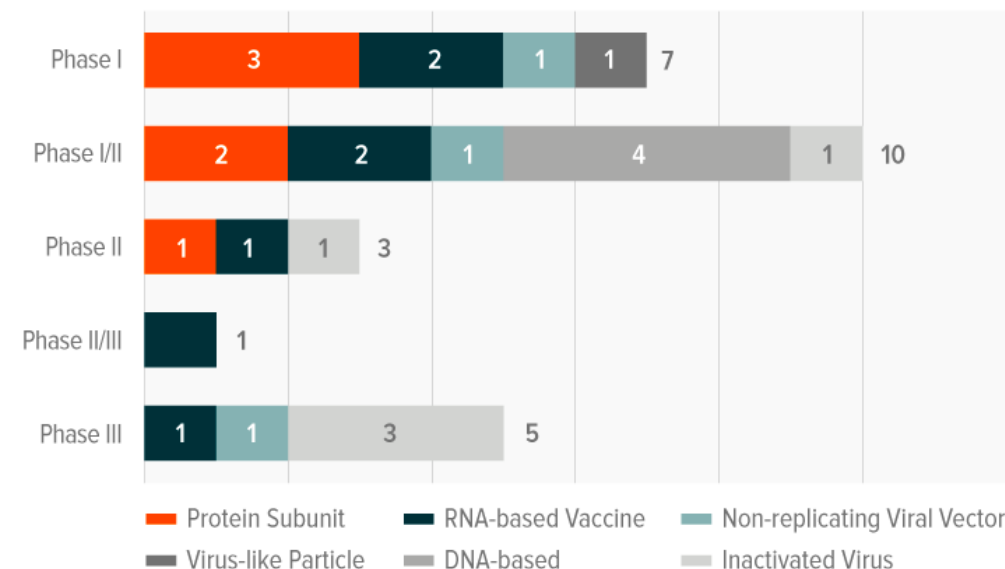
BREAKDOWN OF COVID-19 TREATMENTS AND VACCINES, BY CATEGORY (% OF TOTAL)



Note: 527 different COVID-19 treatments and vaccines, categorized by the Milken Institute - covid-19tracker.milkeninstitute.org  
Source: Global X ETFs, Milken Institute, Aug 21, 2020.

## OVER 25 TREATMENTS/VACCINES HAVE ADVANCED INTO CLINICAL TRIAL PHASE AS OF AUGUST 21, 2020

BREAKDOWN OF COVID-19 PHASE 1-3 CLINICAL TRIALS (# OF TREATMENTS/VACCINES)



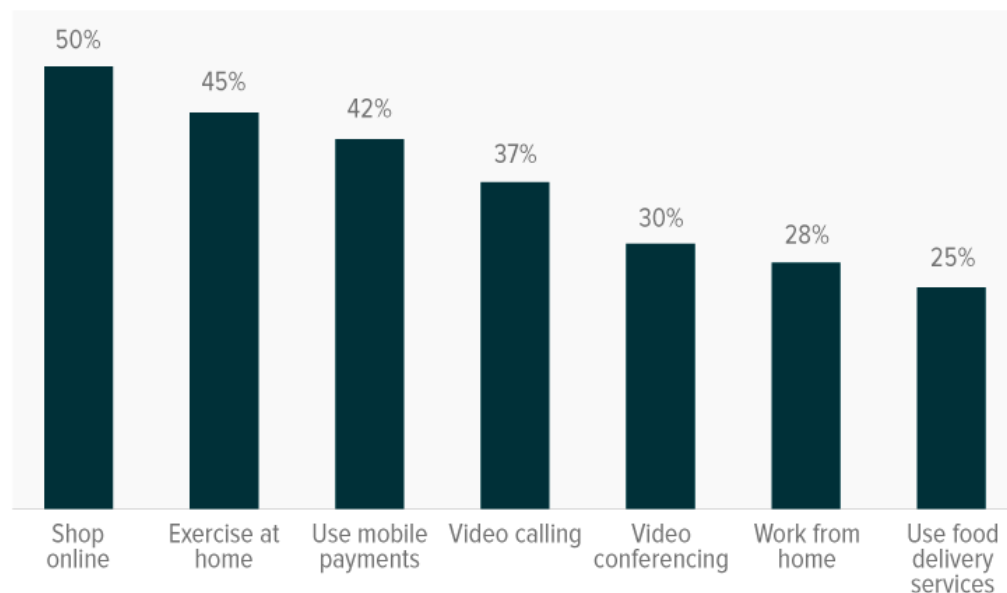
Note: 527 different COVID-19 treatments and vaccines, categorized by the Milken Institute - covid-19tracker.milkeninstitute.org  
Source: Global X ETFs, Milken Institute, Aug 21, 2020.

## Millennials: Pandemic Accelerated or Reversed Certain Behaviors

COVID-19 accelerated Millennials' adoption of disruptive technologies like e-commerce, digital payments, video communications and more. Additionally, the pandemic is pausing or reversing Millennials' migration to cities with many moving to the suburbs or to temporary living situations as the crisis runs its course.

### MILLENNIALS EXPECT MANY PANDEMIC-DRIVEN BEHAVIORS TO STICK IN THE LONG-TERM

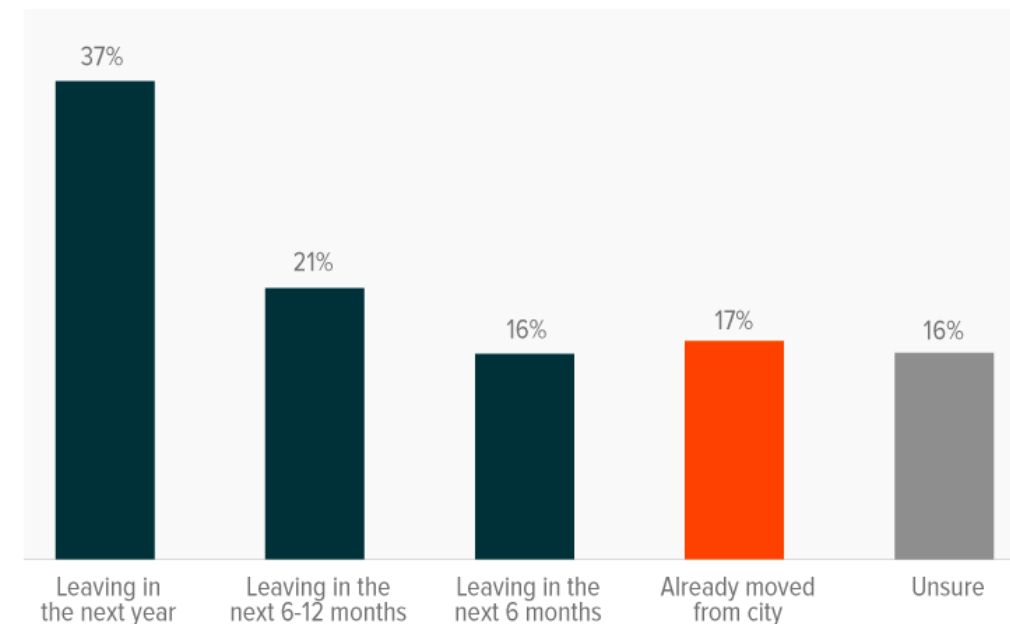
SURVEY: MILLENNIALS INDICATING POST-PANDEMIC ACTIVITY INCREASE (%)



Note: N = 15,271 global internet users surveyed by Global Web Index.  
Source: Global X ETFs, Global Web Index, July 2020.

### OVER ONE-THIRD OF MILLENNIALS RENTING IN CITIES PLAN TO MOVE HOMES

SURVEY: INDICATED IMPACT OF PANDEMIC ON MILLENNIAL CITY-LIVING SITUATIONS (%)

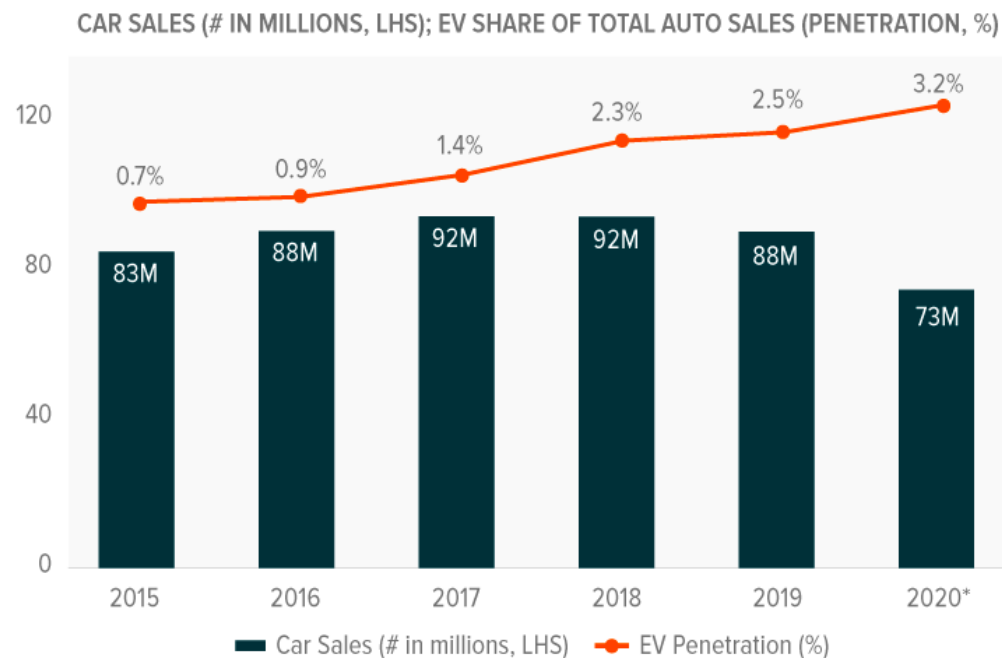


Note: N = 1,000 millennial renters in cities across the US; all indicating future move included in "moving in the next year" bucket.  
Source: Global X ETFs, Quicken, 2020.

## Electric Vehicles & Lithium Battery Tech: Current Resilience & Future Demands

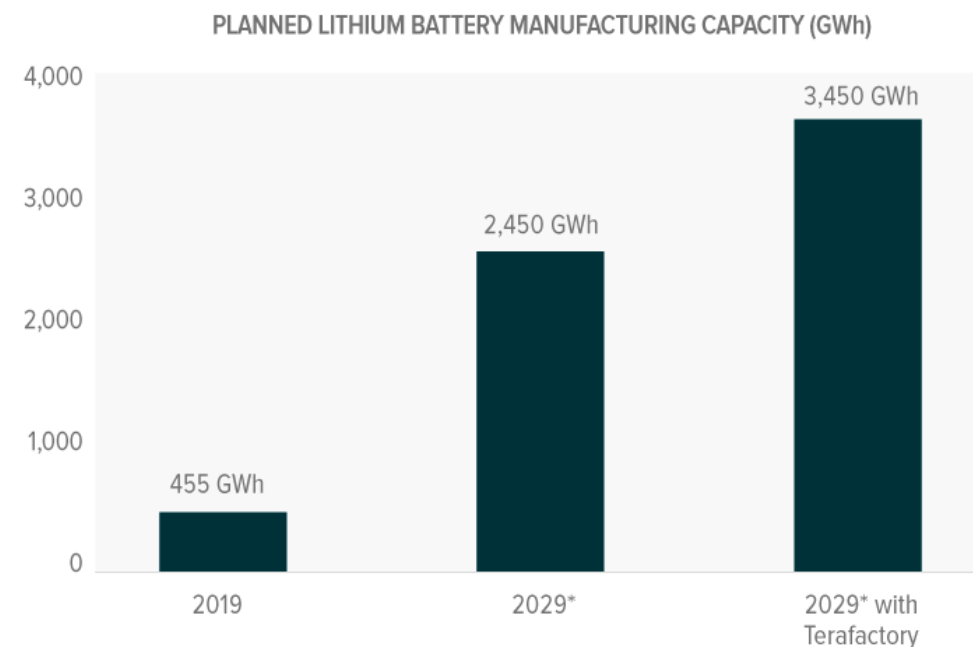
Despite pandemic-driven economic woes negatively impacting the overall market for automobiles, electric vehicles continued to gain market share versus their internal combustion engine counterparts. This demonstrates the resilience of EV demand and should have upstream impacts that include increased manufacturing capacity for lithium-ion battery manufacturers.

### DESPITE COVID'S NEGATIVE IMPACT ON OVERALL AUTO SALES, EV PENETRATION CONTINUES TO RISE



Source: Global X ETFs, IEA, August 2020.

### WITH EV BOOM IN MIND, LITHIUM BATTERY MANUFACTURERS PLAN TO SCALE CAPACITY



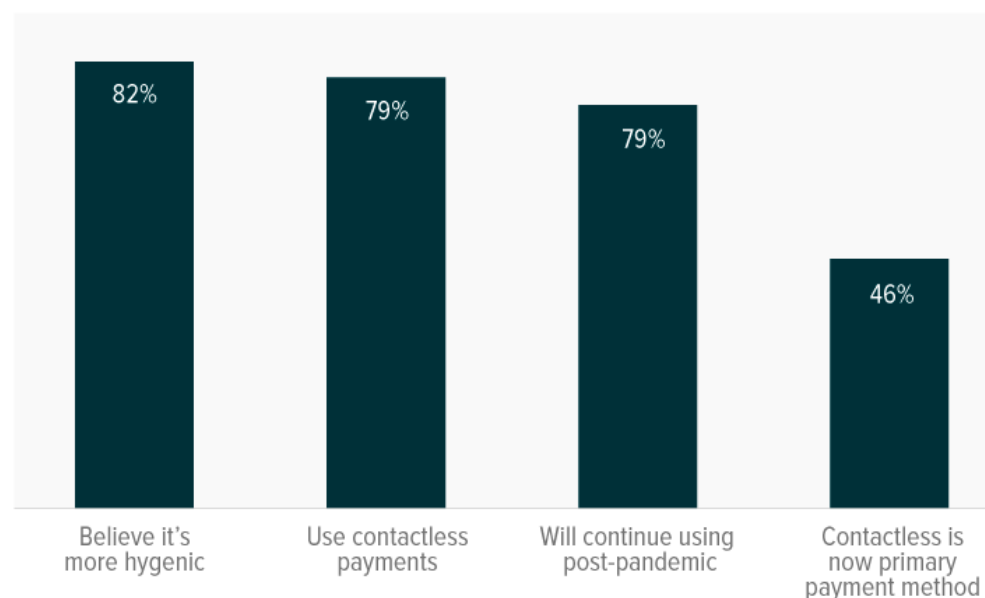
Source: Benchmark Mineral Intelligence, 2020.

## FinTech: Contactless Payment Volumes Rise as Adoption Increases

FinTech solutions like digital and contactless payments have seen increased adoption as individuals seek to limit physical touchpoints that could lead to infection and prolong the pandemic. We think that contactless payment adoption will continue to grow in a post-pandemic reality and that other fintech solutions that enable/streamline virtual finance and commerce will similarly benefit.

### COVID-19 IS DRIVING CONSUMERS TO ADOPT CONTACTLESS PAYMENTS TO AVOID PHYSICAL TOUCH

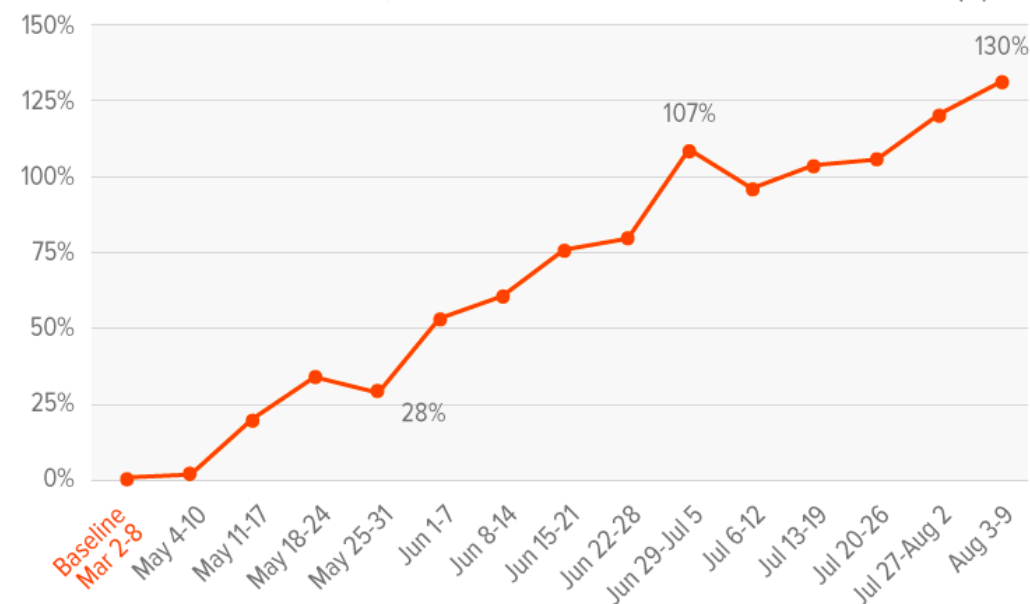
SURVEY: CONSUMER CONTACTLESS PAYMENT SENTIMENT (%)



Note: Mastercard survey; N = 17,000 consumers in 19 countries, surveyed in mid-April 2020.  
Source: Mastercard, April 2020.

### CONTACTLESS PAYMENT VOLUMES CONTINUE TO RISE, REFLECTING NEW, POSITIVE VENDOR & BUYER SENTIMENT

WEEKLY CONTACTLESS \$ PAYMENT VOLUME GROWTH VS 3/2 - 3/8 BASELINE (%)



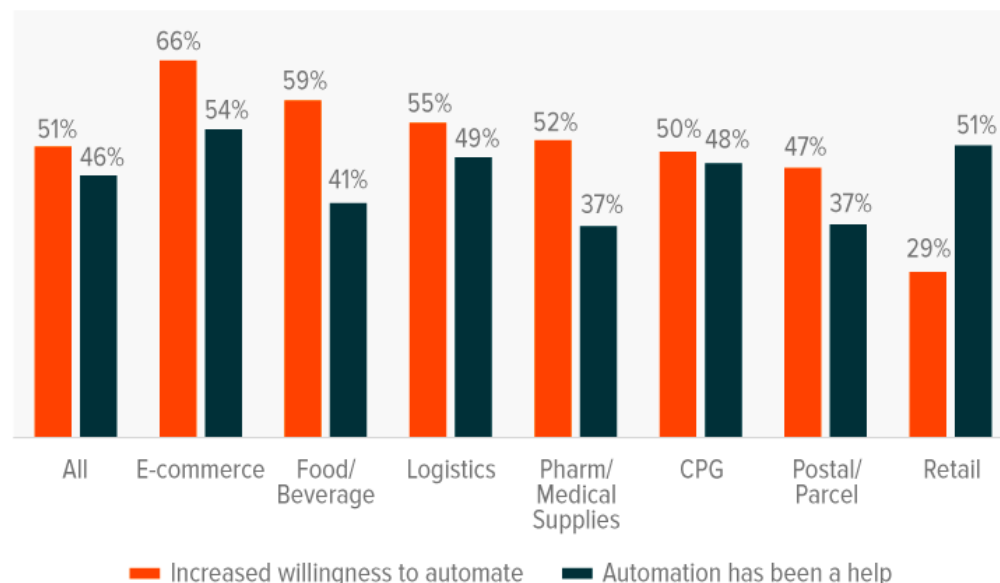
Note: N = 60k US small businesses that use CardFlight software. Data shows \$ payment volume % change vs. baseline.  
Source: Global X ETFs, Card Flight Small Business Report, August 2020.

## Robotics & Artificial Intelligence: Enhancing Business Continuity & Enabling Supply Chain Reshoring

Robotics, artificial intelligence, and other automation technologies have gained favor as businesses look for solutions that allow for continued operations if workers are unable to be physically present. Further, disruptive macro events like trade conflicts and the pandemic at-hand are pushing firms to reshore their supply chains; a trend that is likely to propel automation as firms look to affordably maintain/increase production.

### AUTOMATION HAS PROVEN ITS WORTH TO MANY ENTERPRISES DURING THE PANDEMIC

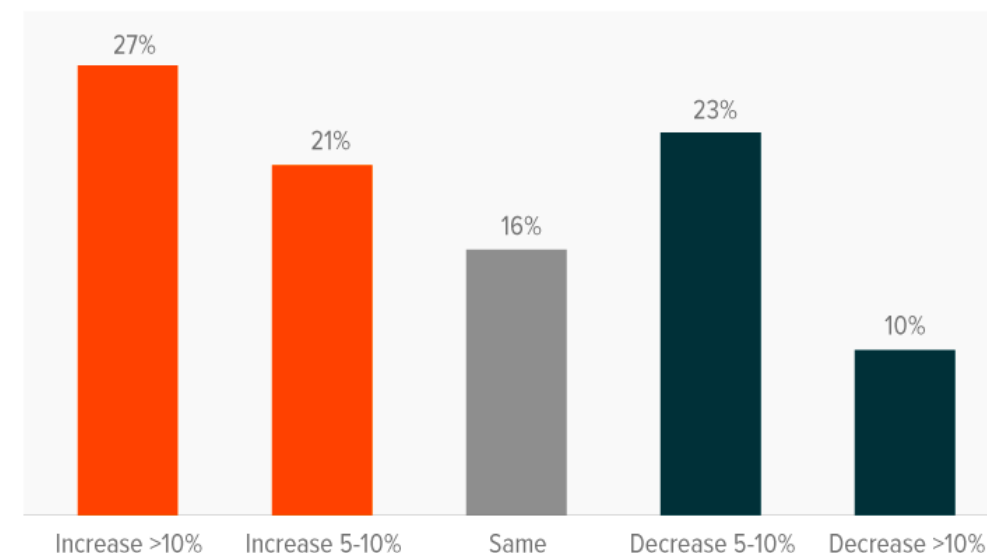
SURVEY: US EXECS' ATTITUDES TOWARD AUTOMATION AMID PANDEMIC (%)



Note: N = 434 US senior corporate decision makers.  
Source: Global X ETFs, Honeywell, KRC Research, August 2020.

### AUTOMATION SPENDING SHOULD TICK UPWARD IN CURRENT AND POST-PANDEMIC ENVIRONMENT

SURVEY: RESPONDENTS INDICATING CHANGES IN AUTOMATION SPENDING PLANS OVER NEXT 12 MONTHS (%)



Note: N = 160 global corporate decision makers; numbers may not add up to 100% due to N/A  
Source: Forester, UliPath, May 2020.



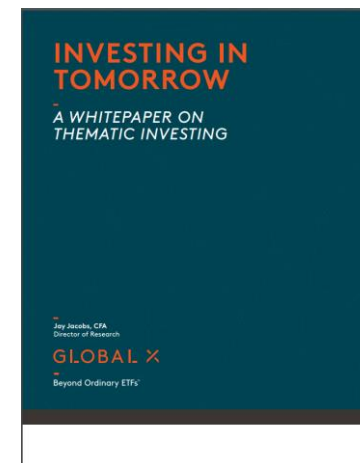
## More Research On Thematic Investing

See our latest research on thematic investing for more information on these powerful trends, or visit [globalxetfs.com/research](https://globalxetfs.com/research)

- [Introducing the Global X Telemedicine & Digital Health ETF \(EDOC\)](#)
- [Thematic ETF Report Q2 2020](#)
- [Introducing the Global X Education ETF \(EDUT\)](#)
- [Genomics: How a Cutting-Edge Field is Fighting COVID-19](#)
- [Can Lithium Keep Up With the EV Boom?](#)
- [Video Game Industry Hits Reset in 2020](#)
- [Thematic Disruption Accelerates & Expands Amid COVID-19 Pandemic](#)
- [Global X ETFs: 2020 Second Half Outlook](#)
- [How the Cannabis Industry is Coping in 2020](#)
- [An Infrastructure Plan for the 21st Century](#)
- [Theme Lab: A Look Inside An Amazon Fulfillment Center](#)
- [How Supply Chain Disruptions Are Accelerating Robotics Adoption](#)
- [Mapping the Cloud: A Look at the Segments Driving Growth](#)
- [Thematic Growth Valuation Analysis](#)
- [How Cybersecurity Will Accelerate IoT's Growth](#)

You can also follow us on twitter:

- [\*\*@JayJacobsCFA\*\*](#)
- [\*\*@ALittle\\_gx\*\*](#)
- [\*\*@PPalandrani\\_gx\*\*](#)





## Global X Thematic Growth ETF Suite

Global X has 19 ETFs designed to target companies that may benefit from disruptive structural changes in technology and innovation, people and demographics, and the physical environment, in addition to 1 multi-theme, single-ticker ETF<sup>1</sup>. To see individual ETF holdings across the Global X Thematic Growth Suite, click the below links:

### Disruptive Technology

[Global X Social Media ETF \(SOCL\)](#)

[Global X Lithium & Battery Tech ETF \(LIT\)](#)

[Global X FinTech ETF \(FINX\)](#)

[Global X Internet of Things ETF \(SNSR\)](#)

[Global X Autonomous & Electric Vehicles ETF \(DRIV\)](#)

[Global X Future Analytics Tech ETF \(AIQ\)](#)

[Global X Cloud Computing ETF \(CLOU\)](#)

[Global X Robotics & Artificial Intelligence ETF \(BOTZ\)](#)

[Global X Video Games & Esports ETF \(HERO\)](#)

[Global X Cybersecurity ETF \(BUG\)](#)

### Physical Environment

[Global X U.S. Infrastructure Development ETF \(PAVE\)](#)

### People & Demographics

[Global X Millennials Thematic ETF \(MILN\)](#)

[Global X Longevity Thematic ETF \(LNGR\)](#)

[Global X Health & Wellness Thematic ETF \(BFIT\)](#)

[Global X E-commerce ETF \(EBIZ\)](#)

[Global X Cannabis ETF \(POTX\)](#)

[Global X Genomics & Biotechnology ETF \(GNOM\)](#)

[Global X Education ETF \(EDUT\)](#)

[Global X Telemedicine & Digital Health ETF \(EDOC\)](#)

### Multi-Theme

[Global X Thematic Growth ETF \(GXTG\)](#)

<sup>1</sup>As of 08/28/2020

## Disclosures

Investing involves risk, including the possible loss of principal. There is no guarantee the strategies discussed will be successful. International investments may involve risk of capital loss from unfavorable fluctuation in currency values, from differences in generally accepted accounting principles or from economic or political instability in other nations. Emerging markets involve heightened risks related to the same factors as well as increased volatility and lower trading volume. Narrowly focused investments may be subject to higher volatility. The investable universe for thematic ETFs may be limited. The funds are non-diversified.

Video Game and Esports and Cybersecurity Companies are subject to risks associated with additional regulatory oversight with regard to privacy/cybersecurity concerns, shifting consumer preferences, and potential licensing challenges. Declining or fluctuating subscription renewal rates for products/services or the loss or impairment of intellectual property rights could adversely affect profits. Thematic companies may have limited product lines, markets, financial resources or personnel. They typically engage in significant amounts of spending on research and development, capital expenditures and mergers and acquisitions.

The risks related to investing in cloud computing companies include disruption in service caused by hardware or software failure, interruptions or delays in service by third-party data center hosting facilities and maintenance providers, security breaches involving certain private, sensitive, proprietary and confidential information managed and transmitted by cloud computing companies, and privacy concerns and laws, evolving Internet regulation and other foreign or domestic regulations that may limit or otherwise affect the operations of such companies. Education companies may be affected by changes in demographics and consumer demands, and government regulations, programs and policies.

Investing in securities engaged in the social media industry include disruption in service caused by hardware or software failure; interruptions or delays in service by third-parties; security breaches involving certain private, sensitive, proprietary and confidential information managed and transmitted by social media companies; and privacy concerns and laws, evolving Internet regulation and other foreign or domestic regulations that may limit or otherwise affect the operations of such companies. Health Care and Information Technology sectors can be affected by government regulations, rapid product obsolescence, intense industry competition and loss or impairment of patents or intellectual property rights.

Information Technology companies can be affected by rapid product obsolescence, and intense industry competition. Risks include disruption in service caused by hardware or software failure; interruptions or delays in service by third-parties; security breaches involving certain private, sensitive, proprietary and confidential information managed and transmitted; and privacy concerns and laws, evolving Internet regulation and other foreign or domestic regulations that may limit or otherwise affect the operations.

***Carefully consider the Funds' investment objectives, risk factors, charges, and expenses before investing. This and additional information can be found in the Funds' summary or full prospectus, which may be obtained by calling 1.888.493.8631, or by visiting [globalxetfs.com](https://globalxetfs.com). Please read the prospectus carefully before investing.***

Global X Management Company LLC serves as an advisor to Global X Funds. The Funds are distributed by SEI Investments Distribution Co. (SIDCO), which is not affiliated with Global X Management Company LLC or Mirae Asset Global Investments.

This information is not intended to be individual or personalized investment or tax advice and should not be used for trading purposes. Please consult a financial advisor or tax professional for more information regarding your investment and/or tax situation.