Getting a move on

Health and fitness wearables and apps, a six country survey

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July 2022
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Project overview

- Sample size of over 18,000 respondents across six countries (China, France, Germany, Italy, United Kingdom, United States) to determine the impact of wearables and apps use on physical activity during the pandemic period.
- Across the six countries surveyed, respondents whose first use of fitness and health devices and apps occurred **during and due to the pandemic were twice as likely to have increased their physical activity and exercise intensity during the pandemic** than the respondents who did not start using a wearable or app during the pandemic.
- The 3 “I”s of health and fitness technology:
  - **Inspect**: **Users track on average between four and five metrics** about their bodies and activity.
  - **Interpret**: Tracking enables new insights based on the collected data. For instance, **around half of users of sleep trackers only found out about their lack of sleep or sleep quality** through the tracking output.
  - **Improve**: Consistently, **more than 70% of tracking users find their devices and apps helpful in achieving their fitness and health goals.**
- **Health and fitness apps’ effect on exercise intensity is similar across income brackets.** Virtually all income brackets in all countries surveyed **increase their average daily exercise time when they use tracking functions**.
- Among those who use fitness and health technology, the 55+ age group is not only using a similar set of functions as younger respondents, but also the **elderly (age 55+) in Germany, France, and Italy keep track of more metrics than younger respondents.** The 55+ age group also sees higher increases in their physical activity by tracking than younger users.
- Consequently, there is **substantial upward potential in terms of achieving SDG 3** and increasing awareness of health and fitness since **overall usage levels of health and fitness technology drop below average around the age of 50.**
- **Employees are ready to welcome health and fitness technology into the workplace if it makes employers more mindful of their employees’ specific needs.** Around half of them agree that it would be great if the employer used such technology to tailor breaks to their needs. **Generally, employees look out for technology that helps them to improve their mental performance even more than their physical performance.**

Introduction

Today, access to tracking technology is almost ubiquitous. Virtually any smartphone features some health and fitness tracking by default. Smart wristbands and watches have become more affordable. New devices to inspect, interpret, and improve one's physical or mental activity gain traction with consumers. This report sets out to shed a spotlight on actual use of health and fitness wearables rather than ownership focused on in typical market reports. The findings are based on a six country survey of more than 18,000 consumers.

Our starting point was the obvious challenge of a further downgrade in physical activity for many due to the necessary mobility restrictions in the fight against the COVID-19 pandemic, such as work from home, gym closures, and more. **We wanted to understand if and how health and fitness wearables and apps can alleviate some of these curbs.**

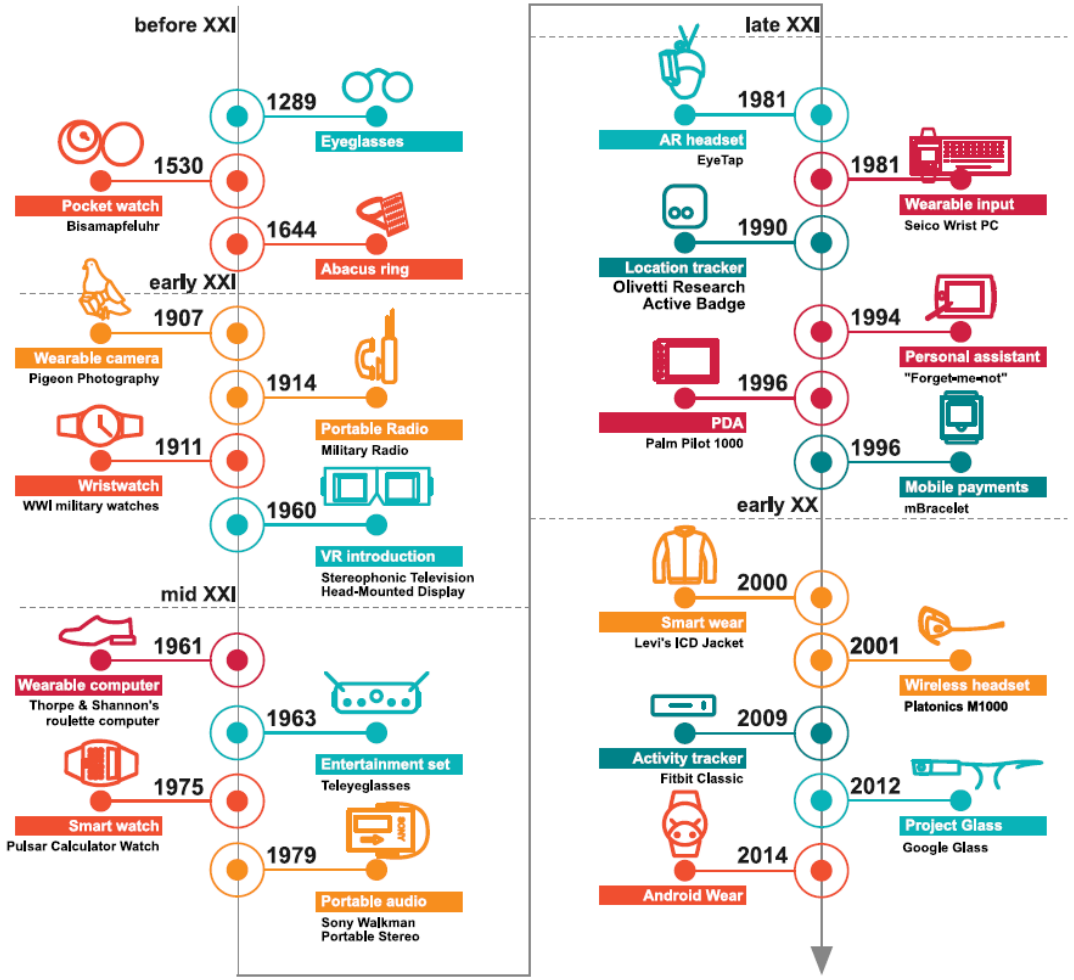
With a uniquely large sample size, we were able to tease out specific effects for groups of consumers which are not usually studied in depth including different income brackets and age groups. Consequently, this report offers unmatched detail and insights into the use of health and fitness wearables and apps.

As today's technology stretches beyond physical activity to include also stress levels, emotional, and mental health, **this research includes specific indices for satisfaction with life, body, and wellbeing, to investigate corresponding effects of wearable and app use.**

The key differentiators of this report are as follows:

1. Larger sample size (n=18,000+) and more global (six countries) than any other study publicly available
2. Built on very granular stocktaking of specific devices and apps use instead of broad brush categories (the questionnaire featured 23 different devices and the 10 most popular apps in each country surveyed in addition apps typically included in major digital device ecosystems)
3. Separation of physical activity and exercise intensity from device and app use when surveying the population to produce unbiased estimates of effects
4. Focus on actual use rather than merely ownership of wearables or download of apps
5. Granular insights on specific functions and related user behavior

Wearables – not nearly as new as we might think



Wearables of the Past

- Wearables have been our steady companions for hundreds of years. Eyeglasses helped with our vision as early as 1289. Pocket watches told us the time beginning in 1530. The first wearable computer emerged in 1961.
- The first “smartwatch” (with a built-in calculator) dates back to 1975.
- The first activity tracker followed only in 2009 prompting Gary Wolf’s influential article on the “quantified self”.[1]

Wearables of the Present

- According to IDC market data, the shipments of wearables globally have surged from around 85 million units in 2015 to 534 million units in 2021. The analysts expect further growth until 2026, when the market size is projected to reach 265 billion US$.[2]

Source: 1 Wolf, G. (2009): Know Thyself: Tracking Every Facet of Life, from Sleep to Mood to Pain, 24/7/365. WIRED, 22-June-2009. 2 IDC (2022): Worldwide Wearable Computing Device Forecast, 2022–2026, cited from https://www.nasdaq.com/articles/an-overview-of-the-top-5-wearables-companies **Image:** Ometov, et al. (2021): A Survey on Wearable Technology: History, State-of-the-Art and Current Challenges. Computer Networks 193(2021) ((CC BY 4.0)

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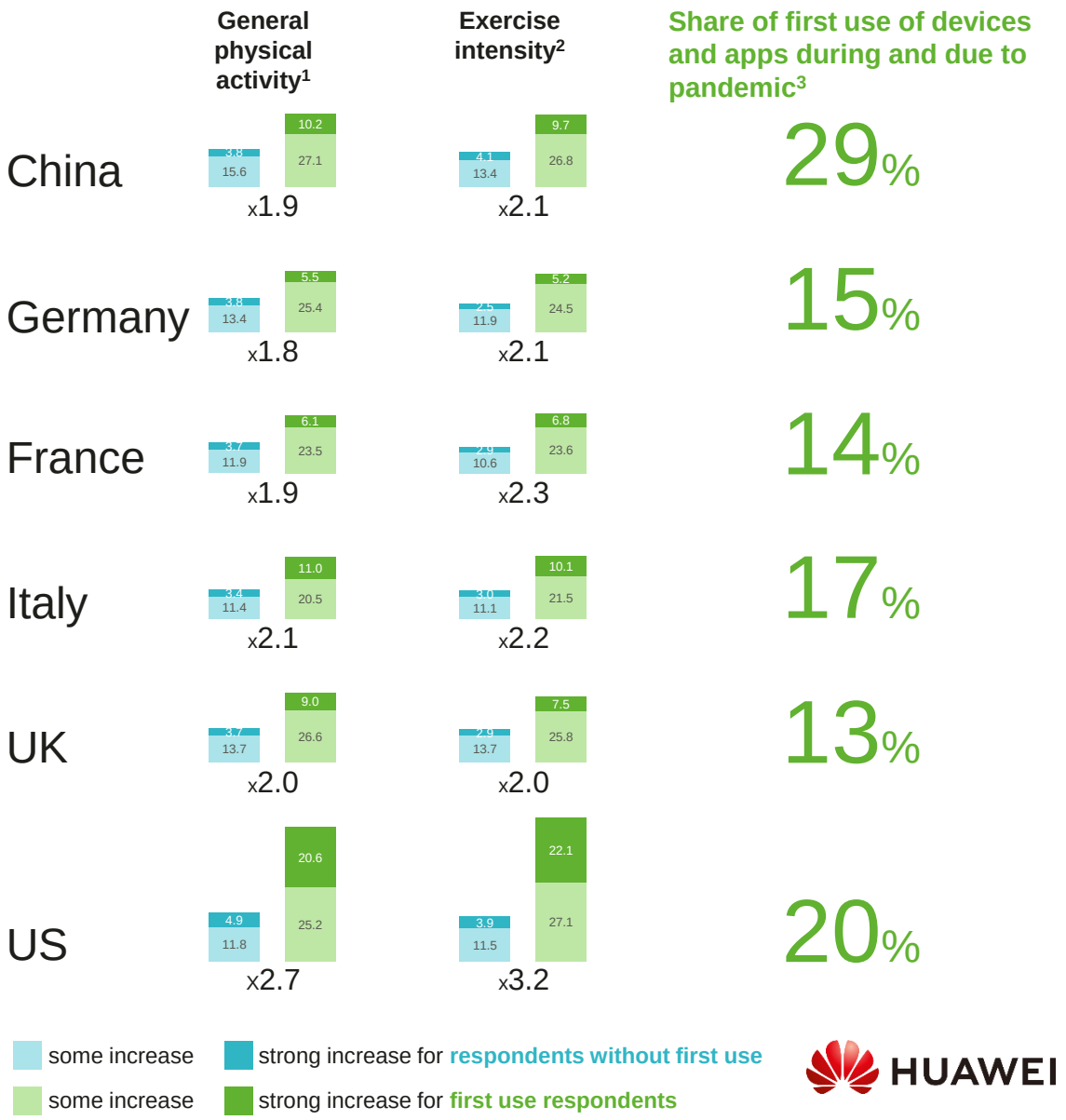
Wearables and apps pushed physical activity and exercise intensity during the pandemic

Physical activity in virtually all industrialized economies is insufficient compared to the levels recommended by the World Health Organization (WHO). Whilst the reduction of mobility has been a key success factor in fighting the pandemic, it has left a significant share of people with even diminished physical activity levels. **Across the six surveyed countries, we find on average 39% of respondents feeling their physical activity intensity has reduced due to the pandemic.** For exercise intensity, the share of respondents who felt a reduction is similarly high at 37%.

On the other hand, our survey identifies a group of respondents who were disproportionately likely to increase their physical activity and exercise intensity. **Those who started use of at least one wearable or app during the pandemic were twice as likely to see (strong) increases in their physical activity and exercise levels than those who did not add a new wearable or app.**

Our result firmly underscores the positive effect that wearables and apps for fitness and health can have on physical activity. The focus on a particularly challenging period for taking up or increasing physical activity suggests a strong link between the starting use of health and fitness technology on the one hand and physical activity on the other.

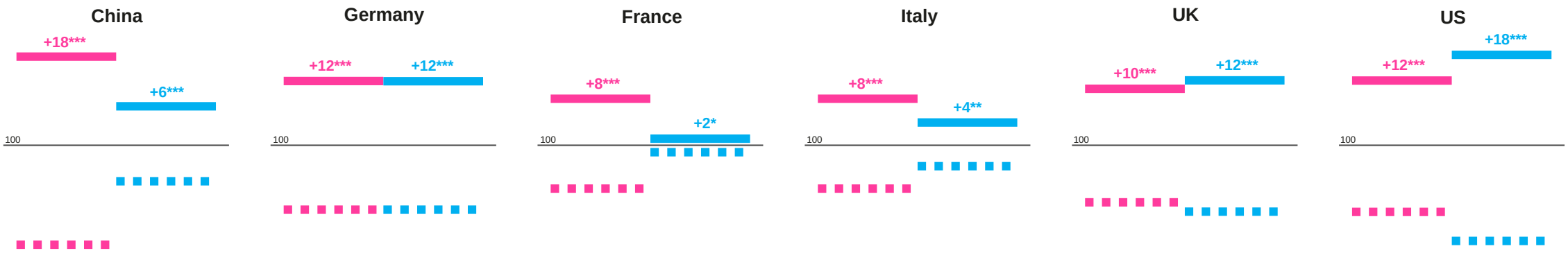
The remainder of the report provides further detailed insights into the role that health and fitness technology can play for physical activity and exercise intensity.



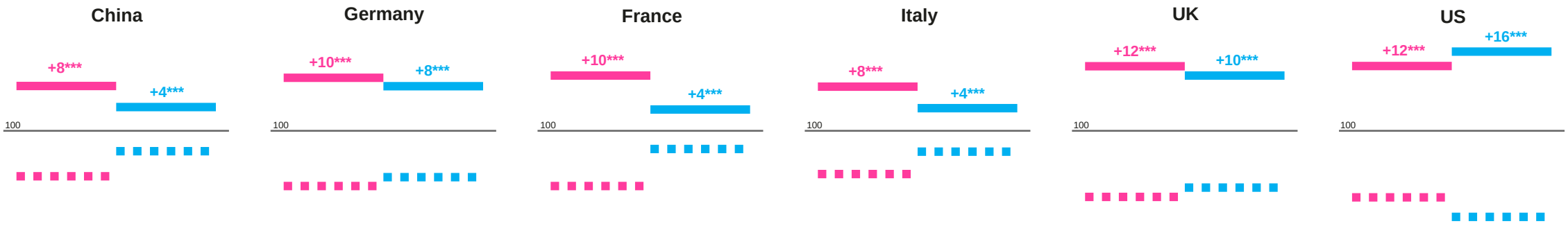
Legend: An 11-point scale ranging from "-----" to "+++++" with 0 as the neutral midpoint was used by respondents to indicate their perceived change in physical activity and exercise intensity due to the pandemic. The categories in the figure summarize the top2 items (strong increase) and the remaining increase items (some increase). Respondents with first use include all respondents who have used at least one health and fitness related device or app during the four weeks prior to the survey and who have began to use at least one such device or app during and due to the pandemic. Respondents who did no meet these two conditions were categorized as respondents without first use. 1 n(with first use) = 2,950; n (without first use) = 14,936 (missing values omitted). 2 n(with first use)= 2,953; n(without first use) = 14,705 (missing values omitted). 3 relative to the device and apps used within four weeks prior to the survey.

Exercise and higher satisfaction with life and body are linked; women tend to see more increase with exercise than men

Satisfaction with life index (average = 100)



Satisfaction with body index (average = 100)



Legend: The average refers to the specific gender within each country respectively; n(female no exercise)=4,474; n(female with exercise)=4,814; n(male no exercise)=3,957; n(male with exercise)=5,113. *p<.10; **p<.05; ***p<.01 (t-test)

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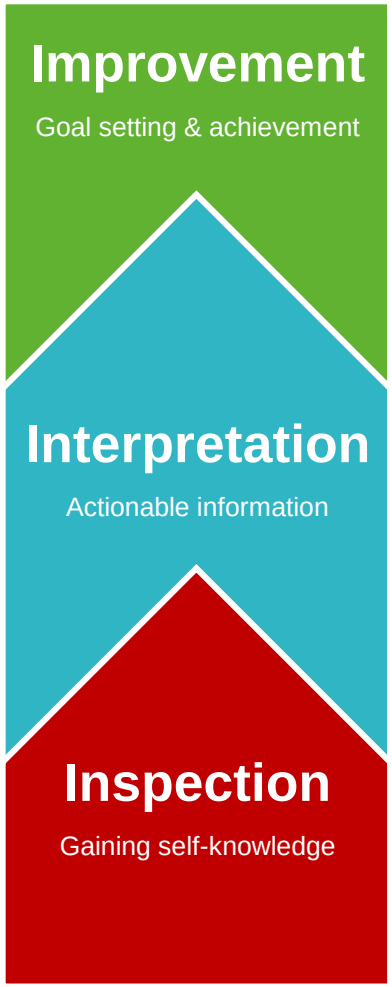
From inspection over interpretation to improvement

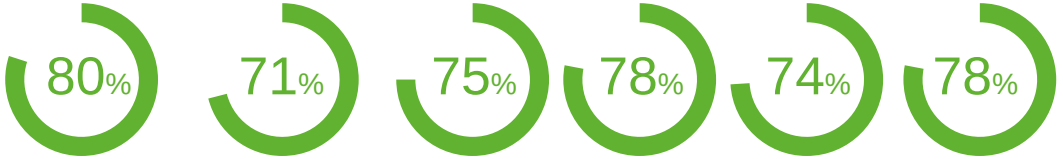
Wearables as such are not new. Neither is the conceptual link between self-knowledge and self-improvement. As Crawford et al. (2015) note, the promises made about the weight scale at the end of the 19th and early 20th century are essentially similar to the ones made about today's wearables. However, the weight scale provided only a single raw output metric by a mechanical measuring process. Users had to rely on (in)formal knowledge about how to interpret this information and further how to act upon it.

Today's wearables differ markedly from this pattern. Commonly, sensor readings are processed in a probabilistic manner to arrive at various data outputs. This enables a greater variety of metrics to be tracked with just one device or even just one integrated sensor unit. Thus, it is possible to provide augmented outputs on one's sleep quality, gait or stress level. In addition, users can receive specific advice on how to make improvements and achieve their goals.

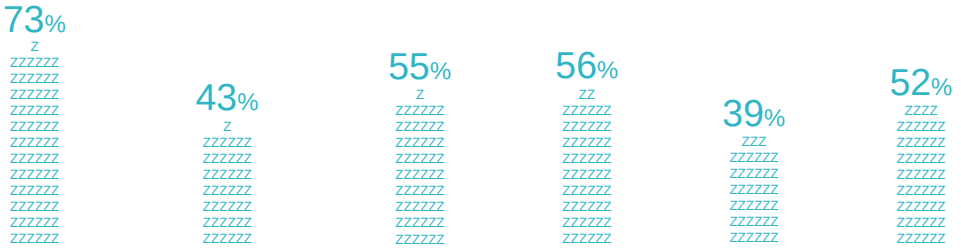
Our survey shows that users of tracking functions on average follow between four and five metrics. As the example of sleep trackers demonstrates, respondents appreciate the interpretation functions offered with 39% (UK) to 73% (China) agreeing that they only realized that they were not getting enough or good enough quality of sleep after they started using the sleep tracking. We also find that goals associated with exercise are strongly linked to either preserving or improving one's health and fitness status which underlines the demand for specific recommendations on how to achieve these goals. The majority of tracking users contend that the devices and apps they use actually contribute to achieving their exercise goals.



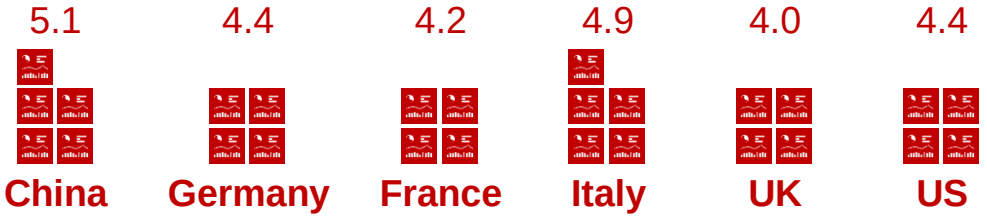
Trackers who found their devices and apps helpful in achieving top ranked goals[3]



Sleep trackers agreeing that they only learned about their lack of sleep (quality) by interpretation provided[2]



Average number of metrics tracked by tracking users[1]



Source: Crawford, K., Lingel, J., & Karppi, T. (2015). Our metrics, ourselves: A hundred years of self-tracking from the weight scale to the wrist wearable device. European Journal of Cultural Studies, 18(4-5), 479-496. **Legend:** 1 n=4,938; tracking describes deliberate tracking instead of any metrics a device or app may track by default unless opted out. 2 n=2,064. 3 n=4,938 **Icon:** Rafael Garcia Motta from the Noun Project.

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Only awareness can lead to action – Health and fitness tech helps achieving SDG 3, in particular for the 55+ age group

Share of respondents who track at least one metric about their physical activity or body

China	44%
Germany	23%
France	19%
Italy	28%
UK	22%
US	26%

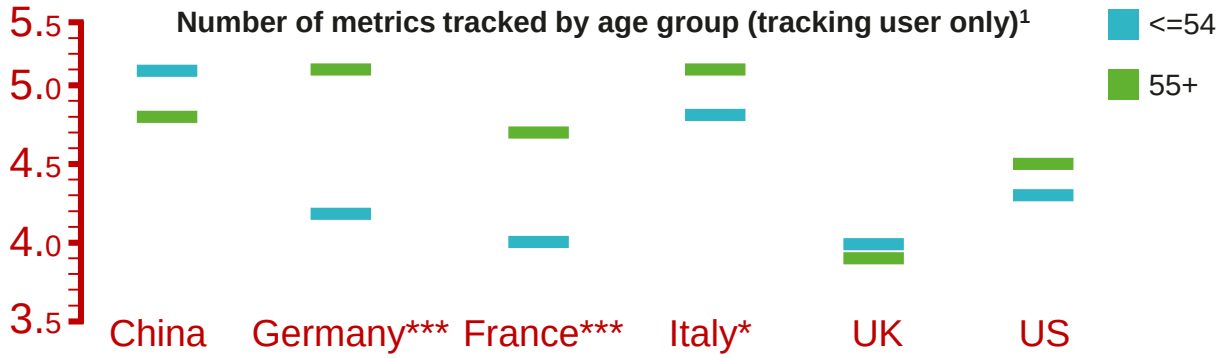
The World Health Organization (WHO) has long advocated for more physical activity especially in industrialized countries whose populations spend too much time seated and often follow unhealthy diets. Correspondingly, the United Nations Sustainable Development Goal 3 (SDG 3) seeks to ensure healthy lives and promote well-being for all ages.

Health and fitness technology provides a critical stepping stone to achieving this SDG as it can make accessible the required information through tracking of physical activity, body functions, or nutrition. Our survey finds that between 19% and 44% of respondents already track at least one such metric.

As health and fitness typically deteriorate with age, it is particularly relevant for the achievement of SDG 3 that the elderly have access to this information and act on it. In spite of generally lower digital affinity typical among the 55+ age group, we find that in three of the six countries surveyed, these users are actually more avid trackers than younger respondents who track at least one metric.

The metrics the 55+ age group track hardly differ from the ones that younger respondents typically track. On average, metrics focusing on (general) physical activity, body functions such as heart rate and blood pressure, and nutrition (calorie intake, calories burned, fluid intake) are most popular. Sleep and expert sports metrics (e.g. power output) are less interesting to users on average.

Number of metrics tracked by age group (tracking user only)[1]



Distribution of types of metrics tracked by tracking users by age group[2]

Country	Age	Physical activity	Bodyweight & Composition	Body functions	Nutrition	Sleep & stress level	Sports expert metrics
China	<=54	22	18	19	17	15	9
	55+	22	14	22	16	15	11
Germany	<=54	28	11	19	19	15	9
	55+	26	11	21	18	15	9
France	<=54	28	15	16	20	14	6
	55+	26	13	20	16	15	10
Italy	<=54	24	11	20	18	16	12
	55+	25	9	23	18	14	11
UK	<=54	28	10	20	19	16	6
	55+	27	10	22	18	16	7
US	<=54	25	12	21	19	15	8
	55+	24	12	22	17	14	12

Legend: 1 n=4,834 *p<.10; **<.05; ***p<.01 (Mann-Whitney-U test); 2 n=4,834. Tracked metrics categories: Physical activity (steps distance and flights of stairs, gait, movement patterns), bodyweight & composition (bodyweight, body composition), body functions (heart rate, blood pressure, breathing rate, body temperature), nutrition (calorie intake and burn, fluid intake), sleep & stress level (sleep, stress level), sports expert metrics (power output, blood oxygen level, muscle electrical activity)

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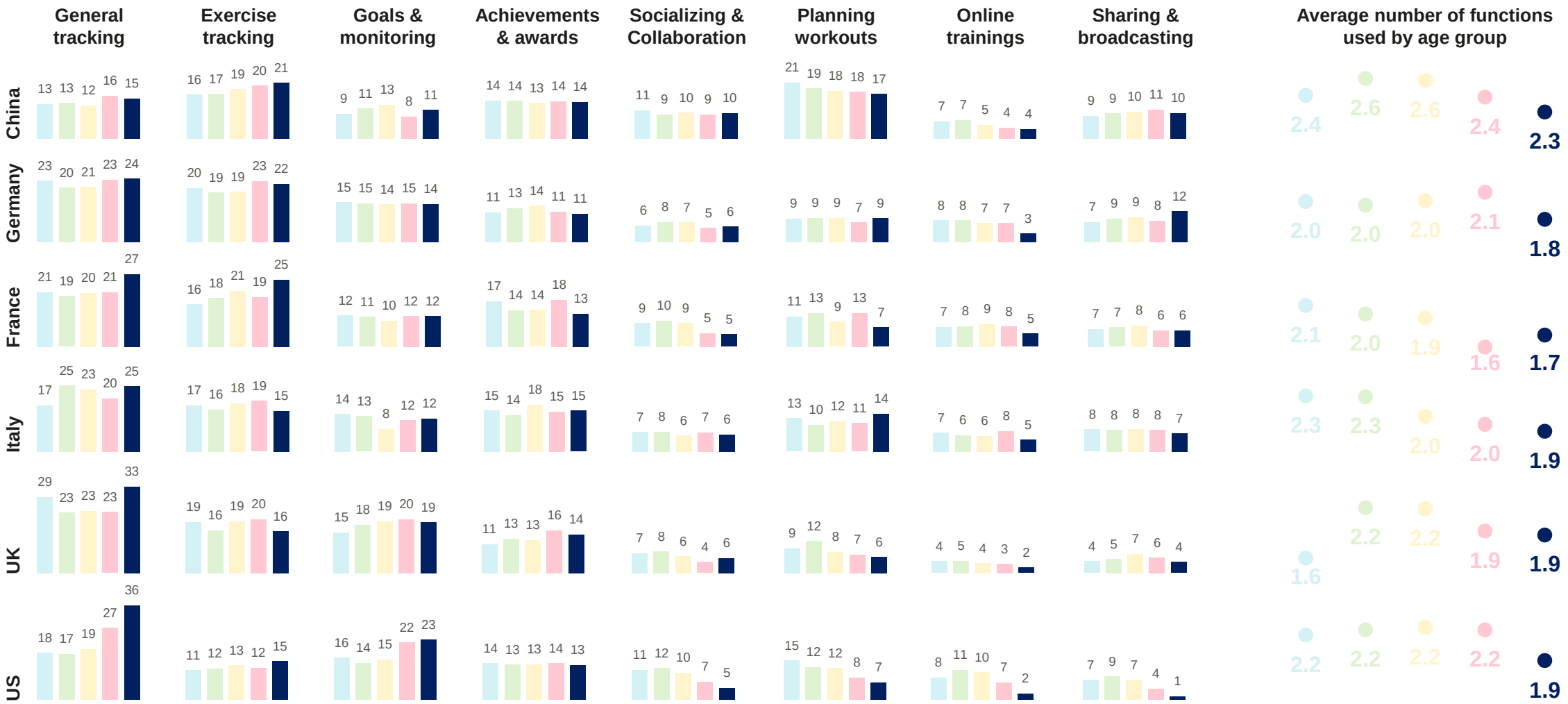
The 55+ age group shows some preference for tracking, but overall surprising similarity to others in their health and fitness devices' and apps' functions use



Legend: Relative share in % of health and fitness devices' and apps' functions use among devices and apps users using at least one function by age group, n=4,938.

Young tracking users increase their exercise intensity less than older ones

Indexed average daily exercise time (index 100 = average exercise time of those who do not track any metrics about their physical activity in each age group)[1]

Age	18 to 24			25 to 34			35 to 44			45 to 54			55+		
Tracking	none	either	both	none	either	both	none	either	both	none	either	both	none	either	both
China	100	130	129	100	133	145	100	161	174	100	142	166	100	153	83
Germany	100	134	155	100	162	208	100	138	205	100	195	160	100	173	208
France	100	158	177	100	119	199	100	167	232	100	167	198	100	153	225
Italy	100	116	133	100	146	224	100	151	196	100	172	226	100	122	260
UK	100	153	89	100	143	187	100	148	209	100	212	259	100	165	309
US	100	159	277	100	168	202	100	191	228	100	146	228	100	200	248
Average change		**+42**	**+60**		**+45**	**+94**		**+59**	**+107**		**+72**	**+106**		**+61**	**+122**

none = no tracking of physical activity
either = either tracking general physical activity or exercise related physical activity metrics
both = tracking both general physical activity and exercise related physical activity metrics

As the preceding slides showed, the most avid trackers are in the age group 55+. This has a pronounced effect on their exercise intensity.

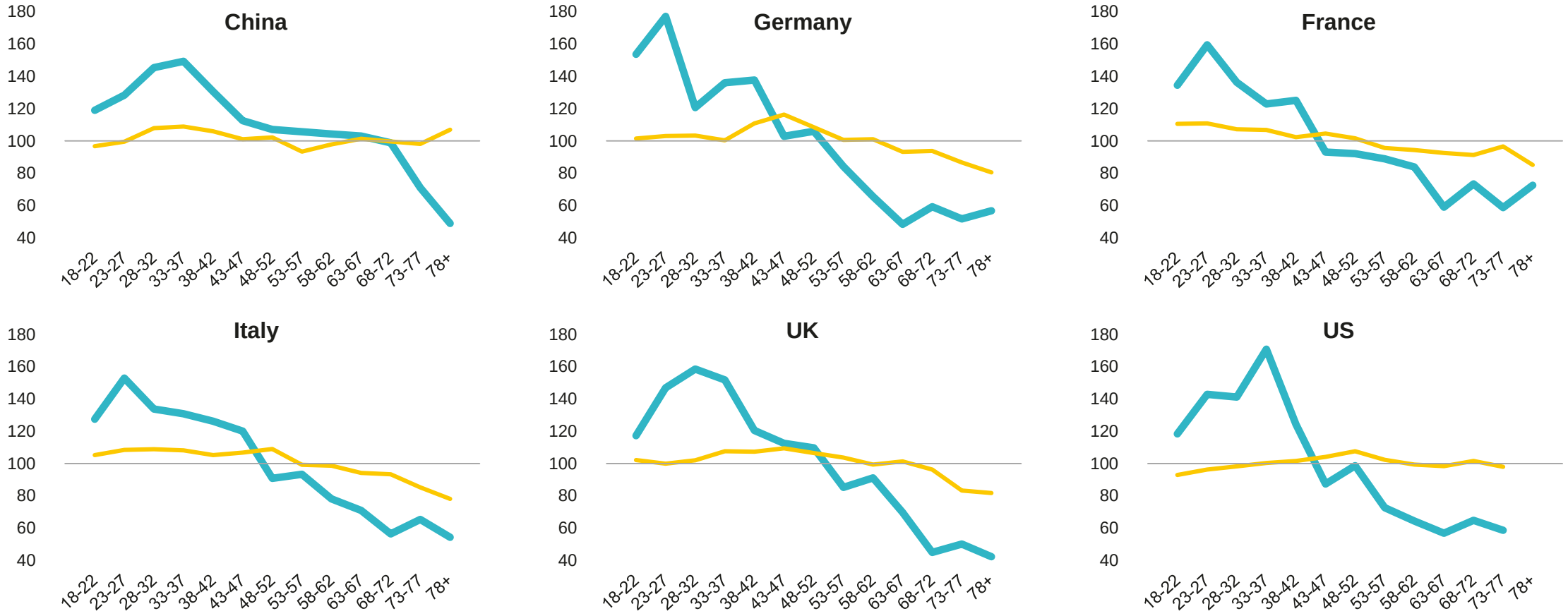
The results in the above table clearly show a strong link between tracking of one's general physical activity and exercise activity on the one hand and daily exercise time on the other. This effect becomes stronger with increasing age. Consequently, the 55+ age group not only tracks more metrics than younger trackers, but also benefits disproportionately from doing so.

Increased exercise intensity leads to improved health and a prolonged active life. This is particularly important for the 55+ age group as physical health deteriorates with age and good exercise routine can slow down this process immensely.

Notably, the respondents in the 55+ age group who exercise consistently score not only higher than those in the same age group without exercise as regards their satisfaction with life, but also show the highest scores overall. This underlines the contribution that exercise can have for positive aging.

Legend: 1 n=18,358, exercise time was collected in great detail in the questionnaire encompassing mild, moderate, and strenuous exercise during paid work, unpaid work, and leisure separately for weekdays and weekends; for data analysis, exercise was defined as at least moderate exercise. Definitions used in the questionnaire: mild exercise (e.g., stretching, casual walking, fishing, golf using cart), moderate exercise e.g., yoga, hiking, jumping on a trampoline), strenuous exercise (e.g., martial arts, competitive soccer, football, hockey, high impact aerobics).

Further potential for uptake of health and fitness technology among the elderly



Legend: Level of fitness and health technology use based on the number of corresponding smart devices and apps used* as well as the number of functions of these used and the number of metrics tracked digitally; level of general digital technology based on use of smartphone, tablet, PC, and smart TV as well as communications, Social Media, work-related, gaming, education, and streaming apps. Scores were normalized and indexed to the respective country average (avg=100); some results for China in the age bracket from 53 to 72 have been smoothed. N=18,358;
* Base: The top10 most popular local health and fitness apps in each country based on the average monthly active user (MAUs) in six months prior to the survey taken from Apple App Store and Google Play Store data; COVID-specific, health insurance and period tracker apps were replaced by the next most popular apps on the respective MAUs rankings.

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Little difference in added exercise time from tracking across income groups

Indexed average daily exercise time (index 100 = average exercise time of those who do not track any metrics about their physical activity in each income bracket)[1]

Income group	Low income <75% of median			Medium income 75% to 200% of median			High income >200% of median		
Tracking	**none**	**either**	**both**	**none**	**either**	**both**	**none**	**either**	**both**
China	100	139	168	100	124	162	100	106	51*
Germany	100	155	166	100	143	169	100	146	184
France	100	123	223	100	146	219	100	159	136
Italy	100	147	219	100	152	227	100	120	188
UK	100	151	270	100	171	199	100	126	188
US	100	191	290	100	180	232	100	135	204
Average change		**+48**	**+112**		**+49**	**+95**		**+31**	**+49**

none = no tracking of physical activity

either = either tracking general physical activity or exercise related physical activity metrics

both = tracking both general physical activity and exercise related physical activity metrics

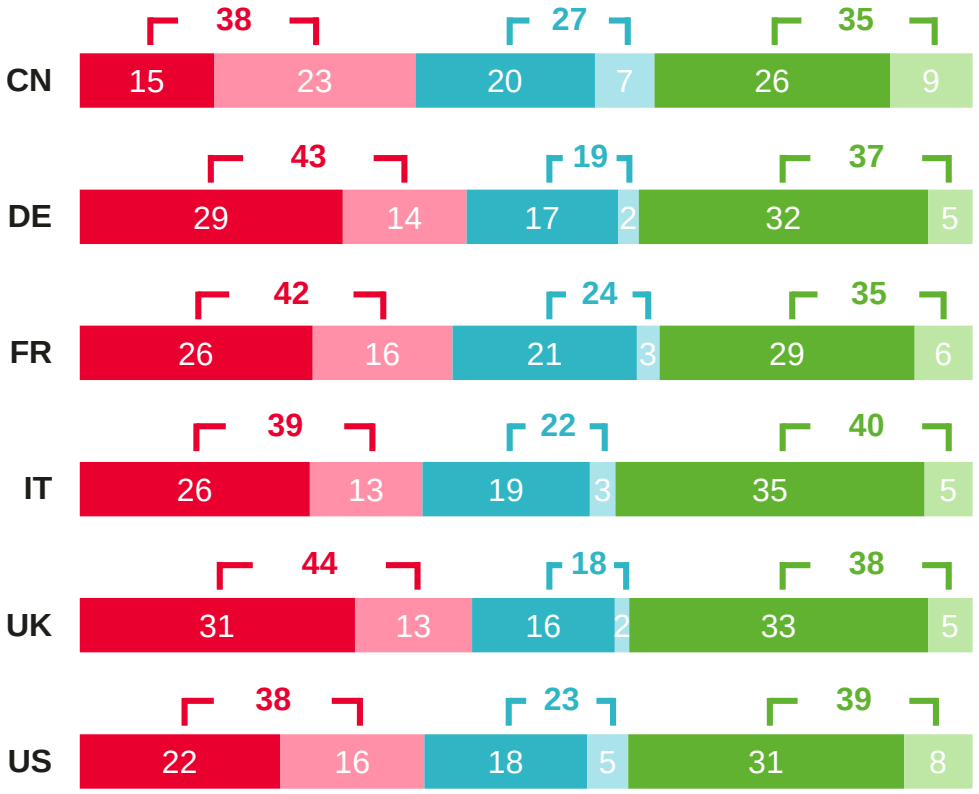
As many smartphones offer tracking of physical activity through pre-installed apps, access and affordability become less and less of an issue for following one's physical activity. Nonetheless, various studies report about digital inequality in the effect of tracking (and other digital solutions that promise to increase physical activity) rather than access to or use of such technology.[2]

Whilst confirming similar patterns of access and use, our survey does not reflect the same digital inequality for the effect of tracking physical activity. The average increase of daily exercise time for low and medium income level groups for those who track their physical activity is very similar. For respondents in the highest income bracket, this effect is smaller than for other groups.

Legend: 1 n=18,358, exercise time was collected in great detail in the questionnaire encompassing mild, moderate, and strenuous exercise during paid work, unpaid work, and leisure separately for weekdays and weekends; for data analysis, exercise was defined as at least moderate exercise. Definitions used in the questionnaire: mild exercise (e.g., stretching, casual walking, fishing, golf using cart), moderate exercise e.g., yoga, hiking, jumping on a trampoline), strenuous exercise (e.g., martial arts, competitive soccer, football, hockey, high impact aerobics) *very small sample size in this cell (average change excl. this cell = +80). 2 See for instance Western, M.J. et al. (2021):The effectiveness of digital interventions for increasing physical activity in individuals of low socioeconomic status: a systematic review and meta-analysis. International Journal of Behavioral Nutrition and Physical Activity – 09-November-2021.

The greatest leverage of health and fitness technology may be found during paid work hours

Relative contribution to average daily physical activity time in %



	Physical activity index avg=100	Exercise time index avg=100
CN	89	136
DE	132	111
FR	100	98
IT	94	78
UK	93	73
US	92	104

Taking a closer look at the average daily physical activity as captured in our survey reveals that Germany shows the highest overall physical activity intensity (132) while respondents in China have the highest level of exercise.

Independent from considering general or exercise-related physical activity, we find that paid work contributes the smallest share in all countries. Leisure on the other hand, contributes the highest share of physical activity.

Wearables and apps could be leveraged by employees and employers to increase physical activity during paid work even for occupations that normally require little physical activity. However, as wearables and apps offer an increasing number of augmented functions, they can also help to reduce stress or provide tailored breaks depending on the task, environment, and individual.

Our survey tested the attitudes of employees among the respondents towards such technical solutions. We find that employees would be particularly open to health and fitness technology being used for their benefit. Interestingly, they showed slightly more interest in solutions that could up their mental performance rather than their physical performance.

Legend: 1 n=18,358, physical and exercise time was collected in great detail in the questionnaire encompassing mild, moderate, and strenuous physical activity and exercise during paid work, unpaid work, and leisure separately for weekdays and weekends; for data analysis, physical activity and exercise was defined as at least moderate physical activity and exercise. Definitions used in the questionnaire: mild (e.g., sitting, stretching, casual walking), moderate (e.g., light lifting, hiking), strenuous (e.g., heavy lifting, competitive soccer); (Un)paid work includes commuting which can arguably a significant source of exercise as part of these categories, but there can also be others. Results rounded.

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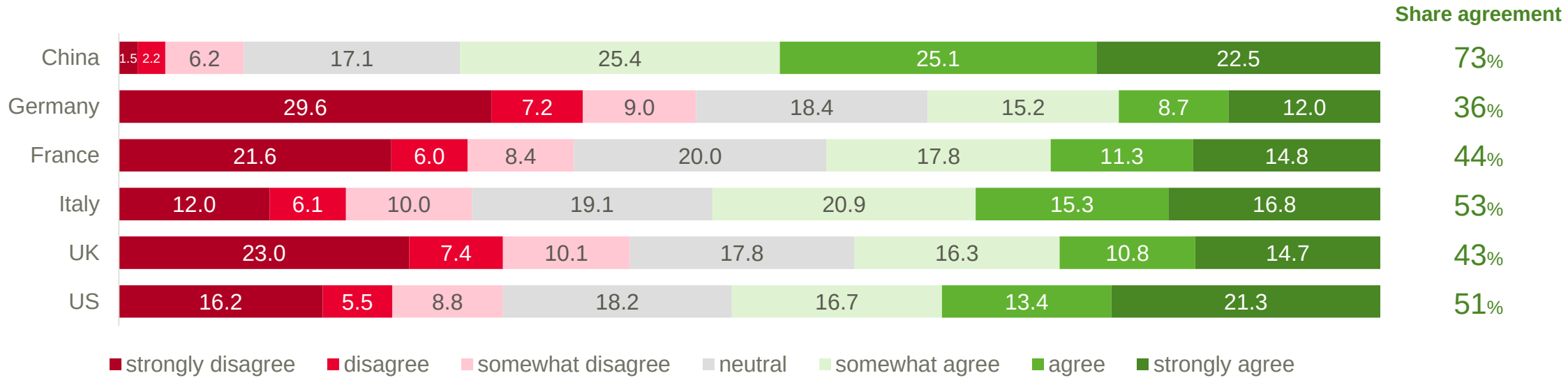
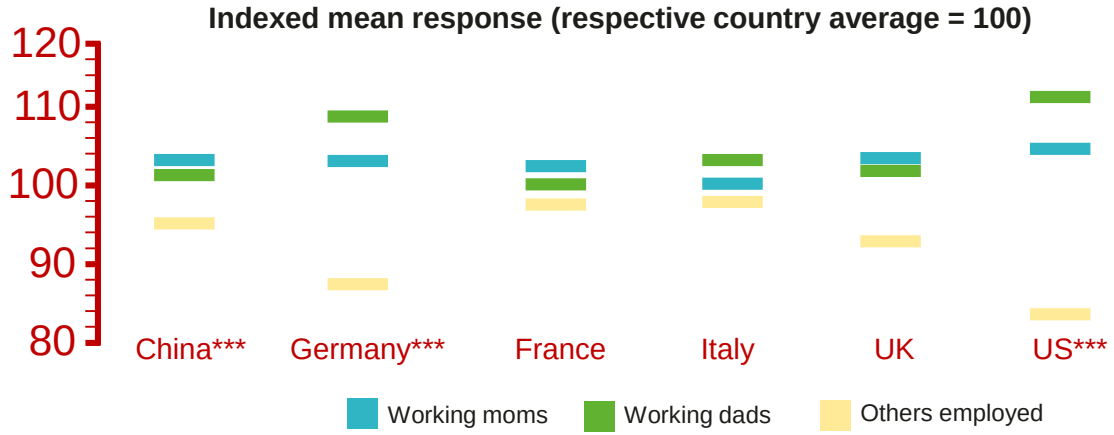
Wearables and apps can help employees to get the rest they need, improving their health and performance



An increasingly competitive work environment and the pandemic have drained the batteries of many. High stress levels must be cushioned by phases of recovery so that performance can be maintained for as long as possible. In times when employees exceed their own physical and mental stress limits, the desire for a decelerating and protective capacity is therefore not surprising.

Health and fitness technology can fulfill that role. Particularly in high-performance societies such as China and the US, we find a potentially strong demand for the idea of having apps suggest tailored break times based on one's own measured state of exhaustion.



Legend: n=8,401 (only employed respondents in both figures on this slide), Statement: "I wish my employer would let me take breaks when my app says I am fatigued." Agreement on 7-point Likert-scale ranging from 1="strongly disagree" over 4="neutral" to 7="strongly agree"; working moms and dads were identified in the survey based on the number of children currently living the respondents household and the respondent's stated gender. *<.1; **<.05; ***<.01 for Tukey's HSD referring to working moms and dads (highest p-value across groups) difference to others.

Similar top tech used for fitness and health across countries

Top 3 are the same across countries[1]

China	82%	28%	34%
Germany	49%	20%	11%
France	45%	17%	5%
Italy	57%	24%	20%
UK	48%	19%	6%
US	54%	22%	11%

Top 3 user growth potential[2]

Except in China, smartwatches represent the wearables with the greatest growth potential. Next to already well-established sports headphones, on body monitors and VR glasses appear to be significant drivers of growth.

12 27 VR glasses	13 24 Smartwatch	13 22 Smart scale
6 12 Smartwatch	4 13 On body monitor	4 10 Smart headphones
6 16 Smartwatch	5 12 Smart scale	4 10 Smart wristband
8 19 Smartwatch	7 17 Smart headphones	6 18 On body monitor
4 8 Smartwatch	3 6 On body monitor	2 6 Smart headphones
10 12 Smartwatch	8 11 On body monitor	8 10 VR glasses

Top 3 consumer blind spots[3]

Consumers are least familiar with a very similar selection of (future) wearables regardless of which country they are from. Smart tattoos feature on the first rank in all surveyed countries. PEMF headbands and smart underwear feature in the Top 3 in almost all countries.

73% Smart tattoo	67% Smart underwear	64% Smart ring
82% Smart tattoo	79% PEMF headband	79% Smart underwear
84% Smart tattoo	76% Smart insoles	75% Smart underwear
83% Smart tattoo	78% PEMF headband	76% Smart underwear
89% Smart tattoo	89% PEMF headband	88% Smart underwear
75% Smart tattoo	75% Smart underwear	73% PEMF headband

Legend: 1 used in the past four weeks prior to the survey in % of all respondent per country referring to (1) health and fitness apps on the smartphone, (2) smartwatches, and (3) smart sports headphones. 2 Future use as indicated by the respondents in each country in %; the dark shading reflects “very likely to use” and the light shading reflects “somewhat likely to use” respectively; notably, future use does not equal future purchase, but may be interpreted as reflecting market potential generally. 3 Share of respondents in each country who stated to have never heard of the respective devices. N=18,358 **Icons:** Aneeque Ahmed, Bence Beyeredy, and Satawat Anukul from the Noun Project.

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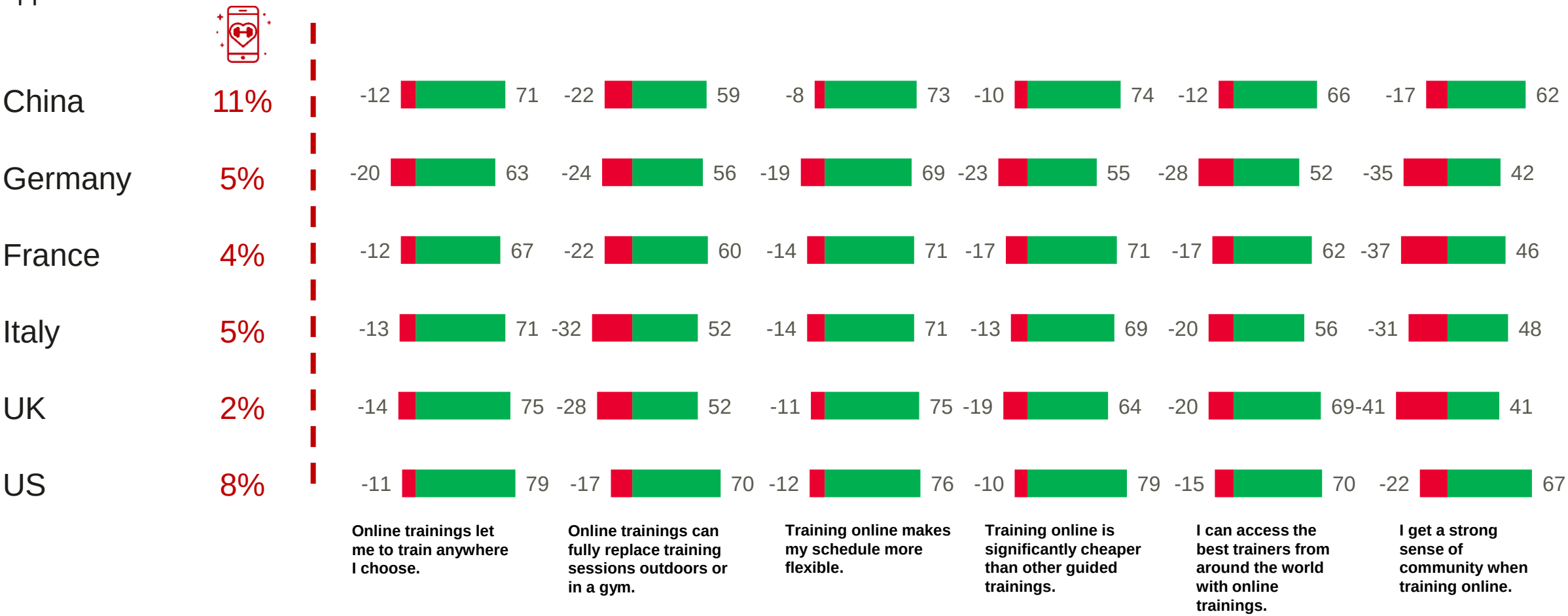
Interactive training apps show great promise

So far, few people use recorded and live trainings through health and fitness apps…[1]

…but their attitudes towards online trainings are very positive.[2]



Legend: 1 n=18,358; 2 n=1,075. Agreement on a Likert scale ranging from 1="Strongly disagree" to 7="Strongly agree", red depicts all "disagree" and green depicts all "agree", neutral, don't know, and missing values omitted.

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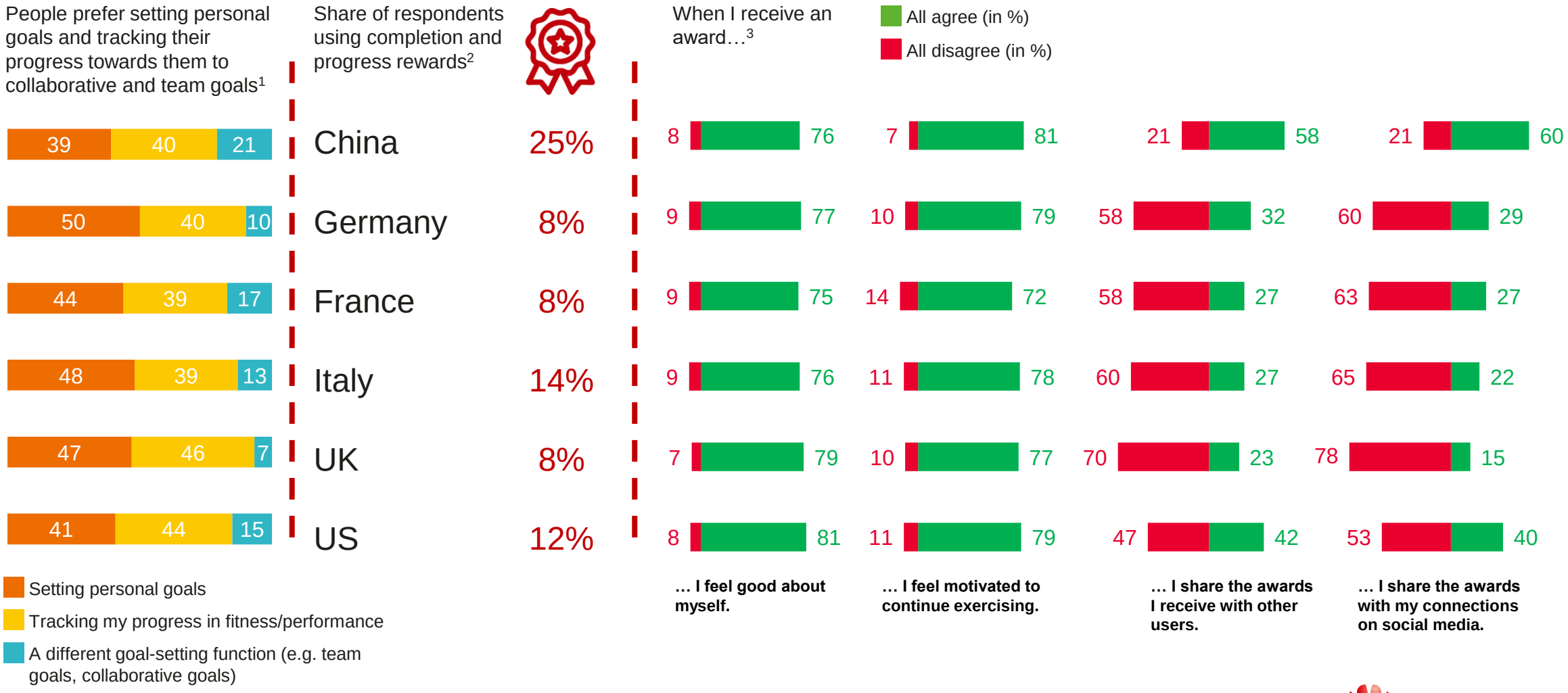
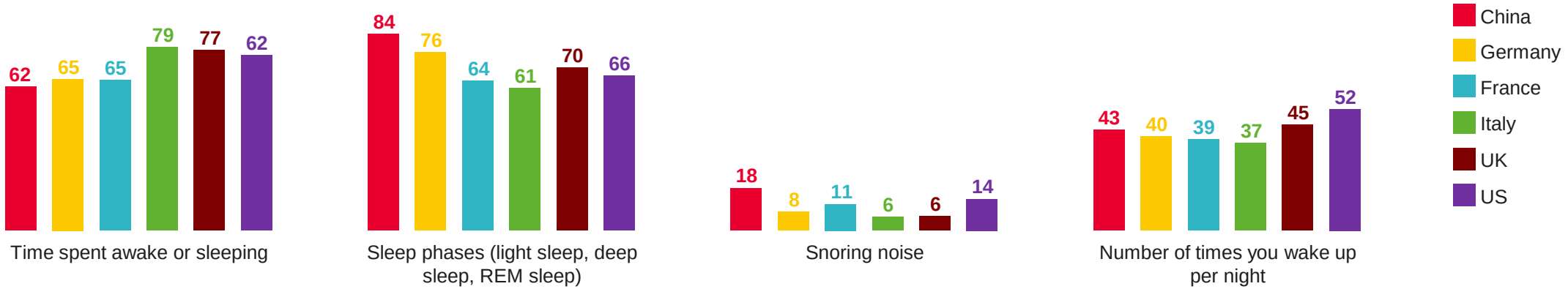
For their goals, in-app rewards and achievements motivate users, but they rarely share them with others online



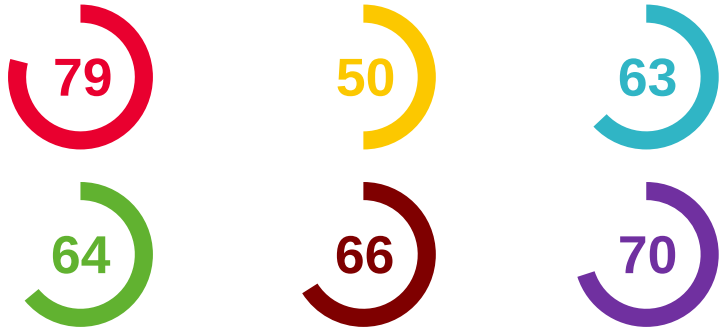
Legend: 1 Share of tracking and goal setting functions used on all tracking and goal setting functions used (multiple choice question), average number of goal setting and tracking functions used by respondents = 1.5; n=2,255. 2 n=18,358. 3 n=2,333 (respondents who use the in-app achievements functions), Agreement on a Likert scale ranging from 1="Strongly disagree" to 7="Strongly agree", red depicts all "disagree" and green depicts all "agree", neutral, don't know, and missing values omitted.

Sleep tracking helps people to understand their sleep cycle and feel healthier

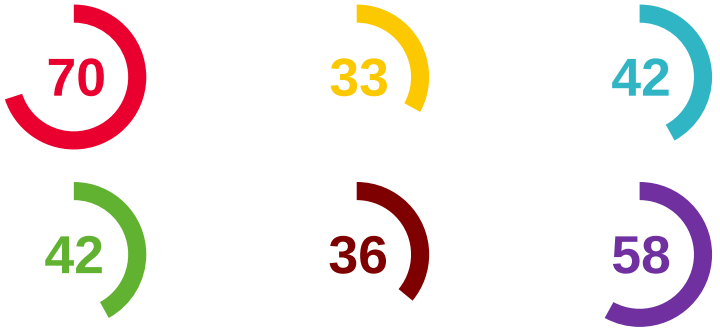
Sleep-related metrics tracked by those who use the sleep tracking function (in %)



Agreement with the statement "Using a sleep tracker has helped me better understand my sleep cycle." (in %)



Agreement with the statement "I feel much healthier when I follow the recommendations of my sleep tracker." (in %)



Legend: n=2,064 (sleep tracking users only), Agreement on a Likert scale ranging from 1="Strongly disagree" to 7="Strongly agree", the portion of each pie depicts all "agree", don't know, and missing values omitted.

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Methodology

Method:	CAWI: Computer Assisted Web Interview
Sample size(s):	n=18,358 (Germany n=3,073; Italy n=3,065; France n=3,078; China n=3,007; UK n=3,052; US n=3,083)
Sampling time:	2022/04/26 to 2022/05/09
Length of interview:	The median length of interview varied between 21 and 24 minutes depending on the country.
Sampling frame:	The sample type is a non-probability sample recruited and stratified on basis of representative quota distributions (quota sample).
Sampling procedure:	Using YouGov's proprietary sampling technology, quotas are framed based upon the census or profile of the required population in the beginning. This frame is the basis on which the sampling software controls the flow of members into each survey. The sampling software randomly selects from the available panel, and allocates to surveys according to the quotas set. YouGov's sampling software includes a router. This removes the potential for self-selection on surveys, and increases the ability to deliver lower incidence samples within a short time frame. Panelists receive an invitation email containing a survey link. When they access the link the router checks against quotas on all live surveys and allocates them to a survey for which they qualify. Thus, panelists are not invited to a specific single survey, reducing the risk of early response bias, social desirability or other motivational biases.
Survey pretest:	For testing functionalities, the online survey was soft launched from 2022/04/25 to 2022/04/26. On the basis of the results, minor adjustments were implemented. Respondents from the soft launch were removed from the final sample.
Questionnaire:	Huawei in collaboration with Prof. Dr. Anna Schneider provided the master questionnaire in English. YouGov reviewed the questionnaire and translated it into the local languages required for the target countries.
Data preparation and analysis:	The survey data was processed by YouGov and provided in a SPSS data set. Incomplete cases were removed from the data set. Cases from the pretest as well as cases with duplicate cookie ids were removed. Analyses were done in R.

Review of other mainstream studies

- Deloitte consumer survey (n=2,009 US consumers, 2021) finds that 58% of households have a smartwatch or fitness tracker. Among device owners, 14% bought their smartwatch during the pandemic. Typical metrics tracked are daily steps (59%), workouts (42%), heart health (37%), and sleep quality (35%).
- PwC “The wearable life 2.0” (n=1,000 US consumers plus n=500 respectively in Australia, Mexico, Singapore, UK, 2016) indicates an already strong diffusion of wearable technology in the US as well as other markets even for niche wearables (e.g. 12% owning smart clothing and 15% owning smart glasses).
- Trajectory Partnership “The future of wearable technology” (n=1,500 UK consumers, 2021) sees a tipping point when it comes to wearable technology, with mainstream adoption driven by a combination of low-powered fitness trackers and feature-packed smartwatches from the tech giants. They find around 35% in their sample owning a wearable device of some sort.
- Ericsson Consumer Lab (n=5,000, Brazil, China, South Korea, UK, and US, 2016) provides some high-level insights as regards the future use cases of emerging wearables. The report provides some general insights into adoption and use of current wearables.
- AARP 50+ Tech Trends (n=2,807, US, 2021) shows the growth of wearables and tracking adoption among other general tech trends in the age group 50+. On average, 27% of 50+ US consumers owned a wearable in 2020, and 38% said they were tracking health and fitness metrics.

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Since 2017, Anna Schneider is Professor of Business Psychology. Her research interests and teaching revolve around the impact of digitalization on consumer behavior, and in particular how people communicate and interact with emerging technology. Anna is a member of various research associations and sits on the scientific board of the Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste (WIK) – a renowned communications and internet policy think tank. Drawing on more than 20 years of hands-on experience in market research she regularly advices public and private organizations on surveys as well as qualitative research projects.

Dr. René Arnold

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René Arnold is Vice President Public Affairs Strategy at Huawei Technologies. Previously, he worked at high-profile think tanks in Germany (German Economic Institute and WIK) and Brussels (Bruegel) where his research focused on digital economy, internet policy and impact assessments of regulatory frameworks. Over the past ten years, René has (co-)authored more than 100 conference papers, journal articles and white papers. He is a frequent speaker at both academic and industry events contributing among other fora to the ITU economic and industry round table, the Digital Summit of the German government and the research committee of the Munich Circle.

Thank you.

Bring digital to every person, home and organization for a fully connected, intelligent world.