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IKMZ – Department of Communication and Media Research

Research Report – Media Change & Innovation Division

Use and Assigned Relevance of Algorithmic-Selection Applications in Switzerland

Report 1 from the Project: The Significance of Algorithmic Selection for Everyday Life: The Case of Switzerland

Michael Latzer (Project Lead)
Noemi Festic
Kiran Kappeler

MEDIA CHANGE and innovation a division of ikmz

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University of Zurich
IKMZ – Department of Communication and Media Research
Media Change & Innovation Division
Andreasstrasse 15
8050 Zurich
http://mediachange.ch

PROJECT LEAD

Prof. Dr. Michael Latzer (m.latzer@ikmz.uzh.ch)

PROJECT TEAM

Noemi Festic, M.A. (n.festic@ikmz.uzh.ch)
Kiran Kappeler, M.A. (k.kappeler@ikmz.uzh.ch)

With assistance from Eliza Mitova and Merve Yildirim.

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Contents

List of Figures

General Introduction to the Project

Algorithms on the internet govern our lives and our realities (Just & Latzer, 2017). They change our perception of the world and affect our behavior by influencing our choices. Consider the selection of online information via search engines, of music and video entertainment content via recommender systems, of products in online shops, or of status messages displayed on social online networks. With their governing power, algorithms on the internet have become an important source and factor of social order in digitized societies (Latzer & Just, 2020).

Governance *by* and governance *of* algorithms

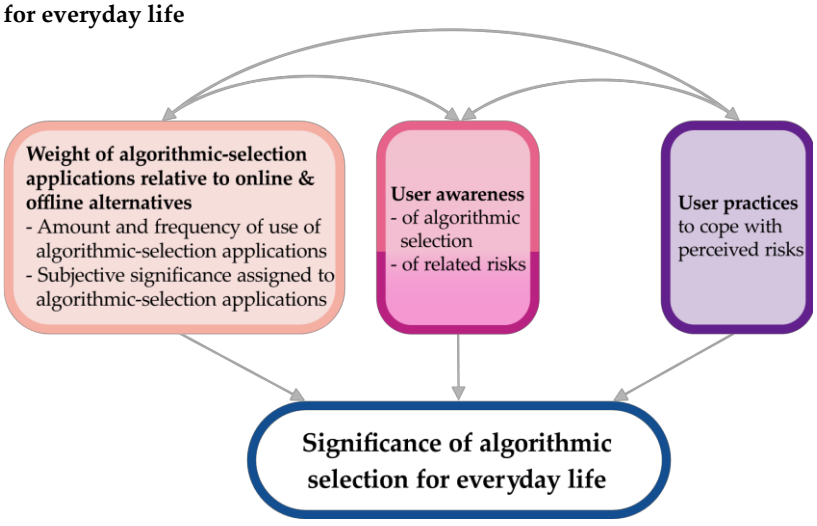
The benefits of this governance *by* algorithms in everyday life are accompanied by potential risks like manipulation, bias, discrimination or threats to privacy, which call for an adequate governance *of* algorithms (Latzer et al., 2016; Saurwein, Just & Latzer, 2015).

Empirical project on the significance of algorithmic selection for everyday life

The project "The Significance of Algorithmic Selection for Everyday Life: The Case of Switzerland" empirically explores the significance of internet-based applications that build on automated *algorithmic* selection, essentially defined as the assignment of relevance to selected pieces of information. It provides empirical evidence for assessing the possible risks and the societal groups that may be particularly affected by them. It thereby provides the basis for a more evidence-based governance of algorithms.

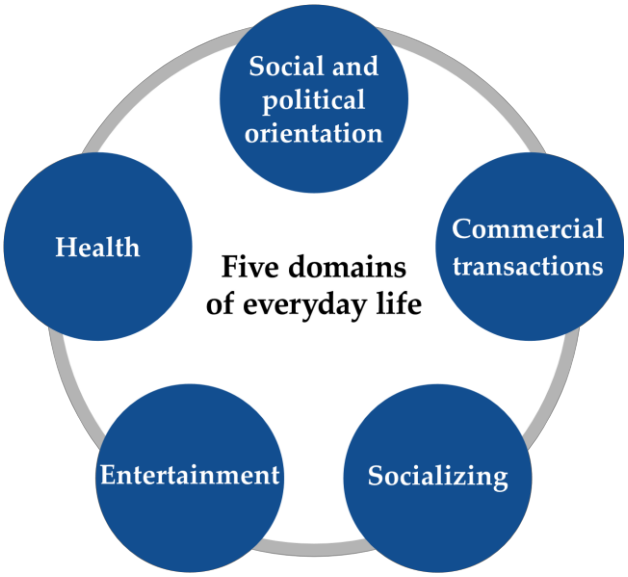
The project is based on a representative survey of Swiss internet users conducted between December 2018 and January 2019. It is conceptually grounded in a measurement model for the significance of algorithmic selection for everyday life based on five variables (Latzer & Festic, 2019): usage of algorithmic-selection applications, the subjective significance assigned to them, awareness of algorithmic selection, awareness of associated risks, and practices to cope with these risks (see Figure 1).

Figure 1: Measurement model for the significance of algorithmic selection for everyday life



Algorithmic-selection applications serve a variety of purposes in everyday life. To reflect these diverse ways of how daily activities are influenced by algorithmic-selection applications, this project evaluates their significance in five life domains: social and political orientation, commercial transactions, socializing, entertainment, and health (see Figure 2).

Figure 2: Five domains of everyday life



In accordance with the measurement model for the significance of algorithmic selection for everyday life, four thematic reports summarize the main results of the survey (see Figure 3):

Figure 3: Four reports on the significance of algorithmic selection for everyday life

1) Use and Assigned Relevance of Algorithmic-Selection Applications in Switzerland.

2) Awareness of Algorithmic Selection and Attitudes in Switzerland.

3) Awareness of Risks Related to Algorithmic Selection in Switzerland.

4) Coping Practices Related to Algorithmic Selection in Switzerland.

Executive Summary – Report 1

Almost everybody in Switzerland uses algorithmic-selection applications (e.g., Google Search, WhatsApp)

- Almost all internet users in Switzerland use the online messenger WhatsApp (97%) and Google Search (96%).
- YouTube (87%) is also widely used. While the use of Facebook (67%) is also common, Instagram (39%) and other social media applications (35%) have lower user numbers. YouTube and Instagram are most widespread among internet users under 25. More women than men use these applications.
- Half of internet users in Switzerland (51%) use 20min.ch or the 20min app.
- The most common reason for not using these algorithmic-selection applications is not being interested in them or not finding them useful. Privacy concerns also play a role, especially for social media non-use.
- On average, internet users spend 3.53 hours a day online. They spend most of this time (2.45 hours) using common algorithmic-selection applications (e.g., Google Search, Facebook, Instagram, 20min.ch).

Offline alternatives are assigned a higher relevance than (algorithmic) online services in all life domains

- Despite the amount of time spent using algorithmic-selection applications, internet users rate offline alternatives as more relevant than online alternatives that are based on algorithmic selection in all life domains. More specifically, offline contacts are perceived as most relevant in all domains except for health information, where personal well-being is assigned the highest relevance.
- Offline contacts, the voting booklet, traditional TV and radio, and print media are assigned a high relevance for opinion formation on social and political issues. Assigning relevance to these services as well as to online news media positively correlates with political interest.
- Offline contacts, events, traditional TV and radio as well as texts on online messengers are assigned a high relevance for entertainment.
- Offline contacts, shops / ads in public and online reviews are assigned the highest relevance for commercial transactions.
- Offline contacts, texts with family and friends on online messengers, offline calls and text messages as well as events are assigned a high relevance for socializing. Compared to the other life domains, social media was assigned the highest relevance for socializing.
- Personal well-being, offline contacts and events are assigned the highest relevance for health information.

– The relevance assigned to YouTube and social media decreases with age in all life domains.
– This report demonstrates that although the internet and algorithmic-selection applications are used extensively, internet users assign comparatively little relevance to them.

A third of Swiss internet users assign relevance to tracking devices for health information

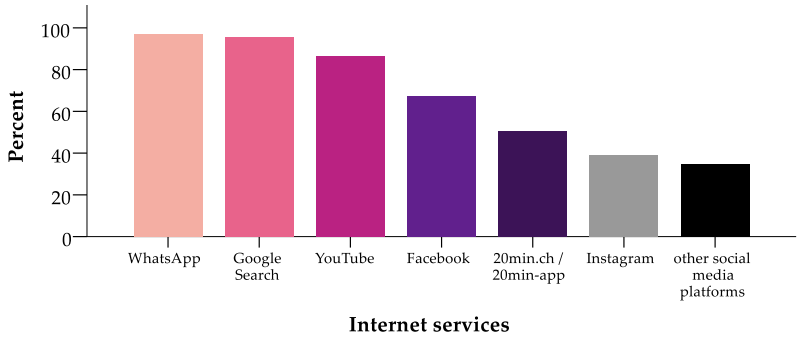
– A third of internet users (31%) assign some relevance to tracking apps or devices that monitor their health or fitness status or automatically track their activities.
– Such tracking devices are used daily or several times a day by more than a third of their users (36%). Their most common purpose is fitness and sports (79%).
– A minority of the users of these devices perceive associated risks like being uncertain about whether the measurements of their trackers are correct (27%), being concerned about the privacy of their data (21%), or overusing their device (9%).
– Three quarters of the users of tracking devices (72%) agree that they do not trust their devices blindly and half of the users (49%) check the accuracy of the measurements their tracking devices provide at least sometimes.
– Four out of ten (42%) users of fitness-tracking devices would be willing to share data such as step counts with their insurance company if they received financial advantages for doing so. This proportion is higher among younger users.

1 Use of Algorithmic-Selection Applications

In 2019, 92% of the Swiss population use the internet

In Switzerland, the proportion of internet users in the population has grown steadily in recent years. While in 2011, 77% of the population used the internet, this share has risen to 92% in 2019 (Latzer, Büchi & Festic, 2019). When online, internet users are likely to be confronted with algorithmic selection, for instance in the form of personalized search results on Google, recommendations on YouTube, personalized advertisements on websites of online newspapers, or individually curated feeds on various social networking sites. How widely are such algorithmic-selection applications actually used in Switzerland? Does the exposure to these applications differ across societal groups? And among those who do not use these services, what are their reasons for not using them? Figure 4 shows the proportions of Swiss internet users who use common algorithmic-selection applications for socializing (e.g., WhatsApp, Facebook), information-seeking (e.g., Google Search, 20min.ch), or entertainment (e.g., YouTube).

Figure 4: Use of algorithmic-selection applications in Switzerland



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

WhatsApp and Google Search are used by nearly all internet users in Switzerland

- Almost all Swiss internet users use WhatsApp[1] (97%) and Google Search (96%). In the small group of Google Search non-users, the most important reasons for not using the search engine are privacy concerns (30%), not being interested in it or not finding it useful (29%), and lacking trust in the service (20%).
- Nine out of ten Swiss internet users (87%) report using the video service YouTube. The most important reasons for not using it are no interest or not finding it useful (57%) and not having the time or being too busy (33%).
- Facebook is used by two thirds (67%) of Swiss internet users. The user groups of Instagram (39%) and other social media such as Snapchat, Twitter, or Jodel (35%) are lower. The most important

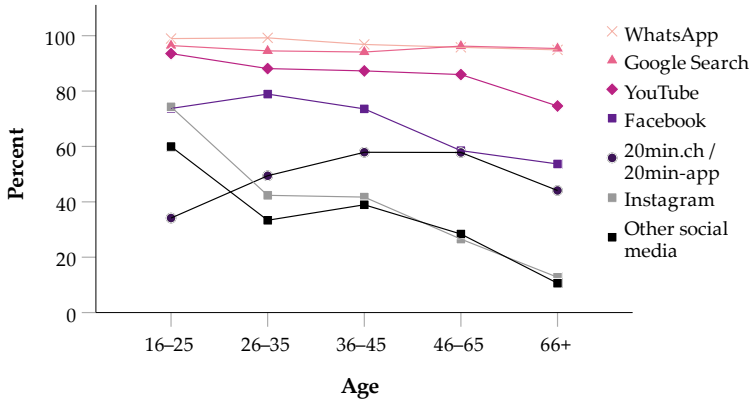
[1] While WhatsApp is a very standard and widely used service in Switzerland, only 20% of the population in the US uses it (Perrin & Anderson, 2019).

reason for non-use of social media is lack of interest (83%). Concerns regarding privacy and personal data (48%) as well as lack of trust in these services (42%) and lack of time to use them (35%) are other common reasons for not using social media.

– Half of Swiss internet users (51%) report using the free online newspaper 20min.ch or the corresponding app.

The use of these services differs with age:

Figure 5: Use of algorithmic-selection applications by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– WhatsApp (97%) and Google Search (96%) are used by virtually all Swiss internet users in every age group.

– The 16–25 age group reports the highest YouTube penetration: 94% use the service. It is used less widely with increasing age. Nevertheless, three quarters (75%) of internet users aged 66 and over use it.

– There are great differences regarding Instagram use between age groups. While three quarters (74%) of the youngest group (16 to 25) use the service, this proportion shrinks with age: Only 13% of internet users in Switzerland aged 66 and over use Instagram.

– Facebook use is most common in the 26–35 age group (79%). Facebook use is less widespread among internet users aged 66 and over (54%), although a majority still use it.

Facebook use is most common among internet users aged 26 to 35

– Other social media services such as Snapchat and Jodel are mainly used by the youngest age group (60%). Only 11% of those aged 66 and over use them.

– The online news website 20min.ch and its app are used most by the 36–65 age group (58%). In the 16–25 age group only a third (34%) use it.

Differences in the use of these applications with regard to gender and education are apparent:

More women (73%) than men (62%) use Facebook. Similarly, slightly more women (41%) than men (37%) are Instagram users.

More women than men use Facebook and Instagram

However, more men (41%) than women (29%) use other social media such as Snapchat, Twitter and Jodel. Slightly more men (90%) than women (83%) use YouTube.

- Facebook is most commonly used by internet users with a medium level of educational attainment (70%). In the lower (62%) and higher (60%) educational groups, Facebook use is slightly less common.
- Instagram is used most in the lower educational group (64%). The proportion of Instagram users is lower in the medium (39%) and higher educational (33%) groups. Other social media are also used most by the group with lower educational attainment (55%). Use is less widespread among internet users with medium (30%) and higher educational attainment (42%).
- YouTube is mostly used by people in the lower (91%) and higher (92%) educational group. Use is slightly less prevalent in the medium educational group (84%), although the differences are small.
- No major differences between gender and educational groups were detected regarding the use of Google Search, WhatsApp, and 20min.ch and its app.

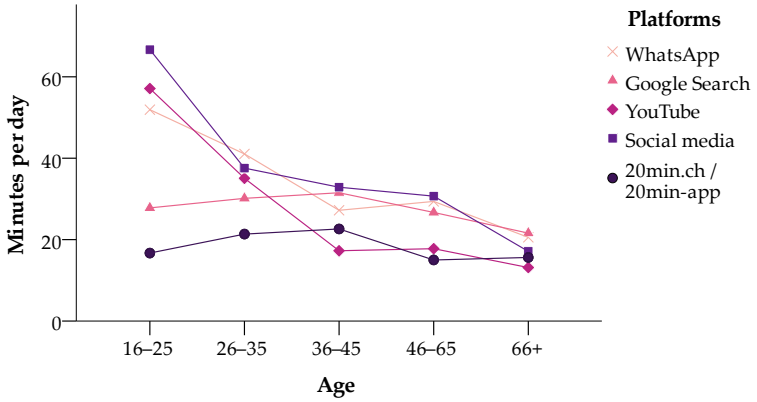
Differences between educational levels and age levels often coincide. This may lie in the fact that many young users have not completed their education yet, which is why they are part of the group with lower educational attainment. Thus the widespread use of social media in the group with a lower educational level may also reflect that many users of these applications are young and still in education.

Swiss internet users spend most of their daily online time (3.53 hours) using algorithmic-selection applications (2.45 hours)

On average, Swiss internet users spend 3.53 hours a day online, with the above-mentioned algorithmic-selection applications making up large shares of this daily internet usage. Each of the applications studied is used for about half an hour per day on average: Swiss internet users spend most of their daily internet time on social media such as Facebook and Instagram (39 minutes) as well as WhatsApp (34 minutes), followed by Google Search (28 minutes) and YouTube (28 minutes). The 20min.ch news site and its app are less used (18 minutes) on average.

The usage times of these algorithmic-selection applications differ with age:

Figure 6: Usage time of algorithmic-selection applications by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

Young people (16–25) spend more time on social media, WhatsApp, and YouTube everyday than all other age groups

- The usage time of Whatsapp, YouTube, and social media like Facebook and Instagram decreases with age: The 16–25 age group use social media (67 minutes), YouTube (57 minutes) and WhatsApp (52 minutes) most extensively. The second youngest age group (26–35) uses social media (38 minutes), YouTube (35 minutes), and WhatsApp (41 minutes) less than the youngest age group. Internet users aged 66 and over use social media (17 minutes), YouTube (13 minutes) and WhatsApp (21 minutes) the least.
- The usage time of Google Search is similar across all age groups, with the 46–65 age group spending the most time per day on the search engine (32 minutes).
- While the usage time for the 20min app and 20min.ch is at similar levels among all age groups (15–23 minutes), people aged between 36 and 45 use this service most extensively (23 minutes).

In addition to these age differences, the usage time also varies between different levels of educational attainment:

Internet users with low educational attainment use social media and YouTube most extensively

- The usage time of WhatsApp, Google Search, and 20min.ch does not differ between the three educational groups.
- Social media (81 minutes) and YouTube (62 minutes) are used most extensively by people with a low level of educational attainment. Internet users with medium or higher education spend less time per day on social media (39 minutes and 29 minutes, respectively) and YouTube (28 minutes and 20 minutes, respectively).

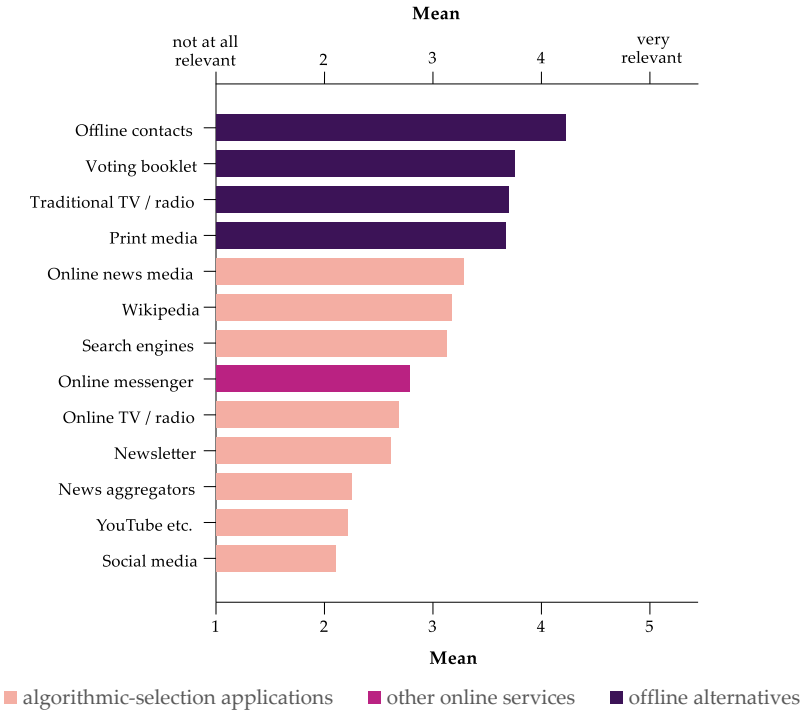
2 Users' Assigned Relevance to Algorithmic-Selection Applications

Widespread and extensive use of algorithmic-selection applications implies frequent exposure to personalized content and related risks

The above-mentioned results confirm that Swiss internet users generally use a plethora of algorithmic-selection applications for a wide range of purposes. They spend significant parts of their day potentially being exposed to personalized content. To what extent have algorithmic-selection applications replaced non-algorithmic online or more traditional offline alternatives? Do Swiss internet users, for instance, now fully rely on algorithmically curated content to obtain information on current issues or do they still perceive other news sources to be more important?

Internet users evaluated the relevance of a list of algorithmic-selection applications compared to online and offline alternatives for five life domains: political and social orientation, entertainment, commercial transactions, socializing, and health. Figure 7 shows the mean relevance assigned to sources and activities for opinion formation concerning current political and societal issues, with "1" denoting no assigned relevance and "5" denoting a very high assigned relevance.

Figure 7: Assigned relevance to algorithmic-selection applications for political and social orientation in Switzerland



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

Offline alternatives (friends and family, voting booklet, traditional radio and TV) are assigned the highest relevance for political and social opinion formation

- Offline contacts, i.e. talking to friends or family, are assigned the highest relevance for political and social opinion formation (mean = 4.23) by Swiss internet users.
- Furthermore, the voting booklet, a print information brochure that is mailed to every Swiss household prior to each vote, is considered a very relevant source by the majority of Swiss internet users (mean = 3.75).
- In addition, traditional radio and TV programs (mean = 3.70) as well as print media (mean = 3.67) are assigned a high relevance by Swiss internet users.

YouTube and social media are assigned little relevance for social and political opinion formation

- Video services like YouTube (mean = 2.21) and social media (mean = 2.10) are assigned less relevance for opinion formation.[2]
- On YouTube, recommendations (mean = 1.76) and advertisements (mean = 1.37) are considered less relevant than videos that have been found via the search function (mean = 2.45).
- On social media, content from friends or other subscribed pages that appear in the feed (mean = 2.02) as well as pages by political parties or interest groups that are directly visited or searched for (mean = 1.86) are assigned more relevance for opinion formation than advertisements in the feed (mean = 1.46).
- Overall, Swiss users assign more relevance to offline than to online alternatives for opinion formation. Ranking all alternatives according to the mean relevance assigned to them, offline alternatives take the first four places, while the highest online alternative comes fifth.

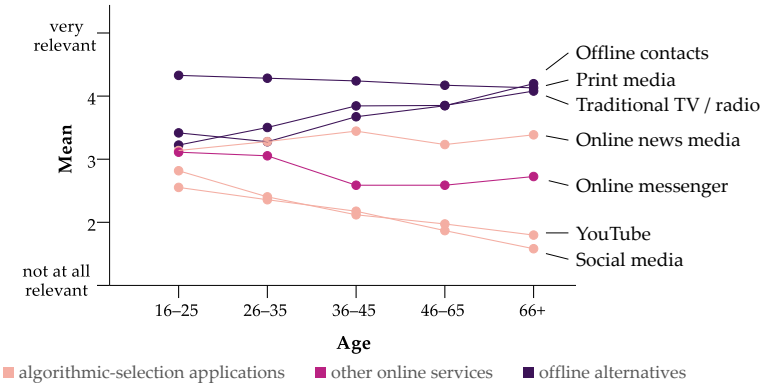
Stronger political interest is associated with higher assigned relevance to voting booklet, traditional media and their online channels for social and political opinion formation

- Political interest is considered an important influencing factor on the modes of political and social opinion formation. Indeed, political interest and the relevance assigned to the voting booklet or similar official brochures correlate significantly positively ($r = .164$, $p < .001$, $n = 1202$).
- Moreover, political interest correlates positively with the relevance assigned to traditional media such as newspapers ($r = .213$, $p < .001$, $n = 1202$) and traditional TV or radio ($r = .178$, $p < .001$, $n = 1202$).
- Political interest correlates with the relevance assigned to media websites ($r = .196$, $p < .001$, $n = 1202$) as well as newsletters or news summaries ($r = .165$, $p < .001$, $n = 1202$).

The relevance assigned to different applications varies across societal groups. Figure 8 shows age differences for the relevance assigned to selected sources of information on political and societal issues.

[2] The finding that social network sites are generally assigned a rather low relevance is in line with the results of the qualitative study by Schmidt et al. (2019).

Figure 8: Assigned relevance to selected algorithmic-selection applications for social and political orientation by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– Offline contacts are considered most relevant for opinion formation on social and political topics among all age groups, with younger internet users assigning an even higher relevance to them (mean = 4.33 for the youngest age group and mean = 4.13 for the oldest).

Relevance assigned to print media and traditional TV or radio for social and political opinion formation increases with age

– Print media are considered more relevant by older (e.g., mean = 4.20 for people aged 66 and over) than by younger age groups (e.g., mean = 3.42 for people aged 16 to 25).

– The same is true for traditional TV and radio. Internet users aged 66 and over (mean = 4.08) consider these traditional sources of information as more relevant than younger groups, e.g., internet users between 16 and 25 (mean = 3.22).

– Online news media are considered slightly more relevant by older age groups. Internet users aged 66 and over perceive online news media to be more relevant (mean = 3.39) than those between 16 and 25 do (mean = 3.14).

– Texts on online messengers are considered more relevant by younger age groups. Internet users aged between 16 and 25 assign a higher relevance to such texts (mean = 3.11) than those aged 66 and over (mean = 2.73).

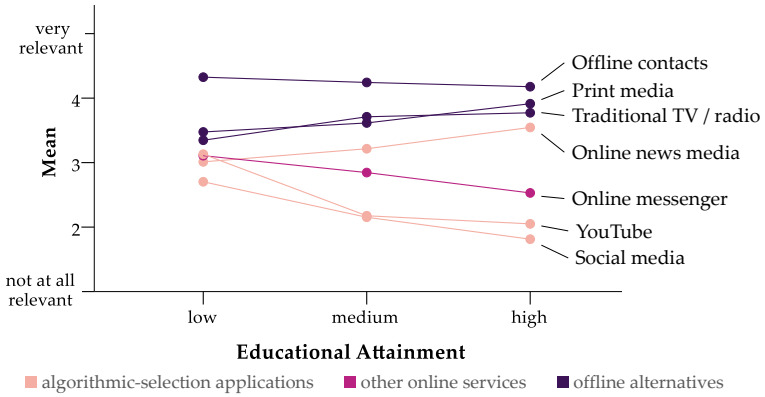
Relevance assigned to social media and YouTube lower in older age groups

– Video services like YouTube are considered more relevant by younger internet users. For example, users between 16 and 25 (mean = 2.82) assign a higher relevance to YouTube than those aged 66 and over (mean = 1.80).

– Younger internet users (e.g., mean = 2.55 for people aged 16 to 25) assign more relevance to social media than older ones (e.g., mean = 1.58 in 66 and over). However, even the youngest group perceives several traditional offline and non-algorithmic online alternatives to be more relevant for their opinion formation on social and political issues than social media.

The assignment of relevance for social and political opinion formation also varies across different educational groups:

Figure 9: Assigned relevance to selected algorithmic-selection applications for social and political orientation by educational attainment



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

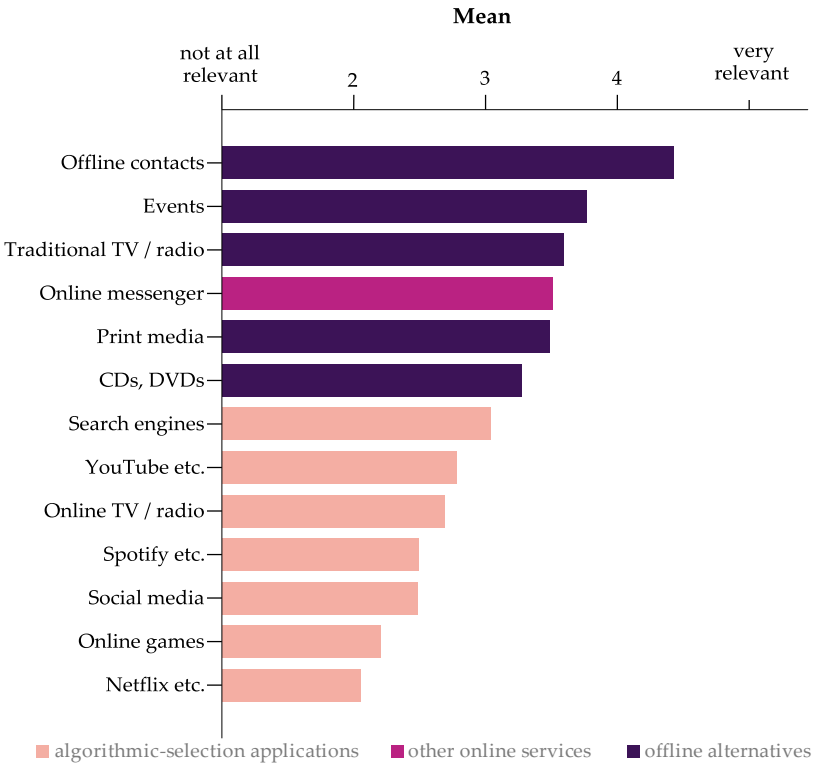
– Offline contacts are assigned the highest relevance for social and political opinion formation among all groups (e.g., mean = 4.32 for the low educational group and mean = 4.18 for the high educational group).
– Print media are deemed more relevant by the higher-educated users (mean = 3.91) than by internet users with low levels of education (mean = 3.48).
– The same is true for traditional TV and radio. Highly-educated internet users (mean = 3.77) consider these traditional sources of information to be more relevant than low-educated users (mean = 3.35).
– Similarly, online news media are considered to be more relevant by highly-educated users (mean = 3.55) than low-educated users (mean = 3.01).
– Text messages on online messengers, however, are considered more relevant by the low-educated group (mean = 3.11). The highly-educated group considers them to be less relevant (mean = 2.53).
– Video applications like YouTube are also considered more relevant by low-educated users (mean = 3.13). Highly-educated users perceive them as less relevant (mean = 2.05).
– Social media are assigned a higher relevance by low-educated internet users (mean = 2.70) as well. The highly-educated group assigns very little relevance to them for their opinion formation on social and political issues (mean = 1.81).

Internet users with higher educational attainment assign higher relevance to print media and traditional TV / radio

Relevance assigned to YouTube and social media for social and political opinion formation lower among higher-educated

Besides being questioned about their online and offline habits concerning information on political and societal topics, the respondents were asked about the relevance they assign to sources, services, or activities for their everyday entertainment. Figure 10 shows the mean assigned relevance of algorithmic-selection applications as well as online and offline alternatives in this life domain.

Figure 10: Assigned relevance to algorithmic-selection applications for entertainment in Switzerland



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

For entertainment, offline alternatives are perceived as most relevant

– For entertainment purposes, offline contacts such as conversations with friends and family are considered as most relevant (mean = 4.43). Swiss internet users assign the highest relevance to these conversations, followed by attending cultural or sports events (mean = 3.77). Traditional radio and TV (mean = 3.59) are assigned the highest relevance of all media sources in the list.

– The online alternative most relevant to Swiss internet users is online text messaging with friends or family, e.g., through WhatsApp (mean = 3.51).

– For entertainment purposes, print media (mean = 3.49) as well as CDs and DVDs (mean = 3.27) are considered more relevant than for example video services like YouTube (mean = 2.78) or online games (mean = 2.20).

Algorithmic-selection applications are considered to be less relevant for everyday entertainment than offline alternatives

– Thus, overall, traditional and offline media alternatives are assigned more relevance on average for entertainment compared to applications based on algorithmic selection, such as YouTube (mean = 2.78), Spotify (mean = 2.49), social media (mean = 2.48), and Netflix (mean = 2.05).

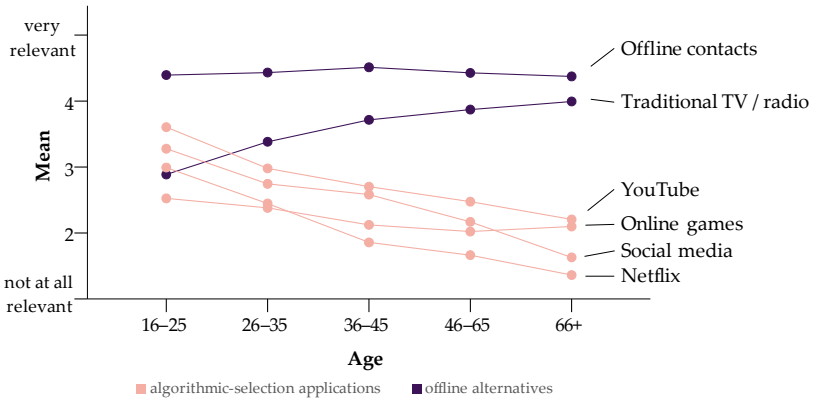
– On YouTube, recommendations (mean = 2.09) and advertisements (mean = 1.35) are assigned less relevance than videos that have been found via the search function (mean = 3.04).

– On Netflix, results that have been found through the search function (mean = 3.55) are deemed more relevant than automated recommendations (mean = 2.93).
– On Spotify, content that has been searched for (mean = 3.42) is also considered as more relevant than automatically recommended content (mean = 2.58).
– Similarly, on social media, content from friends or other subscribed pages that appear in the feed (mean = 2.43) as well as pages by companies or people that are directly visited or searched for (mean = 2.21) are deemed more relevant than (personalized) advertisements in the feed (mean = 1.46).
– Altogether, Swiss internet users appear to assign a higher relevance to algorithmic-selection applications compared to online and offline alternatives for their everyday entertainment than for obtaining information on political and societal issues.

Assigned relevance to algorithmic-selection applications higher for entertainment than for social and political opinion formation

The relevance assigned to applications varies across different societal groups. Figure 11 shows age differences for the relevance assigned to selected sources of entertainment.

Figure 11: Assigned relevance to selected algorithmic-selection applications for entertainment by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– Offline contacts are considered most relevant for entertainment among all age groups (e.g., mean = 4.39 for the youngest age group and mean = 4.37 for the oldest).
– Traditional TV and radio are perceived to be more relevant by older age groups (e.g., mean = 3.99 for people aged 66 and over) than by younger ones (e.g., mean = 2.89 for people aged 16 to 25).
– The opposite is true for all algorithmic-selection applications under investigation. For instance, internet users aged 66 and over (mean = 2.21) consider video services like YouTube to be less relevant than younger groups do, e.g., people between 16 and 25 (mean = 3.60).
– Online games are considered to be more relevant by younger age groups. Internet users aged 66 and over perceive such games to be

For everyday entertainment, assigned relevance to traditional TV / radio increases with age

less relevant (mean = 2.10) than those between 16 and 25 do (mean = 2.52).

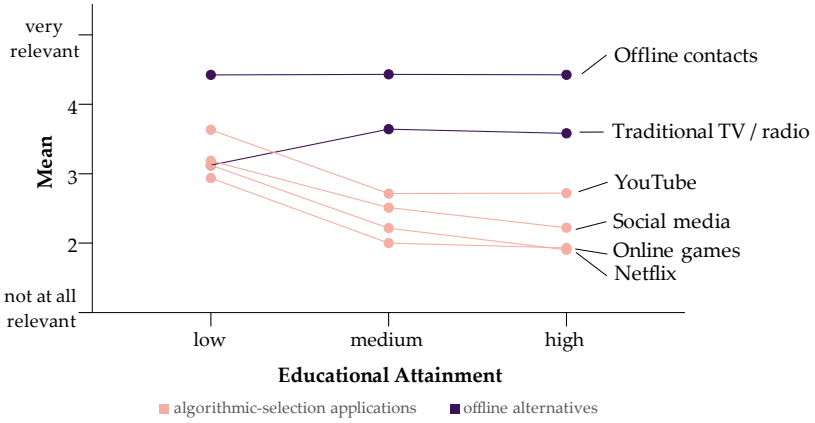
– Social media are assigned a higher relevance for everyday entertainment by younger age groups. For example, internet users aged 66 and over (mean = 1.63) assign a lower relevance to social media for entertainment purposes than those between 16 and 25 (mean = 3.28).

– Streaming services like Netflix are also considered more relevant by younger internet users. For example, users of the 16–25 age group consider these more relevant (mean = 2.99) than those aged 66 and over (mean = 1.36).

The relevance assigned to applications for entertainment not only varies with age but also across educational groups.

The relevance assigned to YouTube, online gaming, social media, and Netflix decreases with age

Figure 12: Assigned relevance to selected algorithmic-selection applications for entertainment by educational attainment



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– Offline contacts are considered most relevant for entertainment among all educational groups (e.g., mean = 4.42 for the low and the high educational group).

– Traditional TV and radio are considered more relevant by highly-educated internet users (mean = 3.58) than by less educated ones (mean = 3.12).

Traditional TV / radio is considered more important by internet users with higher levels of educational attainment

– Video services like YouTube, however, are considered more relevant by the low-educated group (mean = 3.63) than by the highly-educated group (mean = 2.72).

– Social media are assigned a higher relevance by the low-educational group (mean = 3.19) than by the highly-educated group (mean = 2.22) as well.

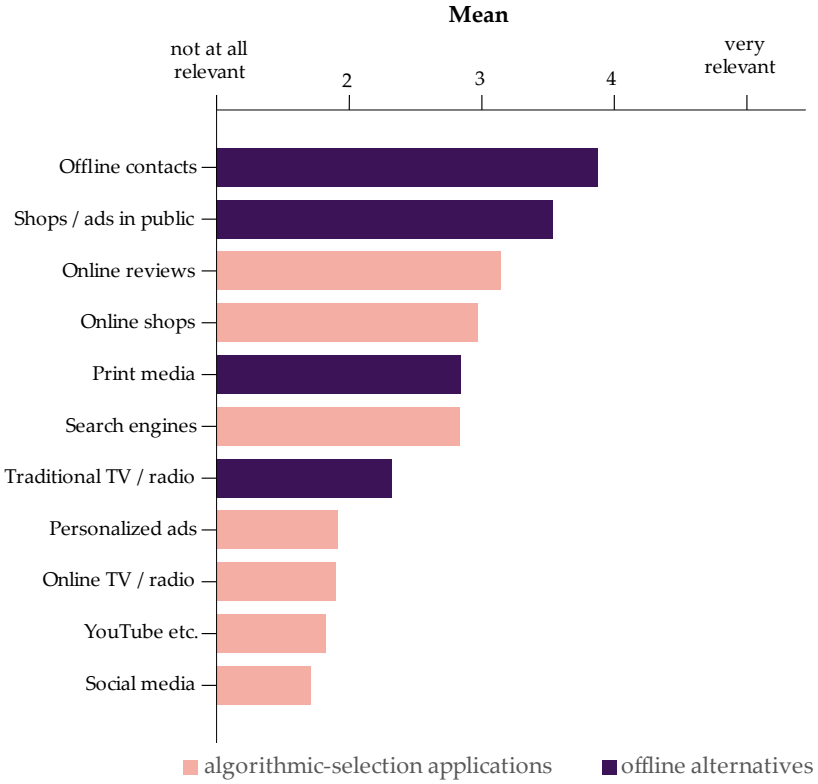
– Similarly, online games are considered more relevant by low-educated users (mean = 3.12) than by highly-educated ones (mean = 1.90).

YouTube, social media, online gaming and Netflix are assigned less relevance for entertainment by higher-educated internet users

– Streaming services like Netflix are considered more relevant by low-educated users (mean = 2.94). Highly-educated users perceive these as less relevant (mean = 1.93).

After being questioned about the relevance of sources related to everyday entertainment, the respondents were asked how relevant algorithmic and non-algorithmic online applications as well as offline activities are for their daily purchasing decisions. Figure 13 shows the mean of the relevance assigned to applications in this life domain.

Figure 13: Assigned relevance to algorithmic-selection applications for commercial transactions in Switzerland



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

Offline alternatives are assigned the highest relevance for commercial transactions

– When it comes to commercial transactions, offline contacts, i.e., talking with friends and family, are assigned the highest relevance (mean = 3.88).

– Furthermore, internet users assign a comparatively high relevance to shops and ads in public (mean = 3.54) for their purchasing decisions.

Online reviews are assigned high relevance for purchasing decisions

– Product information and reviews online (mean = 3.14) are assigned a high relevance with regard to purchasing decisions. Specifically, product ratings made by other users, e.g., on TripAdvisor (mean = 3.29), ratings by sellers or buyers, e.g., on eBay (mean = 2.97), and price comparisons on sites like comparis.ch (mean = 3.47) are perceived as rather relevant.

– Furthermore, online shops (mean = 2.97) are assigned some relevance for purchasing decisions. In online shops, products that have been found via the search function (mean = 3.70) are perceived as more relevant than automated recommendations (mean = 2.23).

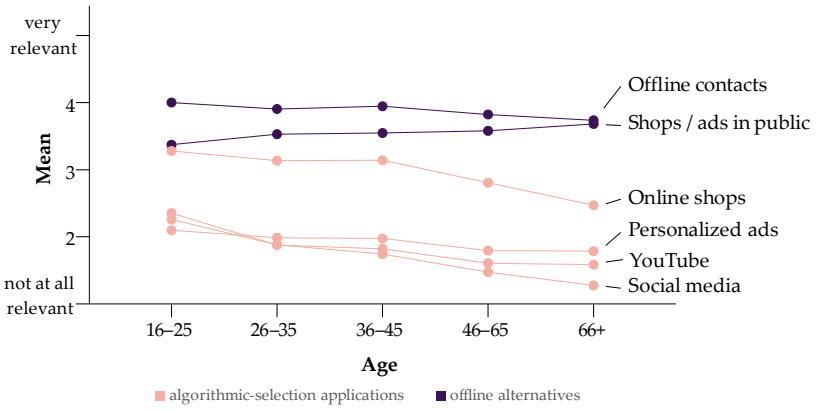
Personalized advertisements are assigned little relevance for commercial transactions

– In contrast, Swiss internet users assign little relevance to social media (mean = 1.71), video services like YouTube (mean = 1.82), and personalized advertisements (mean = 1.91). Product reviews and advertisements in print media are assigned a higher relevance (mean = 2.84).

– On YouTube, videos that have been found via the search function (mean = 1.99) are deemed more relevant than recommendations (mean = 1.51) and advertisements (mean = 1.34). On social media, profiles by companies or people that are directly visited or searched for (mean = 1.78) as well as content from friends or other subscribed pages that appear in the feed (mean = 1.75) are deemed more relevant than advertisements in the feed (mean = 1.45).

The assignments of relevance vary across different societal groups. Figure 14 shows age differences for the relevance assigned to selected applications for commercial transactions.

Figure 14: Assigned relevance to selected algorithmic-selection applications for commercial transactions by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

Offline contacts and shops / ads in public are considered most relevant for commercial transactions in all age groups

– Offline contacts are considered most relevant for purchasing decisions across all age groups (e.g., mean = 4.00 for the youngest age group and mean = 3.74 for the oldest).

– Traditional shops and ads in public are more relevant for older age groups (e.g., mean = 3.68 for people aged 66 and over) than for younger age groups (e.g., mean = 3.37 for people aged 16 to 25).

– The opposite is true for online shops. People aged 66 and over (mean = 2.47) consider them less relevant than younger groups, e.g., people between 16 and 25 (mean = 3.28).

– However, even internet users in the youngest age group assign more relevance to traditional (offline) shops and ads in public than to online shops.

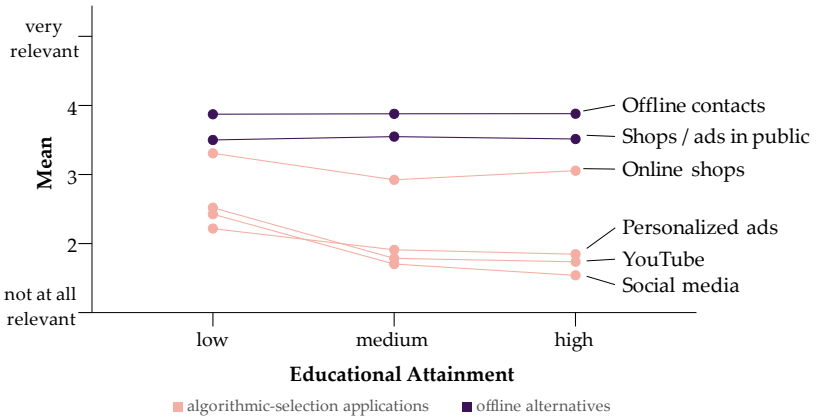
– Similarly, personalized advertisements are considered more relevant for purchasing decisions by younger age groups. Internet users over 66 perceive such ads as less relevant (mean = 1.79) than those between 16 and 25 (mean = 2.10).

Assigned relevance to online shops, personalized ads, YouTube, and social media decreases with age

- Video services like YouTube are considered more relevant by younger internet users. For example, users between 16 and 25 consider them to be more relevant (mean = 2.35) than internet users aged 66 and over (mean = 1.58).
- Social media are assigned a higher relevance by younger users (e.g., mean = 2.26 for the 16–25 age group) than by older users (e.g., mean = 1.28 for those aged 66 and over), too.

The assignment of relevance to services and activities for purchasing decisions also varies across different educational groups:

Figure 15: Assigned relevance to selected algorithmic-selection applications for commercial transactions by educational attainment



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

Traditional shops and ads in public are equally relevant for commercial transactions across all educational levels

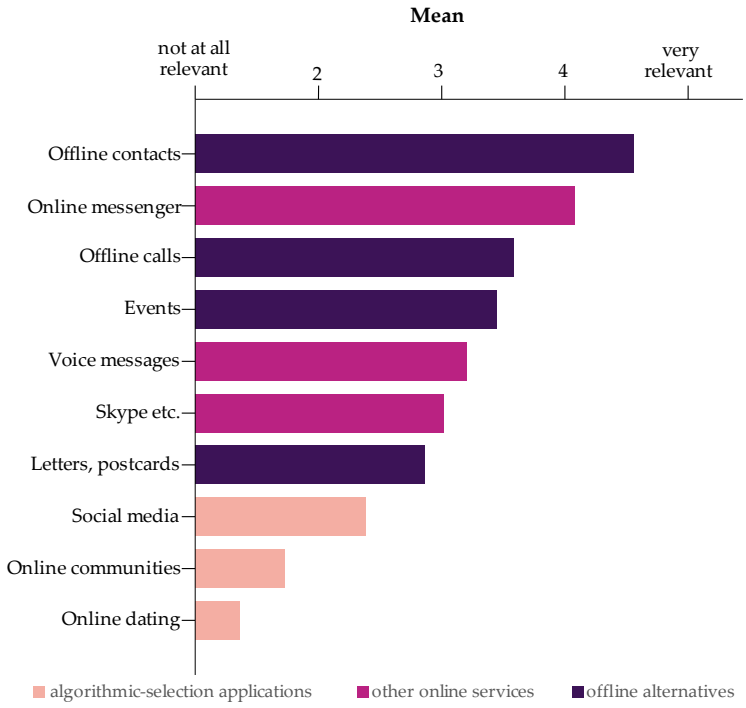
- Offline contacts are considered most relevant for purchasing decisions among all educational groups (e.g., mean = 3.87 for the low-educated group and mean = 3.88 for the highly-educated group).
- There are no differences between educational groups regarding the relevance assigned to traditional shops and ads in public either (e.g., mean = 3.50 for the low educated group).
- Online shops, however, are considered more relevant by the low-educated group (mean = 3.31) than by the highly-educated group (mean = 3.06).
- Similarly, personalized advertisements are considered more relevant by users with a lower educational attainment (mean = 2.22) than by those with a higher education (mean = 1.85).
- Video services like YouTube are considered more relevant for commercial transactions by low-educated users (mean = 2.52). The highly-educated rate these as less relevant (mean = 1.74).
- Social media are assigned a higher relevance by the low-educated group (mean = 2.43) than by the highly-educated group (mean = 1.54).

The relevance of personalized ads, YouTube and social media decreases with higher educational levels

Another life domain that has been fundamentally transformed by emerging (algorithmic) online applications are social interactions. How relevant are algorithmic online services for staying in touch

with people or getting to know new people compared to more traditional online and offline alternatives? Figure 16 shows the relevance internet users assign to applications in the life domain socializing.

Figure 16: Assigned relevance to algorithmic-selection applications for socializing in Switzerland



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

For socializing, offline contacts are assigned the highest relevance

– With regard to socializing, Swiss internet users consider offline contacts, i.e., personal conversations, to be by far the most relevant (mean = 4.56).
– Besides personal conversations, high relevance is assigned to online text messages (mean = 4.08), offline text messages or offline phone calls (mean = 3.59), cultural or sports events (mean = 3.45) as well as voice messages (mean = 3.20) and voice or video calls, e.g., via Skype (mean = 3.02).
– Traditional postcards or letters (mean = 2.86) are considered to be more relevant than any online service that applies algorithmic selection. The three algorithmic-selection applications are in the lowest ranks.
– Social media are assigned some relevance for socializing (mean = 2.39). Even though the relevance assigned is rather low compared with the alternatives investigated, social media are assigned the highest relevance for socializing compared with the other life domains examined.
– On social network sites, profiles that are found through the search function or directly visited (mean = 2.25) as well as status updates

from friends that appear in the feed (mean = 2.08) are assigned a higher relevance than contact or friendship suggestions (mean = 1.88).

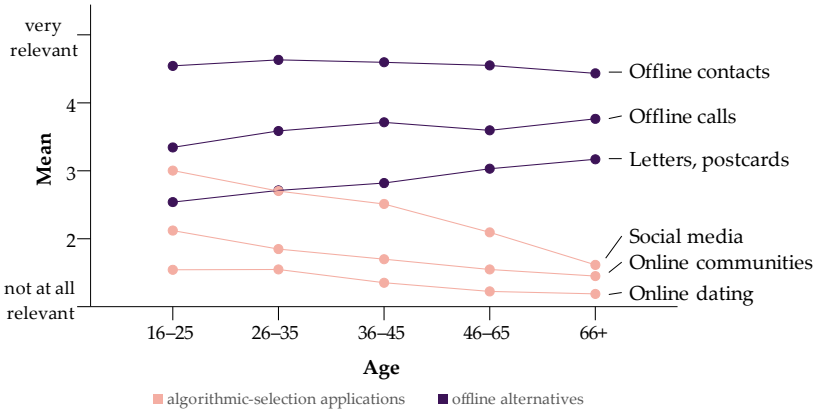
– Online-communities, e.g., for gaming, are not assigned high relevance either (1.72).

– Swiss internet users also assign low relevance to dating applications such as Parship or Tinder (mean = 1.36).

Of all life domains, the relevance assigned to social media is highest for socializing

Figure 17 shows age differences for the relevance assigned to selected applications for socializing.

Figure 17: Assigned relevance to selected algorithmic-selection applications for socializing by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– All age groups consider offline contacts to be most relevant for socializing (e.g., mean = 4.54 for the youngest age group and mean = 4.43 for the oldest).

– Offline calls are more relevant for older age groups (e.g., mean = 3.76 for people aged 66 and over) than for younger age groups (e.g., mean = 3.34 for people aged 16 to 25).

– Similarly, traditional mail is assigned higher relevance by older age groups. Internet users over 66 perceive postcards and letters as more relevant (mean = 3.17) than those between 16 and 25 do (mean = 2.54).

Assigned relevance to offline calls and traditional mail is highest among older groups

– The opposite is true for social media. People aged 66 and over (mean = 1.62) consider them less relevant than younger groups, e.g., people between 16 and 25 (mean = 3.00).

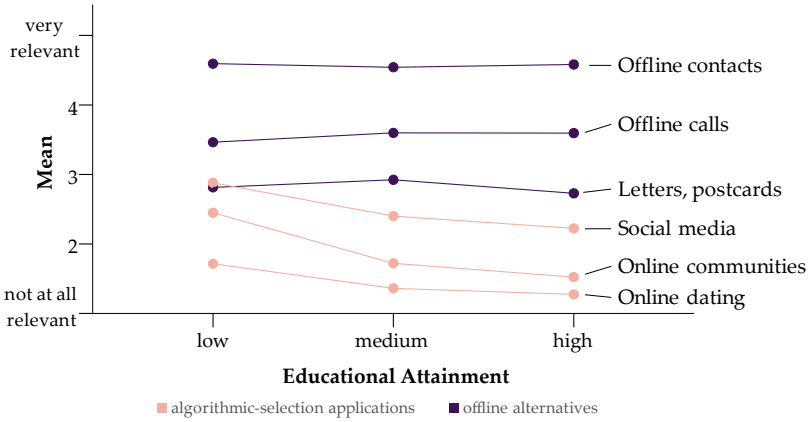
– Online communities, e.g., for gaming, are considered more relevant by younger age groups. For example, internet users over 66 perceive them to be less relevant (mean = 1.45) than those between 16 and 25 (mean = 2.12).

– Online dating services are assigned a higher relevance by younger internet users. For example, users between 16 and 25 consider such services more relevant (mean = 1.54) than users aged 66 and older do (mean = 1.19).

Younger internet users assign higher relevance to social media, online communities, and online dating for socializing

The assignment of relevance in the life domain of socializing not only varies across age groups but also across educational levels.

Figure 18: Assigned relevance to selected algorithmic-selection applications for socializing by educational attainment



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– All educational groups consider offline contacts most relevant for socializing (e.g., mean = 4.59 for the low-educated group and mean = 4.58 for the highly-educated group).
– Highly-educated internet users (mean = 3.59) and low-educated ones (mean = 3.46) both consider offline calls and text messages similarly relevant.
– In the same way, traditional mail is considered similarly relevant by the low-educated group (mean = 2.81) and the highly-educated one (mean = 2.73).

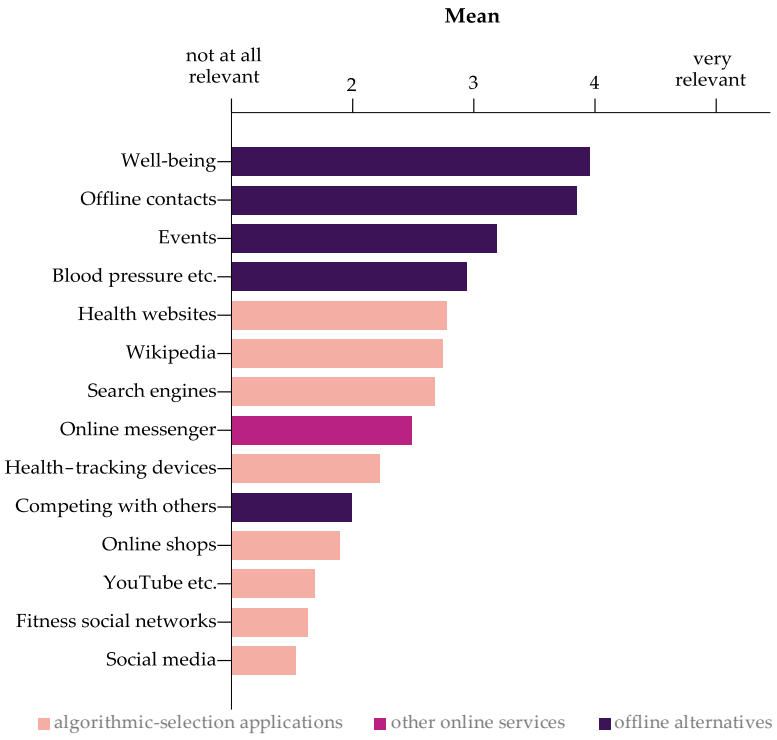
Offline calls and traditional mail are assigned equal relevance across all educational levels

– Social media, however, are assigned a higher relevance by the low-educated group (mean = 2.88) than by the highly-educated group (mean = 2.22).
– Similarly, online communities are considered more relevant by low-educated users (mean = 2.45) than by highly-educated ones (mean = 1.52).
– Online dating applications are considered more relevant by low-educated users (mean = 1.72) than by users with high education (mean = 1.27).

Low-educated internet users perceive social media, online communities, and online dating as more relevant than higher-educated

Finally, the respondents were asked to evaluate the relevance they assign to various services and activities in the realm of health and fitness. Figure 19 shows the mean relevance assigned to various applications in this life domain.

Figure 19: Assigned relevance to algorithmic-selection applications for health in Switzerland



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– In terms of obtaining information related to one's health or fitness, Swiss internet users perceive their own, personal well-being or intuition to be the most relevant indicator (mean = 3.96).

Personal well-being and offline contacts are considered most relevant for health information

– Similar to the other life domains, offline contacts (mean = 3.85) are assigned a comparatively high relevance, followed by attending events such as talks by medical professionals (mean = 3.19) and offline measurements, such as blood-pressure monitoring (mean = 2.94).

– Websites focusing on health information (mean = 2.78) and online encyclopedias such as Wikipedia (mean = 2.75) as well as search engines (mean = 2.68) are considered somewhat relevant.

– Competing with others, e.g., by taking part in a race, is not assigned a very high relevance (mean = 2.00).

– Online shops with health products are deemed not very relevant (mean = 1.90). On the websites of such online shops, products that were found by using the search function (mean = 3.13) are perceived to be more relevant than automated recommendations (mean = 2.11) and advertisements (mean = 1.81).

– Video services such as YouTube (mean = 1.69) are not assigned high relevance with regard to health. On such applications, videos found via the search function (mean = 1.84) are deemed more relevant than recommendations (mean = 1.46) and advertisements (mean = 1.26).

YouTube is assigned low relevance for health information

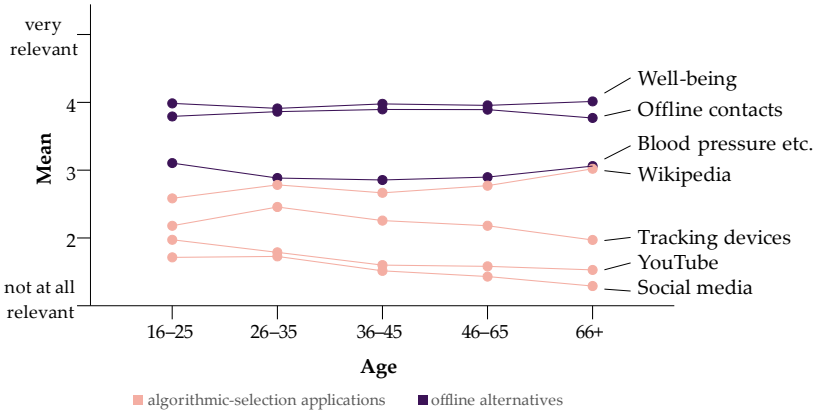
For health information, social media are assigned low relevance

– Social media (mean = 1.54) and social network sites that focus on fitness like Strava (mean = 1.63) are not very relevant for the health domain. On social media, profiles by companies or people that are directly visited or searched for (mean = 1.54) as well as content from friends or other subscribed pages that appear in the feed (mean = 1.51) are assigned a higher relevance than advertisements that appear in the feed (mean = 1.28).

– Health-tracking devices such as fitness trackers and tracking apps (mean = 2.22) are assigned a rather low relevance on average compared with other sources or services that do not apply algorithmic selection.

The relevance assigned to these sources varies slightly across different societal groups. Figure 20 shows age differences for the relevance assigned to selected applications regarding health.

Figure 20: Assigned relevance to selected algorithmic-selection applications for health by age



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

High relevance of personal well-being and offline measurements for health and fitness information across all age groups

– All age groups consider their personal well-being, as well as their intuition or appearance, to be the most important indicator for their current health state (e.g., mean = 3.98 for the youngest age group and mean = 4.01 for the oldest). Similarly, all age groups assign a high relevance to offline contacts for health information (e.g., mean = 3.79 for the youngest age group and mean = 3.77 for the oldest).

– Offline measurements such as blood pressure are deemed relevant by older age groups (e.g., mean = 3.06 for people aged 66 and over) as well as by younger groups (e.g., mean = 3.10 for people aged 16 to 25).

– Online encyclopedias like Wikipedia are considered more relevant for health information by older age groups (e.g., mean = 3.02 for people aged 66 and over) than by younger ones (e.g., mean = 2.58 for people aged 16 to 25).

– The opposite is true for fitness-tracking devices and apps. People aged 66 and over (mean = 1.97) consider these less relevant than younger groups, e.g., people between 16 and 25 (mean = 2.18).

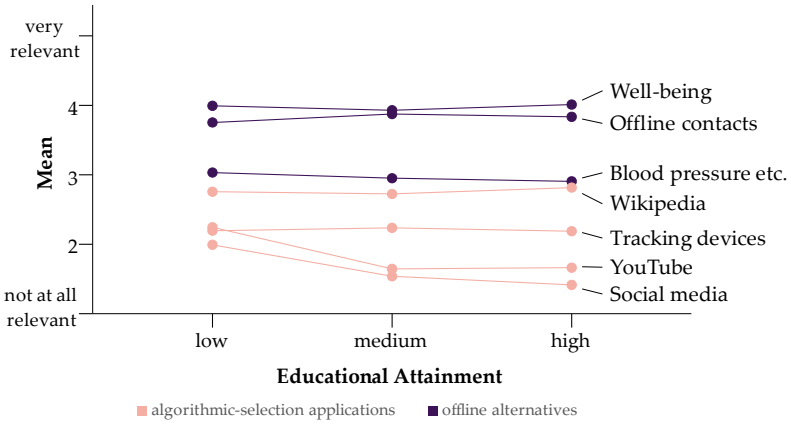
– Video services like YouTube are considered more relevant by younger age groups, too. Internet users over 66 perceive applications as less relevant (mean = 1.53) than those between 16 and 25 do (mean = 1.97).

– Similarly, social media are considered more relevant by younger internet users. For example, users between 16 and 25 consider such applications more relevant (mean = 1.71) than those aged 66 and older do (mean = 1.29).

Tracking devices, YouTube, and social media are perceived to be more relevant for health information by younger internet users

The assignment of relevance to different applications varies only slightly across groups with different levels of educational attainment.

Figure 21: Assigned relevance to selected algorithmic-selection applications for health by educational attainment



Data basis: n=1202, Swiss internet users aged 16 and over, 2019.

– Regardless of their level of education, Swiss internet users consider their own personal well-being (e.g., mean = 4.01 for highly-educated users) as well as conversations with friends and family (e.g., mean = 3.83 for highly-educated users) to be most important for health.

– Offline measurements like measuring one's blood pressure are also considered similarly relevant by highly-educated internet users (mean = 2.91) and by low-educated ones (mean = 3.03).

– There is equally little variability in the relevance assigned to online encyclopedias like Wikipedia in the different educational groups (mean = 2.76 for lower-educated and mean = 2.82 for highly-educated users).

Offline measurements, Wikipedia, and tracking devices are perceived as equally relevant across all educational levels

– Fitness trackers and tracking apps are also considered relevant by the low-educated group (mean = 2.20) and the highly-educated one (mean = 2.19) to a similar extent.

– Differences for the relevance assignment to sources of health and fitness information were only found for two algorithmic sources: Video services like YouTube are assigned a higher relevance by the low-educated (mean = 2.24). The highly-educated group considers them less relevant (mean = 1.66).

– Similarly, social media are judged more relevant by low-educated users (mean = 1.99) than by highly-educated users (mean = 1.42).
– Thus, while all respondents report that they mainly rely on offline sources for information on their health, Swiss internet users with lower levels of education appear to assign a higher relevance to the algorithmic-selection applications YouTube and social media. There are concerns about the accuracy of health- and fitness-related content on these applications since it is often user-generated and may lack professional fact-checking. Low-educated Swiss internet users appear to be exposing themselves to such information and relying on it more.

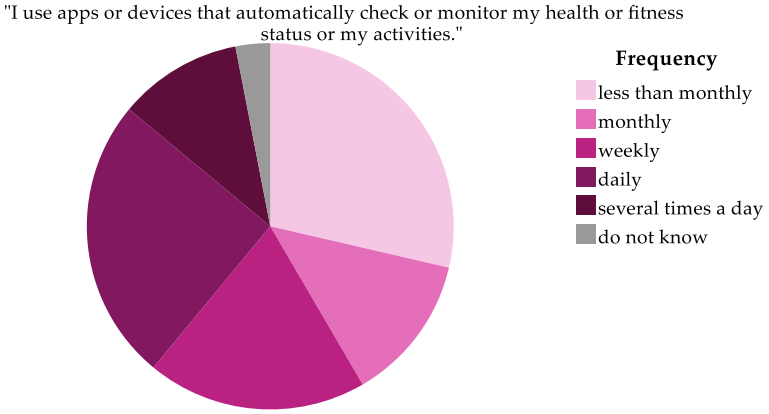
Lower-educated internet users tend to assign higher relevance to algorithmic-selection applications for health information

3 Case Study on Risks and Practices Related to Health-Tracking Devices

A third of Swiss internet users assign relevance to health-tracking devices

A third (31%) of Swiss internet users assign at least some relevance to apps or devices that monitor their health or fitness status or automatically track their activities for obtaining health and fitness information. This group answered additional questions about the use of their tracking devices or apps: How often and for what purposes do they use these devices? What risks do they perceive in connection with their use and how do they deal with them?

Figure 22: Frequency of use of health-tracking devices in Switzerland



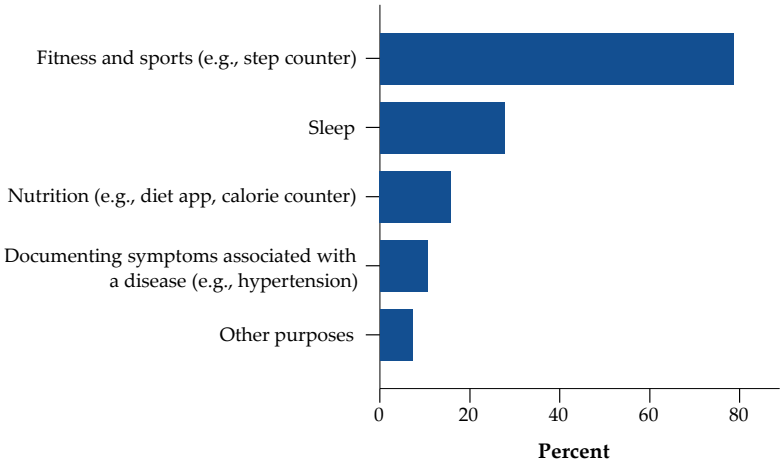
Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

A third of users of tracking devices use them daily or several times a day

- The majority of the users of tracking devices use them either less than monthly (29%) or at least weekly (32%). A quarter of users (25%) use their devices daily and one in ten (11%) even several times a day.
- No major differences were observed with regard to gender, age, or education regarding the frequency of use of such devices.

There are many different wearable devices or apps on the market that allow users to track a wide variety of health indicators or vital information. Respondents were thus asked what they use these devices for. Multiple responses were allowed for this question.

Figure 23: Purpose of health-tracking devices in Switzerland



Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

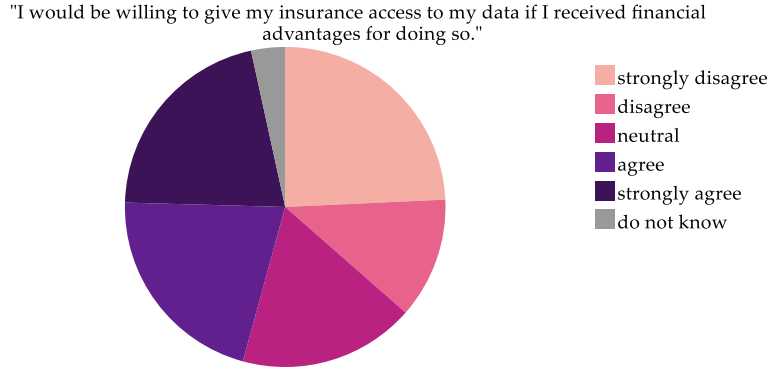
Tracking devices are used for fitness and sports by eight out of ten users

- The most common use of health-tracking devices is in the area of fitness and sports, for example to count one's steps: 79% of all users of such devices report using them for this purpose.
- The use of tracking devices for fitness and sports is common among women and men and across all age groups. Highly-educated users (80%) as well as users with a medium level of educational attainment (79%) use them more for this purpose than low-educated users (70%).
- Furthermore, 28% of users report tracking their sleep.
- Documenting one's nutrition (16%) is a purpose which a rather small group of internet users report using their devices or apps for.
- Specific purposes such as the documentation of symptoms that are associated with a disease are rather uncommon (11%).

In Switzerland, financial benefits on supplementary insurance can be received for sharing data

The use of fitness and health trackers and possible financial rewards is a recently discussed topic in the public debate. In Switzerland, various insurance companies promote financial benefits on supplementary insurance in exchange for health-related data such as daily step counts. Such offers have so far not been legally possible for the compulsory, basic insurance in Switzerland (Urech, 2018). The users of health trackers were asked if they would generally be willing to share their data with their insurance company.

Figure 24: Willingness to share data with an insurance company in Switzerland



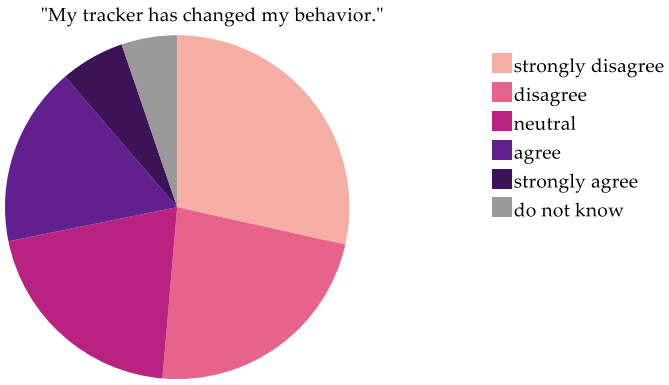
Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

Four out of ten tracking-device users are willing to share data with their insurance company

- Four out of ten users of fitness trackers (42%) state that they would be willing to let their insurance access their data if they received financial advantages for doing so.
- There are no major differences with regard to gender and education. However, younger users of tracking devices tend to be more willing to share their data with their insurance company (e.g., 55% among the 26–35 age group) than among older users (e.g., 28% among users aged 66 and over).

Furthermore, health-tracker users were asked about the influence of such tracking devices on their life:

Figure 25: Change of behavior resulting from use of health-tracking devices in Switzerland



Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

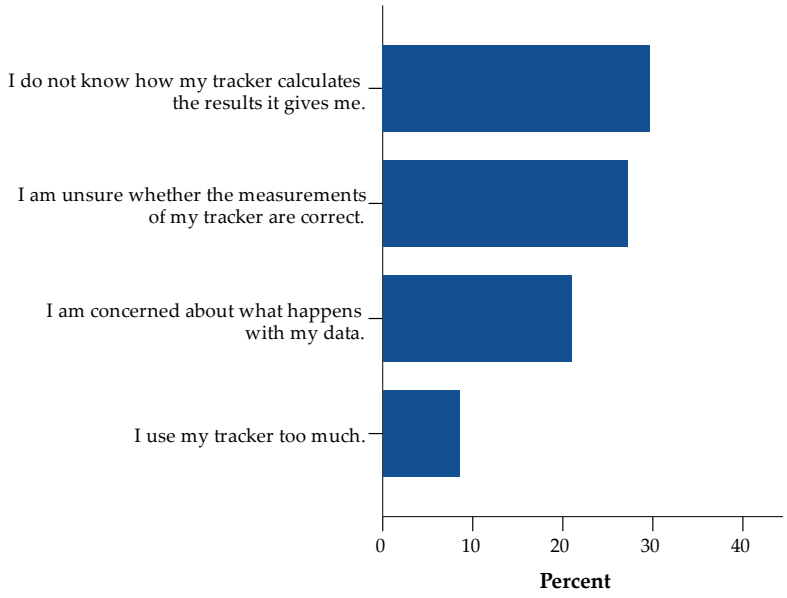
- Almost a quarter of all users of such devices (23%) confirm that their tracker has changed their behavior in one way or another. This can, for instance, be increased physical activity, healthier eating habits, or changed sleeping patterns.
- Slightly more men (26%) than women (20%) agree with the statement that the use of a tracking device has changed their behavior.

Users with medium (23%) to higher levels of education (25%) agree to this more than those with lower levels of education (17%) do. There were no major differences between age groups.

For a quarter of tracking-device users, using their tracker has led to a change in their behavior

The use of health-tracking devices is related to potential risks. Users of such devices were thus asked how strongly they agree with the following statements related to the usage of their app or tracking device. Figure 26 displays the percentage of users who agree or strongly agree with the respective statements.

Figure 26: Risks associated with health-tracking devices in Switzerland



Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

A third of tracking-device users do not know how results are calculated

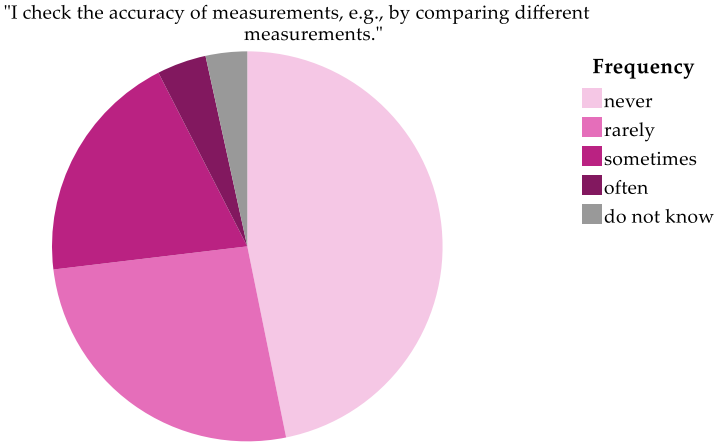
- Three out of ten users of tracking devices (30%) agree that they do not know how their tracker calculates the results it displays.
- Moreover, 27% report uncertainty about the accuracy of the measurements.
- A fifth (21%) of users are concerned about what happens with their data.

Only one in ten users believe they overuse their tracking device

- Overuse of tracking devices does not seem to be viewed as a problem by many users. Only 9% believe that they use their tracker too much. Men (11%) have this perception more often than women (6%) do. Younger users (11% of the 16–35 age group) also perceive overusing their tracker more often than older users (3–5% of people aged 36 and over) do. Highly-educated users (10%) and users with medium educational attainment (9%) also agree to this slightly more often than low-educated users (5%).

Related to these possible risks, users of tracking devices were asked how often they apply practices that concern the use of their trackers. For example, they were asked how often they check the accuracy of measurements provided by their app or health-tracking device.

Figure 27: Checking accuracy of tracker measurements as a coping practice in Switzerland



Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

– Almost half the users of tracking devices (47%) state that they never check whether the measurements their tracker provides are accurate, e.g., by comparing them to other measurements.

Almost half of tracking-device users never check the accuracy of provided measurements

– A quarter (26%) rarely check the accuracy of measurements and a fifth (19%) do so sometimes, but only 4% do this often.

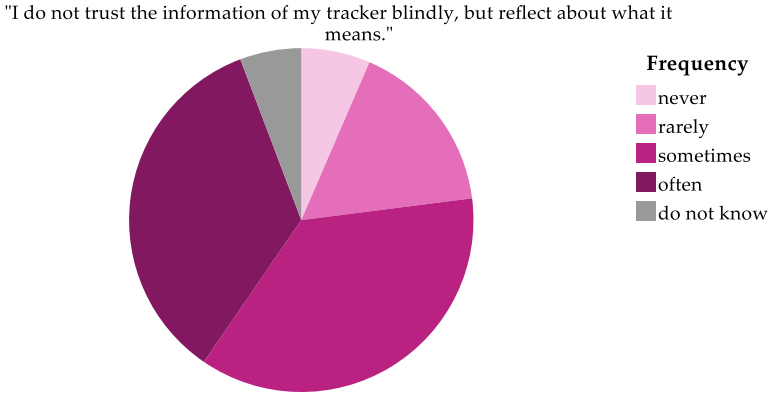
– With regard to this statement, no major differences were observed between women and men or between age and educational groups.

– Not knowing how a tracker calculates its results correlates positively with checking the accuracy of measurements ($r = .222$, $p < .001$, $n = 708$). Moreover, being unsure about the accuracy of measurements correlates positively with checking it ($r = .131$, $p < .001$, $n = 708$).

Not knowing how results are calculated and being unsure about their accuracy is positively associated with frequency of checking it

Related to this practice, users were also asked how often they reflect on what the information of their tracker means rather than trusting it blindly. This may for example include ignoring the device's prompts to engage in physical activity when it is very hot outside, which the tracker may not register.

Figure 28: Not blindly trusting tracker information as a coping practice in Switzerland



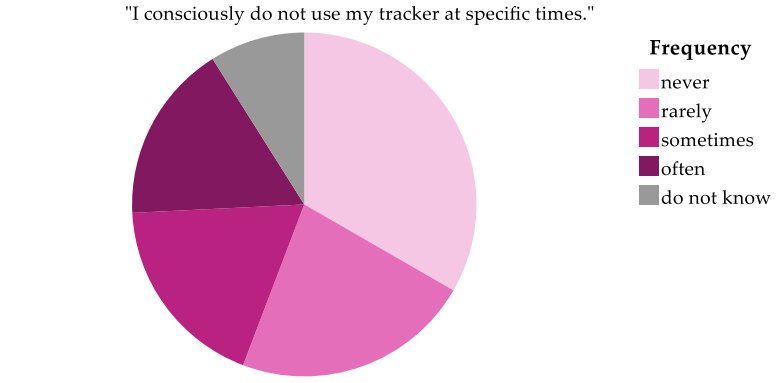
Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

The majority of users of tracking devices sometimes or often reflect about the information of their tracker

- The majority of users of tracking devices state that they often (35%) or sometimes (37%) reflect on what the information of their tracker means instead of trusting it blindly.
- Only a small proportion rarely (17%) or never (7%) reflect on it.
- No major differences with regard to gender, education, and age were detected for this statement.

Similarly, users of health-tracking devices were asked whether they consciously do not use their tracker at specific times, inter alia to avoid over-reliance on their device.

Figure 29: Conscious non-use of tracker as a coping practice in Switzerland



Data basis: n=708, Swiss users of health-tracking devices aged 16 and over, 2019.

Half of tracking-device users never or only rarely abstain from using their trackers consciously

- The answers to the question how often users consciously do not use their tracker at specific times are rather varied. The largest percentage of users state that they never (33%) or rarely (23%) abstain from using their tracker consciously at specific times.
- However, a third of health-tracker users report that they sometimes (18%) or even often (17%) consciously do not use their device.

– With regard to this statement, no major differences between women and men or within age and educational groups were found.

Conscious non-use correlates with the feeling of overuse and with privacy concerns

– The conscious non-use of a certain technology such as a health-tracking device may be related to data concerns or the feeling that one is using the tracker too extensively. As Figure 26 indicates, 21% of users are concerned about what happens with their data, but only 9% feel that they use their tracker too much. The practice of conscious non-use correlates significantly and positively with the feeling that one is using the tracker too extensively ($r = .142$, $p < .001$, $n = 708$) as well as with having privacy concerns regarding one's personal data ($r = .288$, $p < .001$, $n = 708$).

Methods

Representative survey of Swiss internet users

This study is based on a representative online survey of Swiss internet users. The sample of 1202 people is representative of Swiss internet users aged 16 and over by age, gender, language region, household size, and employment status. The data was collected by an independent market-research company, the LINK Institute, between 27 November 2018 and 23 January 2019 in three languages (German, French and Italian).

Online survey with panel sample

The participants were recruited from an existing internet panel (LINK internet panel) and received a small pecuniary incentive for their participation.

The sample was composed slightly disproportionately in order to enable separate analyses for smaller population groups. To balance this disproportion compared to the general population, the data was weighted with regard to age, gender, language region, household size, and employment status.

The survey lasted 30 minutes on average. The response rate was 76%.

Online surveys in absolute numbers:

Age	Total	German-speaking	French-speaking	Italian-speaking
16–25	211	146	58	7
26–35	225	169	49	7
36–45	210	142	57	11
46–65	422	308	97	17
66–85	134	100	28	6
	1202	865	289	48

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