A scoping review of personalized user experiences on social media: The interplay between algorithms and human factors

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ABSTRACT

No social media user sees the same feed. These platforms are personalized to the individual with the aid of algorithms that filter and prioritize content based on users' demographic profiles and personal data. On the one hand, this personalization aids the user by making the service more relevant, for instance by curating information of interest. On the other hand, personalization introduces potential risks associated with privacy concerns, lack of autonomy and control, as well as limited diversity of information. This scoping review presents an overview of the current state of knowledge of social media personalization from different research domains, providing insight on social media users' algorithmic awareness, their customization habits, their interactions with curated content, and the debate on how algorithms may create closed information outlets. It also provides a condensed overview of the different terminology used across domains, in the form of a glossary.

Some have traced the origin of social media back to Samuel Morse's first telegram in 1844 (Rosenwald, 2017), others attribute their source to the e-mail and chat services that followed the launch of the first digital network in 1969 (McIntyre, 2014). Despite the long history, the evolution of social media gained noticeable momentum only at the end of the last millennium, with the popularization of the Internet, the introduction of the smartphone, and quite recently, with the implementation of more advanced data processing. Today, social media are accessible across devices and platforms, and they are widely and frequently used by young and old and everyone in-between.

Social media platforms typically rely on personalization algorithms to tailor their service on the individual level. The personalization of social media thus seeks to make the platforms' offers and affordances more relevant and more compelling to the users (Aydin, 2018). While users are interacting with the platforms, they produce data that feed algorithms the insight they need to improve personalization (Rassameeroj & Wu, 2019). This means that algorithms filter and prioritize pictures, videos, stories, news, and other content, for each user; they do so based on demographics, online habits and preferences, activities of friends and connections, and a number of unknown factors (Rassameeroj & Wu, 2019). Some consider it an evolutionary process where interactions with various content are logged and analyzed, so what is most

popular can be prioritized over what receives less attention. In other words, social media users do not shape their digital worlds only through conscious choices, their worlds are adapting according to their own actions and the preferences of others. Moreover, since algorithms operate on their own accord, and on the individual level, there is little insight on what informs them and which outcomes they yield (Pangrazio & Selwyn, 2018; Rassameeroj & Wu, 2019). The implication of this is that no one knows exactly how algorithms operate in their filtering and prioritization of content, not even the developers that implemented them.

On the one hand, personalization often achieves just what the name implies, an online experience where filtered content is tailored specifically to the user's personal needs and interests (Head et al., 2020). On the other hand, interactions with highly personalized content and services are likely to have an impact on the users themselves. Indeed, research in the area has found that by limiting the diversity of information and reinforcing pre-conceptions, personalization can influence preferences, opinions, worldviews, and self-views (Head et al., 2020; Otto & Maier, 2016). Furthermore, the growing body of empirical work in this domain has showcased negative influences from excessive screen time, predominantly social media use. Among the negative influences are associations with reduced psychological well-being (Orben, 2020),

as well as media skepticism resulting from privacy concerns and worries about being monitored and swayed (Head et al., 2020).

In short, research on personalization has pointed to the potential pitfalls of personally tailored online services, including social media, they have also alluded to some of the benefits of having immediate access to online content filtered by relevance. Our ambition is to extend on existing studies that center on the use of these services, by emphasizing the user experience in personalized interactions. Thus, we wish to set a course aimed directly at the encounter between the user and the online system and we consider a scoping review of the current state of research to be a natural starting point. Because online media are studied across a range of disciplines, we also consider it relevant to harvest insight from several research areas. Our early search attempts helped identify the relevant disciplines, which covered the social and behavioral sciences, the information and computer sciences, and business, communication, and media studies. These attempts also informed us that terminologies, methodologies, and interpretations diverge across the fields. Because researchers in different disciplines are likely to pursue different research questions pertaining to personalization, they are also unlikely to consult research from other disciplines. Consequently, we surmise that many have approached related topics without considering prior studies from other fields. In the long run, this may hamper the research progress due to redundancy over continuation and narrow viewpoints over broad perspectives.

In response to this, we conducted a comprehensive interdisciplinary scoping review, bringing together the current state of knowledge on personalization and online experiences, aiming to shed light on similarities and differences across disciplines. This review thus provides a summary of relevant approaches and perspectives from several research areas, as well as an overview of the different terms used, making it easier for researchers to navigate novel venues and locate otherwise unencountered findings on a range of topics related to personalization. With this fundament, we hope for researchers to further our current knowledge on how social media interact with personalized content and platforms, how they are affected by it, how developers and designers can facilitate better experiences, and how society at large can deal with the related challenges.

Methodology

Undertaking an interdisciplinary review across adjacent fields, such as the one presented, makes it challenging to systematically retrieve and identify relevant scientific works due to the lack of established norms and the scarcity of consensus on terminologies (exemplified through the glossary in Appendix 1). These challenges are alleviated by adopting the scoping review approach to comprehensively collate evidence across a range of domains and study designs. Furthermore, scoping reviews may be used to show the extent and range of research activity within a field, and thus determine the value of performing a subsequent systematic review that could identify research gaps and suggest future directions (Arksey & O'Malley 2005; cited in O'Brien et al., 2016). In our undertaking, we follow the four-step scoping review methodology, proposed by O'Brien and colleagues (2016): 1. research question; 2. search strategy and study selection; 3. charting, collating, and summarizing, and 4. The consultation phase. Steps 1 and 2 make up the methodology section, step 3 is covered in the results section, whereas step 4 permeates the analyses and discussions of the results.

O'Brien and colleagues (2016) describe step 4 as a phase that goes beyond the standard format of a scoping review, by including formal consultations with stakeholders and key informants. Acknowledging the value in consulting professionals who may point out otherwise missed directions, we opted for an informal consultation process to guide and complement the literature. The stakeholders are included as parties in the scoping team, first through early consultations with librarians that aided the operationalization of search terms. Second, with the inclusion of a media study researcher (Demirkol Tønnesen), to supplement the

research backgrounds of the initial team. Lastly, key parts of the findings from this review have been shared in presentations and discussions with other researchers and political stakeholders, including academic workshops and peer-reviewed publications that report on an empirical study (Bell et al., 2022).

Throughout the reviewing of the included articles, the researchers observed that different academic disciplines sometimes use similar terms in describing phenomena related to personalization, while at other times they use quite distinct terminology. We therefore subjectively identified and synthesized relevant terms throughout the review process and used overlaps in their descriptions to formulate the definitions presented in Appendix 1. This glossary may also add value to future research and guidelines, or other attempts to create consensus on terminology.

The scientific publications retrieved through the search were subject to several stages of evaluations adhering to the search strategy and selection criteria outlined in the next paragraph. The final stage comprised descriptive summaries and categorization according to discipline and study design, of the included publications, as well as a qualitative analysis with iterative steps to identify common thematic areas. We opted for this inductive thematic approach mainly due to the motivation underlying the review, in bringing together diverse research on personalization and user experience; a secondary reason was the revelation of plentiful, but unequally distributed study designs and disciplines. The details of this stage are described in the results section.

Step 1. Research question

In line with other scoping reviews, our research question is intentionally broad, in order to scope the full area of interest and summarize the breadth of the evidence (Levac et al., 2010):

Q. How does personalization on social media steer people's online experiences?

Step 2. Search strategy and study selection

The planned search targeted studies on social media experiences for the most popular platforms, identified from two media reports (Head et al., 2020; Medietilsynet, 2020). Search terms were established through a pilot search conducted on Google Scholar, following earlier studies that commenced with exploratory searches on Google Scholar to define eligibility criteria and keywords (McCrory et al., 2020; Tsao et al., 2021). In our exploration, we used a broad selection of keywords to map out relevant research disciplines (personalization "algorithmic" "exposure" "social media" ("teen" OR "youth")). Youth and teen were originally included as keywords since the initial aim was to explore personalization specifically in the context of young users. Despite the initial aim, the lack of relevant search results led us to cover all age groups. Initially, we included "recommendation algorithm" as a keyword but left it out since it mainly provided us with technical papers. However, following expect advice, we included the keyword "recommend*" at a lager stage, which did yield relevant results. Details of the search strategy steps are explained in Appendix A.

While all authors contributed to the refinement of relevant searches, the main literature search was completed by [Demirkol Tønnesen] in the period March-June 2021; the later, supplementary search was conducted in November 2022, but excluded research published after June 2021. The final search terms were:

(youtube OR snapchat OR tiktok OR instagram OR facebook OR roblox OR discord OR twitter OR whatsapp OR influencer OR blog* OR "social media"

OR "social network" OR "digital media")

AND

(exposure AND (content OR ads OR opinion OR news) OR "content moderation" OR "*recommend**" OR "algorithmic feed" OR "algorithmic timeline" OR "algorithmic ranking" OR "incidental exposure" OR "selective exposure" OR "algorithmic curation" OR "profiling" OR "timeline")

AND

(personalis* OR personaliz* OR tailor*)

Relevant databases were selected on the basis that research on algorithms and personalization is mainly covered by the social and behavioral sciences, the information and computer sciences, and business, communication, and media studies. Hence, the search databases included: Mass Media Complete, Business Source, Web of Science, PubMed, and PsycINFO. In addition to searching databases, we carried out manual searches by consulting reference lists of the included articles, along with recent review articles. We included all study designs but limited the search to original English research papers published after 2016,[1] when algorithmic feeds were introduced on the three major social media platforms at the time (Haynes, 2016, p. 22; Isaac & Ember, 2016, p. 29; Newton, 2016). Appendix A outlines the complete search strategy, while an overview of the steps from search to selection is presented in Fig. 1.

The original database search yielded 212 records, which was reduced to 145 after removing duplicates; 26 of these were irrelevant to the area of study. We established a mutual coding protocol for the remaining 119 records, resulting in the exclusion of 92 more records. Each author then evaluated every paper based on these selection criteria:

1. Inclusion: Concerns personalization on social media.
2. Inclusion: Addresses user experience or other human factors.
3. Exclusion: Technical implementations are not relevant.

The selection criteria corresponded with our aim to uncover the relationship between personalization and users' online experiences; therefore, we sought only the studies that explored this relationship. The first two criteria helped us eliminate articles that addressed the ways businesses or governments can best exploit personalization algorithms. We also decided to exclude technical implementations, since they predominantly focus on the backend of personalization systems and present state-of-the-art, but hypothetical, implementations to improve existing technology. Consequentially, there is no way of knowing whether any of the implementations have been adopted on any social media platform.

The second search, carried out following expert feedback, first yielded 976 records of which 100 were covered by the original search. Following the same coding protocol, we eliminated 962 records that were already included or coded as out of scope, that were irrelevant to the area of study, or that did not fit the inclusion criteria. In addition, we identified 14 more records from the references of relevant publications.

Hence, the final stages of the study selection included in-depth readings of 55 articles, first 27 from the original search and 14 from the reference hunt, thereafter 14 from the updated search. Upon further evaluation, 25 more were removed, culminating in a final set of 30 records, 26 originally and four later. These articles were analyzed to shed light on the research question, they also form the basis for the glossary of terms in Appendix 1.

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[1] One of the relevant publications from 2016 involved the same study as a publication from 2015, the earlier one was therefore included during the manual search.

Results

Step 3. Charting, collating and summarizing

Starting with the initial 26 articles, the authors first read through and summarized their allocated selection of papers. This formed the basis for the descriptive summaries of the studies' aims, designs, methodologies, and main findings, presented in Table 1. The summaries formed the foundation for categorizing these articles according to discipline and study design, which revealed a noticeable overweight of certain disciplines and designs. As seen in Fig. 2, there were few papers originating from the business and marketing fields, while communication studies and the social and behavioral sciences were fairly comparable. Due to our exclusion of technological implementations, the information sciences were only represented by studies that fell within the behavioral domain of human-computer interactions (HCI). As for design, there were slightly fewer qualitative studies than quantitative, and a fair number combining them; these approaches were adopted in all but the social sciences, which covered predominantly literature reviews and theoretical approaches. Hence, even though the number of qualitative, quantitative, mixed-methods, and theoretical studies could be grouped and reviewed together, this would not lead to meaningful discussions of separate approaches in different disciplines, nor pre-dominance of certain methodologies of others. Consequentially, the uneven distribution, with a positive skew for theoretical methods in the social sciences and the opposite for the other disciplines, motivated us to choose a different strategy for the remainder of the review work.

We opted for an inductive qualitative approach to a thematic breakdown, which we judged as a reflection of our efforts to bring together findings from different disciplines and highlight ongoing debates that traverse research domains. At this point, all three authors read the remaining publications and came up with independent suggestions for thematical categorizations. After several iterations of joint evaluations, followed by revisions of the suggested categories, we converged on four thematic areas that center on key topics related to personalization and user experience: 1. users' awareness of how algorithms work; 2. algorithmic manipulation and user control over personalization; 3. The many actors involved in social media curation; and 4. The larger concerns around closed information outlets. The four articles identified at a later stage coincided well with this categorization. The thematic categories are further detailed in Fig. 3, which also illustrates that the categories are not mutually exclusive; because they trace the guiding questions in the field, they are inherently linked to each other.

Additionally, the order in which the thematic areas are presented, serves to exemplify how findings covered in one theme have paved the way for later investigations. For example, studies that problematized lack of awareness and control over personalization became precursors to the studies that explored whether people were willing to exercise control and to what extent this control was useful. Another example is how the early words of warning regarding online filtering and prioritization of search results, which were later re-directed to social media, spawned a body of research on filter bubbles and echo chambers. Due to the overlaps and parallel progressions in research questions, this thematic breakdown is not designed to uphold or strengthen the borders between research already segmented across disciplines, but to emphasize their fluidity and connections.

As mentioned, the distribution of the studies' designs according to discipline revealed a marked skew of theoretical works in the social sciences. In contrast, when looking at the distribution of designs and disciplines within and across the thematic areas, we observed that researchers in the larger field of personalization work on related challenges using different theoretical frameworks and methodologies.

Thematic area one points out that algorithmic awareness is generally low and context specific, and that people's practice and experience with using social media is multidimensional and includes cognitive, affective, and behavioral aspects. Furthermore, studies in this area point to
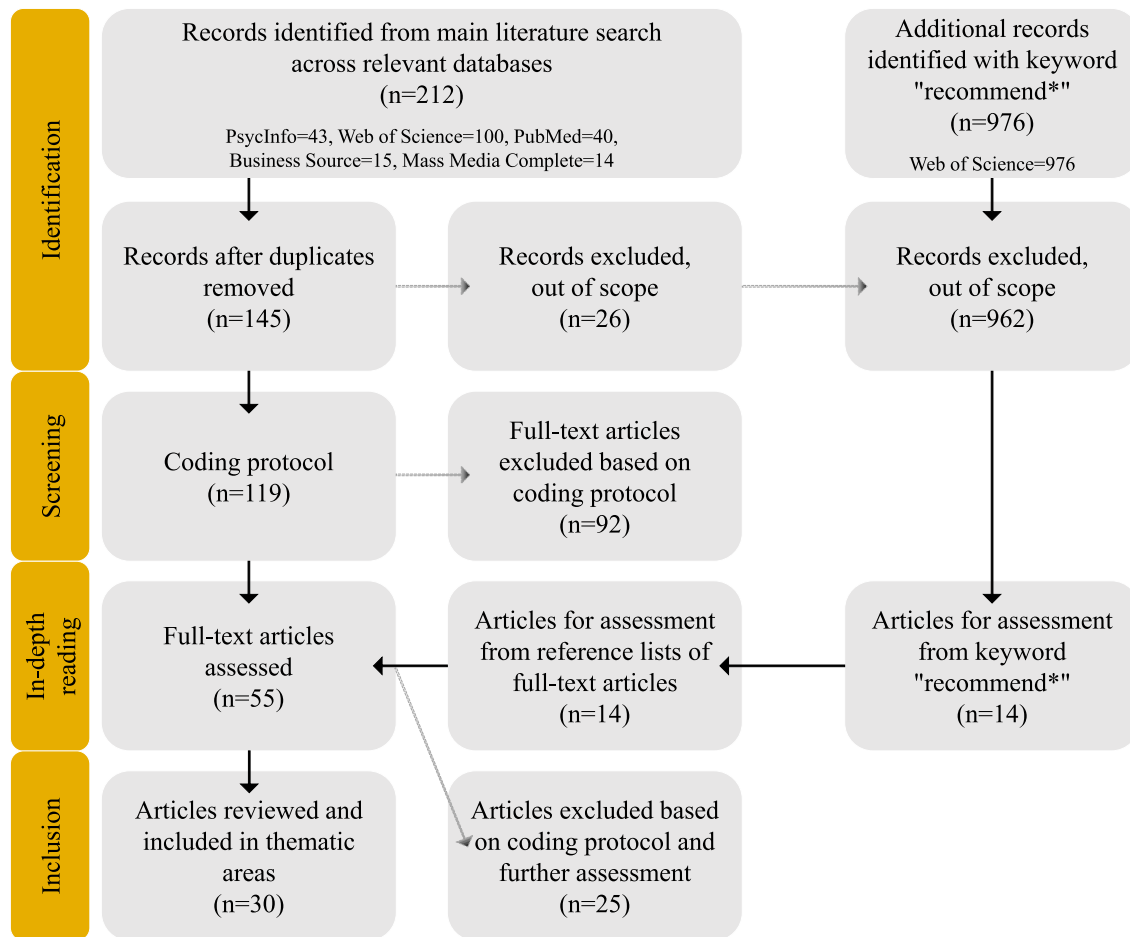
Fig. 1. Overview of the initial (left) and supplementary (right) literature searches, from identification, screening, and evaluation to the final selection of publications.

privacy concerns related to targeted advertisements; these may be especially problematic for children and adolescents, due to the age groups' low algorithmic awareness and susceptibility to digital marketing strategies. Studies in this area build on qualitative methods, mostly interviews (Bucher, 2017; Eslami et al., 2015; Eslami et al., 2016; Schmidt et al., 2019; Swart, 2021; Van den Broeck et al., 2020; Youn & Kim, 2019), and on mixed-methods combining interviews or focus groups with questionnaires (Eslami et al., 2015, 2016; Powers, 2017; Perez Vallejos et al., 2021), in addition to a couple of fully quantitative studies (Jung, 2017; Krstić & Piper, 2020).

Thematic area two outlines how awareness may help users understand the logic behind social media algorithms, with emphasis on the need for better user control through improved transparency or restricted flow of information. Herein are some overlaps with studies in thematic area 1, related to algorithmic awareness; however, in this area the focus is on the practical implications of enabling users to take control over their own social media world. In addition, this section provide examples of how design and other implementations can make users more alert of algorithmic personalization. This area covers primarily literature studies (DeVito, 2017; Albanie et al., 2017; Yeung., 2018: Reviglio & Agosti., 2020), but also includes a few experimental studies (Bol et al., 2020; Kruikemeier et al., 2016), as well as an analytical framework to improve user experience (Alvarado & Waern, 2018).

Thematic area three narrows down the discussion to how users can mediate social media content. This section goes beyond thematic area two by exploring the actual practice of curation and its effects on the user. The studies in this area indicate that few social media users make active use of the curating options provided to them; the practice of shaping personalization by adding or following others is shared by most

but used infrequently. Through mostly empirical work, questionnaires (Auxier & Vitak, 2019; Lee et al., 2019; Merten, 2021; Oeldorf-Hirsch & Srinivasan, 2021; Thorson & Wells, 2016), interviews (Kümpel, 2019), and focus groups (Oeldorf-Hirsch & Srinivasan, 2021), the studies at large present different curation strategies to customize content and take control over own media practices. A couple focus on how many users, both young and adults, find news incidentally and how the likelihood of them engaging with this type of news content tends to rely on its relevance and their pre-existing interests (Kümpel, 2019; Oeldorf-Hirsch & Srinivasan, 2021).

Finally, thematic area four covers critical views on closed information outlets, popularly labelled filter bubbles, echo chambers, and feedback loops (Bruns, 2019; Cho et al., 2020; Dahlgren, 2021; Geiβ et al., 2021; Spohr, 2017; Zuiderveen Borgesius et al., 2016). Four of the studies are theoretical and two are empirical; the latter two tackle the relation to political standing, arguing that the existence of closed information outlets is driven by explicit user interest (Cho et al., 2020) and mainly concerns those that already hold extreme opinions and beliefs (Geiβ et al., 2021).

Combined, the four thematic areas aim for multi-faceted insight on the role of awareness in dealing with personalization algorithms, along with related user habits and the potential impact and consequences related to personalized social media content.

Discussion

Algorithmic awareness and user experiences

Accepting that social media algorithms serve several purposes,

Table 1

Descriptive summaries of the reviewed publications' design, methodology, aims, and findings, grouped according to thematic area.

Thematic area 1. Algorithmic awareness and user experiences

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Bucher (2017)	Denmark, online/ international data collection	October 2014 to June 2015	Qualitative	25 people who tweeted about the FB algorithm, aged 20-64	Algorithmic imaginary, related to how people imagine, perceive and experience how algorithms work	Monitoring and analysis of tweets and e-mail interviews	A mutual relation between users and algorithms, algorithms make assumptions and yield outcomes, users try to adapt and make sense of the outcomes and thereby shape the algorithms' logic
Eslami et al. (2015)	USA	Not reported, first submitted September 2014	Mixed-methods	Quota sample with 40 people representatives of the US population in age (18–64), gender (60% women), ethnicity and socioeconomic status	Algorithmic awareness, encompassing the knowledge that algorithms exist and the level of comprehension	1. Questionnaire on algorithmic awareness and assessment of social media patterns and network size 2. Interview and demonstration of an alternative newsfeed 3. Written follow-up after 2–6 months to explore potential changes in use and satisfaction	Generally low level of algorithmic awareness, the more active users tend to be more aware
Eslami et al. (2016)	USA	Not reported, first submitted September 2014	Mixed-methods	Quota sample with 40 people representatives of the US population in age (18–64), gender (60% women), ethnicity and socioeconomic status	Folk theories on how social media personalize and curate	1. Questionnaire on algorithmic awareness and assessment of social media patterns and network size. 2. Interview and demonstration of an alternative newsfeed 3. Written follow-up after 2–6 months to explore potential changes in use and satisfaction	Ten categories of commonly held folk theories, people tend to rely on more than one and they adapt their behavior accordingly
Jung (2017)	USA, but data collection through Amazon MTurk	Not reported, first submitted October 2016	Quantitative	557 micro-workers, aged 18 to 69 with majority below 40 years, 47% women	Relations between perceived relevance and attention to or avoidance of advertising, as well as mediating effects of privacy concerns	Survey with questions on privacy concerns and perception of, attention to and avoidance of advertising, selected from earlier studies	Advertising effectiveness linked to perceived relevance, with increased attention and decreased avoidance. Relevance also associated with privacy concerns, and in turn avoidance
Krstić and Piper (2020)	Serbia	January 2020	Quantitative	1320 respondents aged 15–30, of which 54% were 15–19 years and 69% were female	Awareness of personal data being used for advertising purposes, and understanding of digital marketing techniques	Opinion pool survey on personal data and digital marketing, conducted on UNICEF's U-Report platform	Many create social media profiles when they are younger than the age limit, most share personal data, often in exchange for benefits, and many are indifferent to cookies
Perez Vallejos et al. (2021)	United Kingdom	February 2017 + February–March 2018	Mixed-methods	Two waves of youth jurors aged 12–23, 144 in 2017 + 116 in 2018	Young people's online experiences with personalization algorithms, including filter bubbles and other algorithmic outcomes, as well as transparency and regulation of algorithms	Youth jury with discussions aided by presented scenarios and dilemmas. Pre- and post-test questionnaires assessed knowledge, opinions, and attitudinal change to algorithmic matters	Algorithmic personalization contributes to privacy concerns and distrust, along with disempowerment from not being heard. The convenience of communication, relevance of information, and entertainment value are considered benefits
Powers (2017)	USA	Not reported	Mixed-methods	Interviews: 37 students mainly under the age of 20. Survey: 147 mainly first-year students	News literacy and critical thinking in the context of online news	Semi-structured interviews and survey	Students tend not to know the terminology and generally have little awareness of the actions and criteria that shape their personalized news selection
Schmidt et al. (2019)	Germany	March 2016–February 2017	Qualitative and experiment	27 participants across three age groups, with a politically engaged sub-sample in each: teenagers (14–20 years), young adults (20–30 years), and adults (30–70 years)	1 Explores the role of intermediaries in group communication, attachment to individual platforms and news-related information seeking and opinion formation in groups	1.Six focus-group discussions and 2. in-dept interviews with three people from each group	A range of different intermediaries were used as information sources, no platform was more dominant than others. Three strategies for use: confronting the concerns by not using the platforms, ignoring concerns and continue as before,

Table 1 (*continued*)

Thematic area 1. Algorithmic awareness and user experiences

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Swart (2021)	The Netherlands	April–July 2020	Qualitative	22 daily social media users, aged 16-26	2. Media source practices and reflections on own usage Algorithmic literacy, including awareness, knowledge, imaginaries, and tactics	In-depth interviews	or acknowledging the concerns reflecting upon trade-offs Algorithmic literacy is context-specific, and the algorithmic experience has three dimensions, cognitive, affective, and behavioral
Van den Broeck et al. (2020)	Belgium	February–March 2017	Qualitative	28 FB-users, aged 25-55	Perceptions of personalized advertisements on FB, framed by the interactive advertising model (behavior depends on both consumer-controlled and advertiser-controlled factors)	Semi-structured interviews with elicitation techniques elaborating on advertising in their own FB newsfeed	Personalized advertising is regarded as an unavoidable trade-off, mediated by autonomy and relevance. Their placement interplay with the perception of control
Youn & Kim (2019)	USA	Not reported, article first received 1 April 2018	Qualitative	Focus groups: 25 college students aged 19–29. In-depth interviews: 6 college students, aged 19-25	Knowledge about and interactions with personalized social media advertising, framed by the persuasion knowledge model and the psychological reactance theory	Focus groups and in-depth interviews	Young people are knowledgeable about the persuasive power of personalized advertisements and have ambivalent attitudes and emotions to their presence

Thematic area 2. Algorithmic control versus user control

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Albanie et al. (2016)	N.A	N.A	Theoretical framework	N.A	Addressing how curator regulation can influence the potential risk from algorithm effects	Literature review	Suggestion of a partial firewall mechanism that restrict the flow of information behind indirect manipulation from algorithms
Alvarado & Waern. (2018)	N.A	January–March 2017	Analytical framework	Step 1 was performed by the author of the paper. Step 2 and 3 included 11 active FB users	Users' opinion of algorithmic experience on FB and of suggested redesign to: 1. raise algorithmic awareness; 2. control content that appear in the newsfeed	Semiotic inspection method (Step 1); sensitizing workshop (Step 2); a redesign workshop (step 3)	A framework for algorithmic experience including algorithmic transparency, profile management, user-control, selective memory, and awareness
Bol et al. (2020)	The Netherlands	January–February 2018	Online tracking tool and survey	Total of 567 participants recruited from Dutch panel (M = 48 years); 80 providing tracking data and 487 answering survey	To study 1. How age, gender, education, and income are associated with content encountered on FB, and 2. how digital efficiency, knowledge about personalized marketing and trust in online companies are associated with FB content	A plug-in data driven devise that tracked FB activity among active users and an online survey	Age, gender, and education were all significant factors contributing to stereotypes based on the branded content the participants were exposed to on FB
DeVito (2017)	N.A	N.A	Quantitative material culture analysis	N.A	To study algorithmic values that drive the story selection of FB newsfeed	Content analysis of four publicly available FB sources that drive newsfeed on the platform: FB newsroom blog, FB notes blog, FB patent filings and FB security and exchange filing	Friend relationship is an overall value of story selection, followed by user interests, age of post, prior user engagement, user preference, page relationship, platform priorities, negatively expressed preferences and content quality
Kruikemeier et al. (2016)	The Netherlands	May and June 2015	A randomized online experiment using factorial between-subjects design	122 University students; mean age 21	Addressing persuasion knowledge, electronic Word of Mouth, and perceived trustworthiness of the source while being exposed to different conditions	Exposure to three conditions; 1: regular FB post, 2: personalized FB post, 3: personalized FB post + explanation of how the personalization works	Persuasion knowledge highest in conditions 2 and 3, but no extra effect of condition 3 on persuasion knowledge
Reviglio & Agosti. (2020)	N.A	N.A	Theoretical	N.A	Addressing social media personalization and its challenges; the users expectations and behavior regarding personalization; and considerations about algorithmic sovereignty	Literature review and concept proposal	To put forward the concept of algorithmic sovereignty that opens black boxes for the user to own their algorithmic life

Table 1 (*continued*)

Thematic area 2. Algorithmic control versus user control

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Yeung. (2018)	N.A	N.A	Theoretical	N.A	Addressing consequences and fears of mass predictive personalization	Literature review	Points to five fears of mass predictive personalization: 1. Exploitation, 2. Manipulation, 3. Exclusion and marginalization, 4. injustice and inequalities, 5. a narcissistic culture

Thematic area 3. Algorithmic, social, and personal curation

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Auxier and Vitak (2019)	USA	Fall 2017	Online survey	A total of 317 US residents aged >18 years that were active social media users (at least once per week)	To assess news consumers' online customization practices, e.g practices that constrain content or practices that expose them to content	Online questionnaire developed by the authors with 16 statements about news customization measured on a 5-point Likert scale ranging from strongly agree to strongly disagree	Among those to practiced news customization less anxiety was a key factor. However, it could also be that those who experience anxiety engage in more restrictive customization in order to regain control over the information they encounter
Kümpel, 2019	Germany	September 2016 and February 2017	Qualitative interviews	A total of 16 FB users between the age of 16–47 recruited from FB university groups and third parties	To study different factors and how social media users influence news engagement on FB. Relevant factors are news providers, engagement decisions, and characteristics of content, curators, news recommendation and news receivers	1.Self-confrontation interview method: participants' FB use was observed and recorded, and the participants were asked for their thoughts and feelings in relation to their online behavior. 2. Qualitative interview was conducted to assess participants' FB and news usage patterns, personal characteristics, and traits	The participants often encountered news incidentally and their decision to engage and retain information was based on pre-existing interests and who shared the content.
Lee et al. (2019)	Six Asian countries: Hong Kong, Japan, Malaysia, Singapore, South-Korea, Taiwan	January–February 2017	International survey	A representative country sample >18 years including 11 142 people	To study individual level of proactive personalization among social media users on four practices: 1. Deleting or blocking others,2. Adding or following other, 3. Changing settings to see more content, 4. Changing settings to see less content	Online questionnaire on news consumption	Proactive personalization is key to digital media literacy and enables users to take more control over their own media practice. Many had tried practice of positive personalization (adding or following others and changing settings to see more content) but did not use it on a regular basis. Negative personalization was rarely practiced
Merten (2021)	36 countries from all continents	January–February 2017	International survey	A representative country sample >18 years including a total of 72 920 people	To study individual level of personal curation among social media users on four practices: 1. Deleting or blocking others, 2. adding or following others, 3. changing settings to see more content, 4. changing settings to see less content	Online questionnaire on news consumption	Most participants engaged in positive personalization (adding or following others and changing settings to see more content). Negative personalization was rarely practiced
Oeldorf-Hirsch & Srinivasan (2021)	USA	Fall 2017	Mixed-methods	60 University students that were active FB users, age 18–22 years	Assess the role of social and mobile media in relation to news content and which factors that enhance and inhibit learning on these platforms	Survey of primary news sources and demographics of participants + focus group discussion	Young adults often use social media as their news source and tend to do so incidentally, but this information is rarely retained. Popular and personal relevance, enticing headlines and controversial topics may lead to more engagement

Table 1 (*continued*)

Thematic area 3. Algorithmic, social, and personal curation

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Thorson & Wells (2016)	N.A	N.A	Theoretical	N.A	Investigating how curated flows influence people's online media experiences	Literature review and theoretical framework of curated flows	Five different curators that may influence online media experiences: journalists, strategic communi-cators, social contacts, algorithmic filters, and individual media users. The latter is called personal curation, which is the selection and customization the user may control

Thematic area 4. Algorithmic bubbles, chambers, and loops

Author, year	Country	Study period	Study design	Study population	Aims	Methods	Main findings
Bruns (2019)	N.A.	N.A.	Literature review	N.A.	To contribute to debates on echo chambers and filter bubbles by examining theories and empirical findings from several disciplines	Literature review	The only filters that seem to bear impact on opinions and worldviews are the ones people impose on themselves. Algorithmic filters do not lead to the divergence and polarization that many have feared.
Cho et al. (2020)	USA	November 2016	Experimental	A total of 108 undergraduate students with the mean age of 22 years	To assess whether participants exposed to content that are based on self-generated search terms would exhibit a stronger association and a stronger affective polarization towards political ideology versus exposure to content that are generated by algorithmic driven search terms	Exposure to a manipulated YouTube account with political topics of personal interest (self-search), topics recommended by friends (social preference) or control (random). A questionnaire covering positive and negative emotional reactions were given prior to and after the experiment	Political association is stronger when participants are exposed to content based on self-generated search terms, rather than algorithmic driven content. There were no findings of participants reporting affective polarization
Dahlgren (2021)	N.A	N.A	Literature review	N.A	To critically reflect upon the underlying assumptions of filter bubbles	Literature review	Provides nine counterarguments to the claims about filter bubbles and conclude that there is little evidence about the impact filter bubbles may have on the individual and the society
Geiß et al., 2021	Germany	September 2016	Quantitative	A total of 355 German internet users aged 14–69 years recruited as a quota sample to be representative of the German population in terms of age, gender, education, and proportion of FB users	To critically investigate the four premises for the echo-chamber concept: 1. social media are the only source of information, 2. Content in social media is different than genera news media, 3. Echo chambers equally apply to all social media users, and 4. Echo chambers immunize against "big messages", for example opposing data from the public discourse	A 14-day diary with daily entries and reflections on two political issues regarded as important that day, along with the source of information. Combined with pre- and post-questionnaire on demography, FB use, personality strengths, and political interest and orientation. Statistical model identified factors contributing to opinion expression	1. Social media as the only source of information lead to exaggerated conclusions, 2. Stronger opinion expression is an effect of more political information, regardless of the source of information, 3. Echo chambers are more prevalent among people that already hold extreme opinions, and 4. Politically extreme individuals are more likely to express opinions if they are exposed to political information on social media over time
Spohr (2017)	N.A	N.A	Literature review	N.A	To highlight the ideological polarization on FB to be driven by selective exposure rather than echo chambers and filter bubbles	Literature review	There are probably both algorithmically and individually created filter bubbles. However, the paper emphasizes self-exposure for different content online as the major concern
Zuiderveen Borgesius et al. (2016)	N.A	N.A	Literature review	N.A	To critically reflect upon the underlying assumptions of filter bubbles and to assess the empirical research upon the prevalence and effects of personalization	Literature review	Much of the concern related to personalization (e.g., spiral of attitudinal reinforcement, influence over public opinions, restriction of people's autonomy, lack of transparency and discrimination due to social targeting) has little reference to empirical research

FB=Facebook; N.A = not applicable.

Fig. 2. Publications included in the scoping review, grouped by study design and discipline; all studies on human-computer interactions (HCI) included behavioral perspectives and are grouped accordingly.

Fig. 3. Thematic areas categorized from qualitative evaluation of the 30 reviewed publications. The categorization is based on the main focus of the papers, but due to the multi-faceted nature of the domain, there are topics that appear across thematic areas.

researchers generally emphasize their common goal: to filter away what is deemed uninteresting and prioritize what is deemed interesting to the user. Although these processes are pervasive, many remain unaware or uniformed on how algorithms are mediating their online experiences. Where some studies address the general level of awareness, comprehension, and perception surrounding social media algorithms (Eslami et al., 2015, 2016; Bucher, 2017), others address subjective experiences for specific algorithmic processes pertaining to curated news (Powers, 2017; Swart, 2021) and targeted advertising (Van den Broeck et al., 2020; Youn & Kim, 2019).

A few studies have found that people are generally unaware of algorithms (Eslami et al., 2015, 2016; Powers, 2017). Some years back, a large share of social media users may even have been surprised to learn that certain stories would never make an appearance in their feeds (Eslami et al., 2015). However, more recent findings indicate that awareness levels are rising. In these studies, the majority of participants were familiar with algorithmic outcomes in the form of personalized selections of content (Schmidt et al., 2019; Swart, 2021; Van den Broeck et al., 2020; Youn & Kim, 2019). One study addresses the issue specifically, suggesting that the varying results may be related to demographic differences and the recruitment of participant groups likely to be well-versed in social media technology (Swart, 2021). On the other hand, users may not necessarily be familiar with how algorithms function, but they may still have an understanding that the content they meet online is filtered or that recommendations are based on their own profiles (Schmidt et al., 2019). A person who lacks technological competence may be unable to relate to established vocabularies or scientific definitions of personalization and algorithms, yet may still have a subjective understanding of the phenomena (Swart, 2021).

The recognition that algorithms exist and operate on online content, has been labelled algorithmic awareness (Eslami et al., 2015; Swart, 2021). A related term, algorithmic literacy, encompasses a broader skill set, including awareness, knowledge, beliefs, and behavioral tactics (Swart, 2021). In the first of two publications based on a study of Facebook's News Feed algorithms, Eslami and colleagues (2015) identified features of passive and active engagement and found a trend towards higher awareness among the more active users. Participants also changed interaction patterns and exhibited a tendency towards higher satisfaction, with rising algorithmic awareness. Swart (2021) adds that awareness and knowledge about algorithms can have affective outcomes, ranging from negative emotions and distrust to positive emotions and appreciation. Cognition and emotion can in turn moderate behavior. Swart (2021) further suggests that algorithmic literacy is contextual, awareness in one situation may not imply awareness in a different situation. Because unexpected or confusing outcomes can raise awareness, it often becomes a matter of learning by doing.

Swart (2021) noted that participants would have subjective interpretations of algorithmic outcomes, similar to what Eslami and colleagues' label 'folk theories' (2016) and Bucher's (2017) 'imaginaries'. Regardless of the label, they all refer to the tendency to create or adopt laymen hypotheses when a phenomenon is not fully comprehended (Eslami et al., 2016). Swart (2021) sees this as a reflection of how difficult it is for users to make sense of the workings of algorithms. Furthermore, users seem to adapt their behavior according to their adopted hypothesis, for instance by avoiding certain content, and they tend to rely on more than one theory, sometimes even mutually exclusive theories (Eslami et al., 2016). Bucher's (2017) work on imaginaries outlines several ways in which users have affective experiences with algorithms, ranging from frustration at flawed profiling to attempts at manipulating the algorithm's informational ground. The researcher concludes that there is a reciprocal relation between users and algorithms. Algorithms yield outcomes based on assumptions about the users, at the same time users try to make sense of the outcomes and they adapt accordingly, thereby altering the system's logic (Bucher, 2017). In this way, the user contributes to shaping the algorithm itself. On the flipside, this reciprocity implies that algorithms may carry social power.

In the words of Bucher, algorithms are more than scripted computations, "they also have the power to enact material realities by shaping social life to various degrees" (2017, p. 40).

Once noticed, personalization is likely to have bearing on the user experience, and there seems to be a precarious balance between the good and the bad. Running 25 youth juries with adolescents and young adults, a team of researchers in the UK discovered that the large majority would like to have more control over what happens online; many were concerned about their online safety and privacy, for instance related to the prevalence of fake news and to how digital platforms used their personal data, and with this came a sense of disempowerment over not being considered (Perez Vallejos et al., 2021). Nevertheless, the youth jurors appreciated the freedom that easily accessible information facilitates, and the convenience that personalized content offers (Perez Vallejos et al., 2021).

When reflecting on the consequences of algorithmic mediation, or the influence of online intermediaries (Schmidt et al., 2019), users are forced to take a stand. Schmidt and colleagues (2019) noted that reflections on this influence typically led to one of three strategies: refrain from using the platform, discount the concern, or dismiss the issue as a reasonable trade-off. From their findings, Eslami and colleagues (2016) noted that algorithmic awareness can change interaction patterns in the long run. Drawing connections between algorithms, awareness, and trust, they argue for improving awareness and knowledge through design, for instance by making it easier to navigate online information or making the algorithmic power more transparent. They postulate that algorithmic awareness could lead to greater trust in media operators in the long run (Eslami et al., 2016). This sentiment is echoed by Swart (2021), whose study documents a significant demand for increased transparency about personalization in order to alleviate users' concerns regarding surveillance and compelling mechanisms.

The potential social impact of algorithmic selection becomes prominent when considering how they can serve as news editors. Some claim that publishers and readers benefit from using social media as news distribution platforms, with algorithms working at matching stories with readers. However, others highlight the potential risks associated with using algorithms as gatekeepers (Powers, 2017; Schmidt et al., 2019; Swart, 2021). Powers' (2017) found that young people generally have little awareness of the actions and criteria that shape their personalized news selection. Since the youth tends to be frequent users of personalized services, they may also be less able to counteract the impact of large actors such as Google and Facebook. The young participants in Swart's study (2021) similarly reported heavy reliance on social media for keeping up to date, not pursuing news outlets, but letting news find them. However, in contrast to Powers (2017), many of Swart's participants reported skepticism and concern regarding algorithmically curated news (2021). Schmidt and colleagues (2019) moderate the cause for concern. Although their findings indicate extensive use of online intermediaries as media outlets, across all ages, they add that curation is neither the only source of news, nor the most prevalent.

In the same way that algorithms can match news stories and users, they can also personalize commercial content on social media. And in the same way that the awareness of users has bearings on their news habits, it also impacts how they interact with personalized advertisements on social media. In this line of research, both Krstić and Piper (2020), and Youn and Kim (2019), investigate how young people deal with digital marketing and personalized advertisements on social media, whereas Jung (2017) and Van den Broeck and colleagues (2020) include wider age spans to map out users' perceptions and to explore how to present personalized advertisements that attract attention without triggering avoidance. Working from different theoretical perspectives, the studies identify distinct aspects of interactions with advertisements.

Jung (2017) focused on advertisement effectiveness, studying the relation between the advertisement's relevance and the user's privacy concerns, and how this relation may mediate attention and avoidance to advertisements. Although the results showed that relevance was

associated with privacy concern, and in turn avoidance, this effect was far smaller than the effect size for attention to advertisement perceived as personally relevant. This suggests that participants were aware of the personalization of commercial content, but the relevance seemed to have a greater hold on attention than on any concerns that could follow.

Concerns may be less prominent among the younger recipients of digital marketing strategies, at least going by the tendencies to share personal data and the indifference to cookies that Krstić and Piper (2020) reported in their study. In contrast, Youn and Kim (2019) found high levels of knowledge about the persuasive power of personalized advertisements, as well as ambivalent attitudes and emotions to their presence among their young participants. Their findings indicate that participants were well-aware of the nature of targeted commercial messages and that they appreciated the relevance, but also reacted to the lack of control over their privacy. A similar ambivalence was voiced by participants in Van den Broeck and colleagues' study (2020), where personalized advertising was described as an unavoidable trade-off mediated by autonomy and relevance. In this study, they also discovered that the placement of advertisements interplayed with the experience of autonomy; it seems that the perception of control is of greater importance than actual control when it comes to disclosing personal information. From their findings, the authors see a potential for simultaneously improving the efficacy of personalized advertisements and alleviating privacy concerns, through designs that increase the perception of control.

The outlined studies highlight the significance of personalization in the life of a social media user and they demonstrate how awareness of algorithmic intervention can moderate online habits. It follows naturally that researchers are advocating the importance of increasing awareness levels and studying means to provide social media users with more control.

Algorithmic control versus user control

More control does not equal full control, considering that personalization algorithms take on the much-needed task of organizing the vast amount of online information and making it more accessible for users with different expectations and skill levels. Despite the advantages they provide, current research focuses largely on the potential and observable negative consequences of these algorithms on the user (Albanie et al., 2017; Alvarado & Waern, 2018; Bol et al., 2020; Kruikemeier et al., 2016; Reviglio & Agosti, 2020; Yeung, 2018). Algorithmic effects arise from the unknown nature of proprietary and opaque curator algorithms that are designed to optimize content and match it with users to make the sites both engaging and profitable. Studies by Albanie and colleagues (2016) and Yeung (2018) both problematize these algorithms' potential for manipulating users in their quest to find the best and shortest route to optimal content curation. In a more recent study, Reviglio and Agosti (2020) elaborate on the potential problem and note the capacity of algorithms to limit the diversity of information in users' feeds. They argue that the constrained diversity in available information leads to a restriction of personal creativity and a reduced ability to build productive social networks.

Other studies put more emphasis on the potential societal effects of personalization (Bol et al., 2020; DeVito, 2017; Yeung, 2018). In examining Facebook's patents and press releases, DeVito (2017) found a set of nine News Feed values that drive story selection: friend relationships, explicitly expressed user interests, prior user engagement, implicitly expressed user preferences, post age, platform priorities, page relationships, negatively expressed preferences, and content quality. Extending on the aforementioned concerns surrounding the algorithms' potential for manipulation (Albanie et al., 2016; Reviglio & Agosti, 2020; Yeung, 2018), DeVito (2017) argues that developers of personalization systems embed their own values and opinions into the algorithms to allow them to make value judgments on these nine criteria. Thus, algorithms learning how to evaluate social constructs, such as

friendships, also inherit any biases these developers may hold. This type of bias could as well amplify inequality, for instance in access to information or products.

Perceived bias is also at the center of Bol and colleagues' work (2020), in which they empirically analyze how algorithms may polarize users by upholding and reinforcing stereotypes. For example, they observe that younger users receive more branded content for beauty and fashion, whereas older users receive health-related commercial messages. Bol and colleagues (2020) argue that targeting specific socio-economic factors may not only lead to inequalities in the offer of health services and products but may also lead to poorer health outcomes for those not targeted. Yeung (2018) adds that injustice and inequalities perpetuated by personalization may lead to a narcissistic culture in which the individual's needs, perceptions and desires are at the center.

In response to these concerns, Albanie and colleagues (2016), Yeung (2018), and Reveglio and Agosti (2020) stress the importance of circumventing algorithmic manipulation by heightening algorithmic awareness among social media users. They address the challenge that operators encounter when trying to fulfil their responsibility to increase algorithmic awareness, namely the difficult balance involved in determining how much and what kind of information is needed for social media users to make informed decisions (Albanie et al., 2017). As a consequence, these platforms often provide users with lengthy and incomprehensible policy documents. Reviglio and Agosti (2020) argue that a major shortcoming of the policy approach is that it shifts the responsibility from the operator to the user; this point is especially prominent since many social media users are unmotivated to find out how personalization works (Alvarado & Waern, 2018; Kruikemeier et al., 2016).

Investigating the role of guided attention, Kruikemeier and colleagues (2016) explored whether labelling posts as sponsored or targeted would increase awareness surrounding politically sponsored Facebook posts. On the one hand, many of the young participants processed the labelled post more carefully, or critically, than the unlabeled, and they engaged in fewer likes, comments, and shares. On the other hand, the findings also showed that a third of participants did not notice that the posts were sponsored. These findings imply that many young people may be unaware that the social media posts they see daily might be personalized, but those that are aware may have their trust in a political party challenged precisely because their messages are targeted.

Similar to Kruikemeier and colleagues (2016), other researchers have argued for the responsibility that lies with the operator, for instance by offering design solutions that raises awareness more efficiently than the available options. Alvarado and Waern (2018) coined the term algorithmic experience, which relies on clear labelling of personalized content, as a way forward for the user to own more of their online story. Similarly, Reviglio and Agosti (2020) introduced algorithmic sovereignty and called for operators to open the black boxes of personalization and offer users better control over their algorithmic life. Furthermore, Albanie and colleagues (2016) called for a reform in algorithmic functions, pointing to the need to inhibit indirect manipulation by restricting the flow of information through a partial firewall. All in all, researchers have agreed that transferring control from the platforms to the users is a way forward in mitigating the potentially problematic consequences of algorithms. However, users' willingness to exercise such control rests in turn on their awareness of personalization algorithms (Kruikemeier, 2016).

Algorithmic, social, and personal curation

Taking the issue of user control head on, Auxier and Vitak (2019) studied which factors are involved when users take action to customize their social media and tailor the news they receive; among the factors were anxiety regarding current events and political orientation. Based on self-reported attitudes to customization, participants in the study

were grouped according to two different tendencies; one group represented those that customize to get more nuanced and diverse exposure, the other consisted of those that customize to receive information that aligns with existing viewpoints. The results revealed a negative correlation between anxiety and diversity seeking, suggesting that those who customize to broaden their news landscape, experience less anxiety or that the versatility in information might lessen anxiety (Auxier & Vitak, 2019). It could also be that those who experience anxiety engage in more restrictive customization in order to regain control over the information they encounter (Auxier & Vitak, 2019). Interestingly, the role of political orientation was most distinct when comparing those who identified with a political party and those who did not, the party itself made less difference. Auxier and Vitak (2019) acknowledge that they cannot establish causation, whether anxiety or partisanship leads to customization or whether the habit of customization is somehow linked to political awareness or alleviation of anxiety, but their findings indicate that customization behavior is likely linked to a need to feel control over the information that comes one's way. Generalizing from this finding, it seems plausible that other divisive topics, such as vaccination, climate changes, and sustainability, may lead individuals on the outer edge to engage in more restrictive customization of online news.

Users and algorithms are not the only ones that have impact on the information that comes through. In Thorson and Wells' theoretical account (2016, p. 310), personalized content is considered as "curated flows" that are moderated and conveyed by different actors. According to them, media's primary purpose is curation: "the production, selection, filtering, annotation, or framing of content". In contrast to more traditional media, social media allow for additional curating actors, including acquaintances, algorithms, and even users themselves. Thorson and Wells (2016) argue for five different curators: journalists, strategic communicators, social contacts, algorithmic filters, and individual media users; the latter is labelled personal curation and refers to the customization and selections the user has control over. Thorson and Wells' account (2016) proposes several research questions they consider timely and relevant for future investigations, and that remain relevant six years later; among the proposed research questions are which curators make the largest impact on media experience, whether these differ across media users, and what factors lie behind the curators' logic.

With Thorson and Wells' (2016) multiplicity of curating actors, user experience on social media becomes a complex and dynamic phenomenon to study. Curators do not act in isolation but interact and adapt to each other. Lee and colleagues (2019) introduce the term proactive personalization as an intermediary between personal and algorithmic curation. Unlike personal curation, which implies total control over encountered content, Lee and colleagues (2019) argue that proactive personalization is achieved by making choices and customizing algorithmically curated feeds. They present four practices that the user can apply, including 1. deleting or blocking others, 2. adding or following others, 3. changing settings to see more content, 4. changing settings to see less content. According to Lee and colleagues (2019), making use of these types of customization is key to digital media literacy, and it enables the user "to proactively influence what is otherwise a process of automatized personalization" (p. 2279). Based on survey data from six Asian countries, they found that a minority (around 30%) did not engage in proactive practices in their news consumption; moreover, those that had applied such practices used positive personalization but did so infrequently. In another study on news curation practices, Merten (2021) used the same survey (Lee et al., 2019) but included the full panel from 36 countries. In contradiction to Lee and colleagues' findings, Merten (2021) observed that most respondents did engage in proactive personalization. Although the two studies have different analytical approaches, the contrast between them may also be attributed to national or cultural differences. In addition, Merten (2021) found a connection between engaging in proactive personalization and consuming more diverse news and media content. However, similar to Lee and colleagues (2019), Merten (2021) also noted that proactive measures for limiting news was rarely practiced.

Despite the prevalence of curation, the number of actors, and the availability of proactive measures, many encounters with social media content occur incidentally. Consequently, there are researchers who make a distinction between selective and incidental content exposure, in turn focusing on how users engage with the latter. For example, Kümpel (2019) noted that incidental exposure does not necessarily lead to decisions to engage with the content. Participants interviewed in Kümpel's study (2019), often encountered news content incidentally, and less commonly sought out news selectively. Still, their decisions to engage and retain information were highly reliant on pre-existing interest and who shared the content. Similarly, in a later study, Oeldorf-Hirsch and Srinivasan (2021) found that young adults rely on social media for news and they tend to do so incidentally. Oeldorf-Hirsch and Srinivasan (2021) interpret this as a shift towards more frictionless news consumption, where news find readers through feeds and alerts and appeal to them with headlines, images, and graphics. Noting that many regard this an imperfect, but unavoidable and convenient, approach to news, the researchers apply the three-step cognitive mediation model to understand what drives attention, engagement, and learning. Oeldorf-Hirsch and Srinivasan (2021) observed that their participants had low engagement with the personalized news they attended to, they were generally reluctant to share public engagement, and several admitted to superficial and incomplete reading of news stories. Moreover, there was a common agreement that the information was rarely retained. Consistent with Kümpel (2019), Oeldorf-Hirsch and Srinivasan (2021) found that reading engagement was more likely if the story was popular or carried personal relevance, enticing headlines and controversial topics also brought about engagement. Although social media users have both the opportunity and the tools to control their feeds, it seems as though they mainly exercise this liberty in their direct interactions with content; it could also seem as though they do not always have full conscious control over these interactions.

Algorithmic bubbles, chambers, and loops

If social media users are indeed swayed by enticing headlines, popular content, and personal relevance, it may suggest that many are inclined to engage with the same type of content online. Possibly spurred on by media and politicians, researchers have voiced concerns over how personalization filters out content and prioritizes what appeals the most to the individual, thereby limiting the amount and diversity of information accessed online (Bruns, 2019; Cho et al., 2020; Dahlgren, 2021; Geiβ et al., 2021; Spohr, 2017; Zuiderveen Borgesius et al., 2016). If personalized media become the only source of information, the concern is that what comes through will tend to coincide with existing preferences and perspectives. On this topic, many terms and many opinions have been put forward. The potential contribution and outcome of personalization algorithms in isolating information accessed online has been called filter bubbles (Bruns, 2019; Dahlgren, 2021; Zuiderveen Borgesius et al., 2016), echo chambers (Bruns, 2019; Geiβ et al., 2021; Spohr, 2017), and feedback loops (Dahlgren, 2021; Spohr, 2017). Arguably, the terms overlap but do not refer to identical constructs; for instance, Bruns (2019) explains echo chambers as arising from preferential connections on social media platforms, whereas filter bubbles are attributed to preferential communications. The commonality is the isolation of information and its impact on the user. Some are sure this type of algorithmic isolation takes place, others are less certain and say it may take place, and others still call it a controversy based on exaggerated claims and moral panic. There are also those who highlight the role of the user, proposing distinctions between their habits and preferences in interacting with online information, for instance in relying solely on social media or seeking out different sources.

Attempting to shed light on personalization and whether there is reason to worry about filter bubbles, Zuiderveen Borgesius and colleagues (2016) did a synthesis of related literature and presented an

overview of the main concerns. In their account, they separate between pre-selected and self-selected personalization. Where the former refers to algorithmic personalization, the latter acknowledges the user's autonomy in choosing which media and which content to interact with (Zuiderveen Borgesius et al., 2016). Their presented concerns range from the effects of pre-selected (algorithmic) personalization on editorial processes, social classification, and the individual's autonomy, along with the lack of transparency, to the impact that self-selected personalization could have on democratic processes. Despite the prevalence of concerns, Zuiderveen Borgesius and colleagues (2016) conclude from empirical studies on the prevalence and effects of personalization that the technology is not advanced enough to create filter bubbles and that most people do not encapsulate themselves in what they label information cocoons. However, they also point out that the potential is there with more advanced technology or with polarized political climates.

Spohr (2017) takes the point further, arguing that this potential has already been achieved and demonstrated through associations between self-selected personalization and political polarization. Speaking against Zuiderveen Borgesius and colleagues' conclusion, Spohr (2017) refers to empirical findings on ideological and political echo chambers on Twitter and Facebook. Selective exposure is also a recurring theme in the paper, Spohr (2017) argues that this self-imposed restriction of information is more common than echo chambers spawned by algorithmic personalization. Following this path, Spohr (2017) further argues that selective exposure can lead to biased cognitive processing, over-confidence in the information that seeps through, and even polarized attitudes. The random content encounters may also lead social media users to believe that they are better informed than they are. Thus, Spohr (2017) speaks for the existence of both algorithmically and individually created bubbles, with emphasis on self-exposure as the major concern. In line with this are findings from Cho and colleagues' (2020) experiment that involved manipulations of YouTube's personalization algorithm. By assessing their participants' emotions towards two political candidates before and after watching five videos on YouTube, Cho and colleagues' (2020) were able to compare the effects of different types of personalization on emotional alignment. Their experiment demonstrated the superiority of personalized content based on a user's personal watch history, over personalization based on social watch history, or no personalization at all. Thus, the study lends support to the potential of personalization in creating filter bubbles, and to the notion that individuals' existing opinions carry more weight than socially suggested opinions. Combined, this suggests that personalization may indeed strengthen political views, and in the extreme it may even contribute to political polarization (Cho et al., 2020).

On the other end of the scale stands Bruns (2019), who dismisses the empirical findings and speaks against the existence of filter bubbles and echo chambers. Bruns' stance is partly founded on earlier reviews on related research, partly on the scant number of empirical works on the phenomena, and partly due to the difficulty of operationalizing the concepts. In Bruns' view, politically engaged individuals may mistakenly believe in the existence of filter bubbles and echo chambers because they make the fundamental attribution error of thinking others are equally engaged in political matters. Instead, any existing bubble or chamber stems from self-imposed restrictions and is likely to be found mainly among the most extreme ideologists. Furthermore, Bruns (2019) believes that researchers' focus on this topic has led to unfortunate distractions from other, more important matters, such as partisan actors exploiting the polarization that is becoming more visible in the modern media landscape.

More in line with Zuiderveen Borgesius and colleagues (2016), Dahlgren's (2021) standpoint is that personalization algorithms may in theory be able to create filter bubbles, but this premise rests on an extrapolation that excludes human factors; in addition, concerns about the long-term consequences on society and democracy remain unsupported by empirical evidence. Dahlgren (2021) builds on this standpoint by proposing nine counterarguments to refute theories on filter bubbles.

The counterarguments are mainly theoretical and range from the individual level, for instance that selective exposure does not equal selective avoidance, to the societal level, which confines the individual's democratic influence to solely that of a voter. One counterargument explicates the research on political news and filter bubbles, advocating that this narrow focus exaggerates the role of politics in ordinary people's lives, not unlike the point made by Bruns (2019). In essence, Dahlgren (2021) advances the paradoxes inherent in theories on filter bubbles, in that they eliminate human agency when moving from self-selected to pre-selected personalization, and that they conjure atypically strong, long-lasting and unavoidable effects. Instead, Dahlgren (2021) recommends a shift in the current research focus, towards the influence of personalization on content diversity, along with the role that human and machine actors play in the filtering of information.

The endeavor of Geiß and colleagues (2021) seems to adhere to this recommendation. Using online diaries to study the opinions of a panel of participants, they collected a diverse set of political issues that the varied sample found important. Based on the diary entries, Geiß and colleagues (2021) identified the most salient political event and combined it with survey data to analyze factors that contribute to opinion expression. Their findings showed that people turn to various media for news, not only social media, implying that the role of social media is likely exaggerated in studies that focus solely on these. Further, their findings indicated that individual differences can explain the strength of opinion expressions but personalization cannot, which they interpret as a tendency among certain opinionated individuals to drift towards self-enforced echo chambers (Geiß et al., 2021). In other words, Geiß and colleagues (2021) surmise that echo chambers are not an inescapable result of personalization algorithms, but a potential consequence of holding extreme views; this coincides with Bruns (2019) proposition that the only plausible filters are those self-imposed by individuals on the extreme ends of divergent topics. Echoing the statements of others, Geiß and colleagues (2021) stress that the echo chamber metaphor should not be overstrained, despite its intuitive nature. Notwithstanding different starting points and different approaches, it appears that quite a few researchers converge towards the same conclusion: that algorithmic chambers, or bubbles, may be theoretically plausible, but when put into practice the theory is overshadowed by human factors (Cho et al., 2020; Dahlgren, 2021; Geiß et al., 2021; Spohr, 2017).

Conclusion

This scoping review identified 30 empirical and theoretical papers on social media personalization, covering diverse research domains and a range of topics related to human factors; the four identified thematic areas spanned from the awareness of algorithms and their mediation to user control and the potential societal consequences of closed information outlets. The reviewed publications share the acknowledgement that algorithms will never be fully understood, not even by their developers or researchers in the field. Many articles also share the stance that algorithms do not operate in isolation but adapt and evolve with the continuous feedback that users provide through their actions. Furthermore, most of the papers address users' awareness of personalization algorithms, either explicitly in studies on literacy, or implicitly in studies on user experiences, targeting, persuasive technology, customization habits, curation practices, and closed information outlets. On the topic of awareness, some investigate the trade-off in exchanging personal data for a service, some consider design elements for increasing awareness, and some study how awareness varies with age, experience, and other background factors. As for the closed information outlets, several put forward strong arguments against the existence of filter bubbles or echo chambers; at the same time, they acknowledge that people can limit their own access to information if they rely solely on personalized platforms.

From the outset, this review aimed for insight on how social media personalization affects users, including their experiences and other

human factors. With this narrowing of scope, the review has outlined both empirical findings and theoretical argumentations that showcase how several aspects of the user experience are affected. Going by the presented results, it seems that users do appreciate the relevance, convenience, and entertainment value of personalized content on social media. Moreover, despite awareness of being targeted, not everyone is opposed to commercial content that speaks directly to them, and the younger social media users appear to be most accepting of these digital marketing strategies.

Nevertheless, there are noticeable outcomes of personalization that are not always appreciated. Social media users of all ages share accounts of feeling monitored, followed, and attempted persuaded by online content. For some, this can lead to a sense of disempowerment from not being considered, neither by the platforms nor by policy makers; others experience resignation from the efforts required to keep track of all privacy statements, settings, and curators, this may in the end lead to a dismissal of any privacy concerns. On top of the reported reservations to individual adaptations on social media, come other concerns; some of these concerns relate to the potential that personalization could facilitate closed information outlets and that these closures could accelerate existing polarization. There are voices who speak against the latter concern, stressing the lack of proper operationalizations and empirical support and suggesting that polarization may not be on the rise, it may just have become more visible with the advent of social media. Chambers, bubbles, or not, there are still good reasons to believe that information on social media bears impact on users. There are also good reasons to continue on the path revealed by researchers who surmise that we lack an understanding of how decision-making processes cope with the narrow messages that arrive by means of personalization and become intermingled with the internet's abundance of information.

As outlined in the methodology, the consultation phase aimed to bring the field forward with recommendations for future research (O'Brien et al., 2016). In this scoping review we have carried out a qualitative analysis of 30 articles shedding light on how researchers from different disciplines, using different methodologies, study personalization on social media. Furthermore, we have shown how different authors use different terminology to express more or less the same meanings. We believe that this presentation of commonly used terminology would be of importance in the execution of future systematic reviews and in attempts to form future reporting guidelines in the field of social media and personalization.

To glean possible directions in future research, we have carried out an unstructured literature search for articles published after June 2021. It seems that researchers are working hard to keep up with the rapid pace of the digital world, we found several new publications on social media, personalization, and algorithms. A few of these study personalization from a marketing perspective, extending knowledge in this field with empirical findings on consumer segmentation (Serrano-Malebrán & Arenas-Gaitán, 2021), advertising efficiency (Jung & Heo, 2021), and brand relations (de Groot, 2022). A couple address ethical perspectives that keep the spotlight on current and future implications of heavily personalized media and information (Hermann, 2022), or the inequality that follows different levels of literacy and access to digital technology (Zarouali et al., 2021b). In the domain of algorithmic awareness and literacy, one study addresses adolescents' own experiences (Bell, Tennfjord, Tokovska, & Eg, 2022)), and two new assessment scales have seen the light of day; both scales are published in 2021 and both by researchers located in the Netherlands. The Algorithmic Media Content

Awareness Scale covers four dimensions, related to awareness of content filtering, automated decision-making, human-algorithm interplay, and of ethical considerations (Zarouali et al., 2021a), whereas the Algorithm Literacy Scale for Internet Users comes with two dimensions, one related to awareness and the other to knowledge (Dogruel et al., 2021). Finally, we also found a review of social media research within the HCI domain. In this review, the authors outline how HCI researchers have progressed through three topical stages, from user behavior in the earliest days, to privacy in what the authors label the growing phase, and lately to design (Shibuya et al., 2022). The authors also address topics and methodologies that have thus far received too little attention, among their recommendations are continued research on social contexts and inequality and furthering the use of mixed-methods and theoretical frameworks founded on feminist perspectives.

Aiming to provide a broad overview of research that addresses how personalization can steer people's social media experiences, the review at hand has unearthed a range of relevant topics and methodologies from several disciplines; it has also identified a rather large and varied set of terms used by researchers in different domains. These observations motivated us to compile a glossary with definitions of terms used in relation to personalization, our hope is that the glossary may be a useful tool for unifying terminology and bring together previously distinct research. In turn, this may benefit future studies in building more solid theoretical foundations. With the ongoing research progress pertaining to algorithmic awareness, privacy matters, and design considerations, we see how the efforts of researchers are shedding light on the many nuances of a large challenge that involves social media users across the globe. Since this challenge comes with the risk of exacerbating existing inequalities, the efforts that are put into this line of research will hopefully bear fruits in the form of better-informed media consumers and more options for giving control back to the users who want it.

If accepting the premise that personalization comes with both burdens and benefits, it seems timely to ask how can they be weighed against each other? That is the overarching question that arises from the reviewed works. On the one hand, researchers could prioritize the user perspective, furthering research on how to best to design social media platforms that encourage awareness, understanding, and individual control, while still providing wanted, personalized content. On the other hand, researchers could turn to the platform providers and policy makers, seeking knowledge on how best to balance the interest of users, commercial actors, and societal structures. Social media platforms are still young and more than likely to take on new formats, functionalities, and network structures, just like researchers across disciplines are more than likely to continue their pursuits from different starting points. If they are not already doing so, we hope these disciplines will begin to look to each other, feeding the others with insight that may accelerate the pursuit of knowledge both on the user side and the technological side.

Declaration of competing interest

Data availability

No data was used for the research described in the article.

Appendix 1. Glossary of terms commonly used in relation to social media personalization

Algorithm	Pieces of code with instructions for specific tasks, to be carried out in sequence. Some algorithms are developed for contexts that involve computations and analyses of online user data, which in turn yield outcomes such as filtered, classified and/or prioritized information. Algorithms are unobtrusive, complex, and evolving, which make their impact covert (Alvarado & Waern, 2018; Bucher, 2017; Eslami et al., 2015; Powers, 2017; Swart, 2021).
Algorithm interpretability	The transparency of an algorithm's logic and the human capacity to understand how it works (Albanie et al., 2016; Reviglio & Agosti, 2020).
Algorithm tagging	An approach towards regulating market algorithms by requiring traders to identify the algorithms at work (Albanie et al., 2016).
Algorithmic amplification	Proposed alternative term to echo chambers that shifts the focus from closed-off spaces and extremity to motivated selectivity without negative connotations (Geiss et al., 2021). However, amplification need not be value-neutral, it has been linked to stereotypes, political orientation, predispositions, beliefs, opinions, and preferences (Bol et al., 2020; Cho et al., 2020; Geiss et al., 2021; Thorson & Wells, 2016; Swart, 2021).
Algorithmic aversion	Preference for human intervention over algorithmic mediation (Alvarado & Waern, 2018).
Algorithmic awareness	Awareness of the existence, purpose, and mechanisms of algorithms. Awareness is linked to both information and encounters, although encounters may not transfer across contexts (Alvarado & Waern, 2018; Bucher, 2017; Eslami et al., 2015; Schmidt et al., 2021; Swart, 2021). Algorithmic awareness springing from experience has been related to frequency of use and exposure, active or passive interaction mode, tendency to adjust settings, as well as deductive and inductive reasoning (Eslami et al., 2015). Awareness can also be related to specific contexts, such as news personalization, tracking of online behavior, social media feeds, and search engine results (Bucher, 2017; Eslami et al., 2016; Powers, 2017).
Algorithmic curation	See *Curation*
Algorithmic experience	An analytical tool for user-centered perspectives on algorithms, including how users perceive algorithms and how to design better experiences with them (Alvarado & Waern, 2018).
Algorithmic imaginary	The way people imagine, perceive and experience algorithms (Bucher, 2016).
Algorithmic intervention	A user perspective of the algorithmic process, with filtered or personalized results as an outcome. Successful interventions can be perceived as positive, for instance when an input from the user yield helpful suggestions. However, when algorithmic interventions violate expectations, human interventions tend to be preferred (Alvarado & Waern, 2018; Swart, 2021).
Algorithmic literacy	Rational and experienced knowledge about algorithms and their impact, particularly in the context of filtering and personalization. May also refer to awareness, subjective perceptions, and behavioral tactics in dealing with algorithms (Reviglio & Agosti, 2020; Swart, 2021).
Algorithmic neutrality	See *Neutrality*
Algorithmic personalization	See *Personalization*
Algorithmic profiling	The use and analysis of online data to infer and predict behaviors, preferences, and traits of individuals and groups. The profiles can serve as general categories that informs a provider about a user's needs and interests, for instance to personalize a platform or select the appropriate target audience (Reviglio & Agosti, 2020; Yeung, 2018).
Algorithmic selection	The presented outcome of filtering algorithms, mostly used to describe a selection of news stories (Merten, 2021; Schmidt et al., 2019). Similar to *Curation*.
Algorithmic sovereignty	The right to decide how, and to what extent, algorithms control online life. On one end stands the individual and their self-determination in interactions with digital technology, on the other end lies the democratic collective and its ownership of digital infrastructures (Reviglio & Agosti, 2020).
Algorithmic targeting	Algorithmic targeting, or merely targeting, typically refers to commercial or political messages that certain groups are more inclined to be interested in or swayed by. These groups are labelled the target audience and they can be identified through demographics, group characteristics, online behavior, past purchases, psychographics, and other forms of profiling. Microtargeting is similarly a way to reach out to individuals by combining online data from different sources, this approach is often hard to trace because they make use of personalized "dark ads" that are visible a limited number of times and only to the target audience. Retargeting is another variation that involves a reminder of what someone has previously clicked on (Bol et al., 2020; Kruikemeier et al., 2016; Reviglio & Agosti, 2020; Van den Broeck et al., 2020; Yeung, 2018).
Algorithmic transparency	Means to give insight back to the users, about why certain content is selected for them, what it is that a platform knows about them, and how it has derived this information. Transparency can come from user-centered interfaces with personalization cues and increased control (including *Seamful* designs), it can also come from added experience with social media and personalized content (Alvarado & Waern, 2018; Reviglio & Agosti, 2020; Swart, 2021; Van den Broeck et al., 2020).
Content neutrality	See *Neutrality*
Curation	Used to describe how media content is selected, organized, and conveyed through curated flows to make the information manageable for interested parties. The curation can be achieved by filtering algorithms, either automated or moderated by personal adjustments. Curation can also be the work of journalists, editors, and other communicators, as well as other users and contacts (Lee et al., 2019; Merten, 2021; Oeldorf-Hirsch & Srinivasan, 2021; Thorson & Wells, 2016).
Curatorial code	The code, or algorithms, that carry out the curation of news and other content (Lee et al., 2019).
Customization	Tools or actions used to shape the social media experience, and to gain more control over information encountered online. Customization can be achieved through subscriptions, for instance to news providers or social media profiles, or by de-selecting or hiding unwanted content. It can also be aided by algorithms based on previous engagement with content and the success of earlier suggestions (Auxier & Vitak, 2019; Lee et al., 2019; Merten, 2021).
Digital inequality	Using algorithms to target some groups over others comes with the risk of differential treatment that reproduce and reinforce social inequalities. Due to personalization, this digital inequality is difficult to establish and address. It also comes with societal implications, for instance the exploitation or exclusion of vulnerable groups, a type of epistemic inequality that may lead to unfair distribution of benefits and self-fulfilling prophecies (Bol et al., 2020; Reviglio & Agosti, 2020; Yeung, 2018).
Digital intermediaries	See *Intermediaries*
Echo chambers	A cluster of information that has been filtered and selected based on predictions of who a user is and what they will do next. Known by many names, including echo chambers, filter bubbles, and feedback loops, the phenomenon remains disputed. It has brought about concerns related to the narrowing and fragmentation of news sources and perspectives, even polarization and extremism (Zuiderveen Borgesius et al., 2016; Dahlgren, 2021; DeVito, 2017; Geiss et al., 2021; Powers, 2017; Reviglio & Agosti, 2020; Schmidt et al., 2019; Spohr, 2017).
Engagement	Many online platforms encourage interactions with the content they share, for instance by pushing a button to indicate a liking or another reaction, or by commenting on or sharing the content; the different types of behavior can be grouped under the term engagement. Some distinguish between active engagement, such as comments, and passive engagement, such as liking (DeVito, 2017; Eslami et al., 2015; Oeldorf-Hirsch & Srinivasan, 2021).
Explicit personalization	See *Self-selected personalization*
Feedback loops	See *Echo chambers*
Filter bubbles	See *Echo chambers*
Gatekeeper / gatekeeping	Traditionally, journalists and editors were regarded as the gatekeepers that set the news agenda, along with politicians and other public actors. With the shift from traditional media outlets to personalized platforms, algorithms have partly taken over the gatekeeping role. This could remove individual control, but it also gives the user the possibility of selecting their own filtered news settings (DeVito, 2017; Merten, 2021; Power, 2017; Reviglio & Agosti, 2019).
Implicit personalization	See *Pre-selected personalization*
Incidental exposure	Encounters with online content that are unintentional and usually outside the user's control. A typical example is going online with an agenda, but ending up engaging with something else. This type of inadvertent exposure occurs frequently on social media, along with other online platforms, and

(*continued*)

	may pave the way for encounters with novel or unexpected information. However, incidental exposure may also lead people to think that they do not actively need to pursue news (Kümpel, 2019; Merten 2021; Oeldorf-Hirsch & Srinivasan, 2021; Schmidt et al., 2019).
Information cocoons	Information sealed off in a so-called cocoon, as a result of self-selected personalization (Zuiderveen Borgesius et al., 2016). Similar to *Echo chambers*.
Information intermediaries	See *Intermediaries*
Intermediaries	Online sites that use filtering algorithms to select, and possibly recommend or personalize, content can be considered intermediaries of information, this includes search engines, social media, and video platforms. Referred to as online, digital, or information intermediaries (Lee et al., 2019; Reviglio & Agosti, 2020; Schmidt et al., 2019; Zuiderveen Borgesius et al., 2016).
Mass customization of content	See *Personalization*
Mass predictive personalization	See *Personalization*
Mechanical neutrality	See *Neutrality*
Microtargeting	See *Targeting*
Neutrality	Proposition to remove biased selection of content, or to make it transparent and voluntary. Used both for algorithms and platforms, as in algorithmic neutrality, mechanical neutrality, and content neutrality (DeVito, 2017; Reviglio & Agosti, 2020).
Online intermediaries	See *Intermediaries*
Personalization	Individual customization of online platforms, services, and content, intended to alleviate information overload but often performed without the user's explicit choice. Personalization is shaped by algorithms that derive insight from users' online behaviors, such as search terms, engagement with content, communications with others, and activities of network connections, as well as demographics and provided interests. With this insight, online platforms can recommend or deliver content that align with predicted interests and preferences. When interacting with personalized platforms, users are feeding the system more data that can be used to further improve the personalization. Personalization is found across a range of online services, including search engines, news outlets, social media, online stores, and other recommending sites. In advertising, personalization is used to make the commercial message more relevant and useful based on a user's characteristics and interests, in effect segmenting the market down to the individual. Also referred to as mass predictive personalization or mass-customization of content (Auxier & Vitak, 2019; Bol et al., 2020; Zuiderveen Borgesius et al. 2016; Cho et al., 2020; DeVito, 2017; Kruikemeier et al., 2016; Lee et al., 2019; Powers, 2017; Reviglio & Agosti, 2020; Van den Broeck et al., 2020; Yeung, 2018).
Pre-selected personalization	Pre-selected, or implicit, personalization is initiated by the platform or third-party provider, and tends to take place without the user's conscious command or consent. Pre-selected personalization can be a choice, for instance when making use of social media feeds, but users who do not realize that these platforms are personalized do not have this choice. Pre-selected personalization is often used in the context of *Echo chambers* (Zuiderveen Borgesius et al. 2016). Similar to *Incidental exposure*.
Proactive personalization	A user's proactive attempt to influence the otherwise automated personalization process, particularly in the context of news curation (Lee et al., 2019; Merten, 2021; Zuiderveen Borgesius et al., 2016). Similar to *Self-selected personalization*.
Profiling	User categories derived from data analysis, or pattern recognition, of past online behavior. These data-driven profiles can used to infer and predict preferences and future behavior of individuals and groups, so that online information and services can be tailored to meet individual needs. Some also consider profiling a public or algorithmic aspect of identity, where users are grouped together based on shared features, comparable to stereotyping (Alvarado & Waern, 2018; Reviglio & Agosti, 2020; Yeung, 2018).
Retargeting	See *Targeting*
Seamless	Seamless interfaces facilitate effortless user experiences by hiding implementations and keeping mediations opaque (Alvarado & Waern, 2018; Eslami et al. 2016).
Seamful	Seamful interfaces are designed for visible implementations, mediations, and connections, thereby giving users the opportunity to evaluate algorithmic outcomes (Alvarado & Waern, 2018; Eslami et al. 2016).
Selective exposure	Seeking out information with intention, by purposefully selecting a platform or news outlet, or by customizing settings to get the desired results. Selective exposure encompasses a tendency to seek out information that aligns with existing viewpoints, and avoiding opposing or challenging perspectives. It has been linked to confirmation bias, relying only on selected sources to strengthen a position, as well as to directional motivation, which adheres to existing attitudes (Cho et al., 2020; Dahlgren, 2021; Merten, 2021; Spohr, 2017).
Self-selected personalization	Self-selected, or explicit, personalization is initiated by the user in order to ensure exposure to relevant content. It is often used in the context of deliberately seeking out information that corresponds to existing points of view (Zuiderveen Borgesius et al. 2016). Similar to *Selective exposure*.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chbr.2022.100253.

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