

DISSERTATION

MIND OVER MACHINE? THE CLASH OF AGENCY IN SOCIAL MEDIA
ENVIRONMENTS

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ABSTRACT

MIND OVER MACHINE?

THE CLASH OF AGENCY IN SOCIAL MEDIA ENVIRONMENTS

Underlying many social media platforms are choice recommendation "nudging" architectures designed to give users instant content and social recommendations to keep them engaged. Powered by complex algorithms, these architectures flush people's feeds and an array of other features with fresh content and create a highly individualized experience tailored to their interests.

In a critical realist qualitative study, this research examines how individual agency manifests when users encounter these tools and the suggestions they provide. In interviews and focus groups, 45 participants offered their experiences where they reflected on how they perceived the engines, e.g., their Facebook feed, influenced their actions and behaviors, as well as how the participants felt they controlled it to achieve personal aims. Based on these and other experiences, this study posits the Social Cognitive Machine Agency Dynamic (SCMAD) model, which provides an empirically supported explanatory framework to explain how individual agency can manifest and progress in response to these tools. The model integrates Albert Bandura's social cognitive theory concepts and emergent findings. It demonstrates how users react to the engines through agentic expressions not dissimilar to the real-world, including enacting self-regulatory, self-reflective and intentionality processes, as well as other acts not captured by Bandura's theory.

Ultimately, the research and model propose a psycho-environmental explanation of the swerves of agency experienced by users in reaction to the unique conditions and affordances of these algorithmically driven environments. The study is the first known extension of social cognitive theory to this technology context. Implications of the findings are discussed and recommendations for future research provided. The study recommends that future research and media discourse aim for an individual-level psychological evaluation of these powerful technologies. This stance will afford a greater understanding of the technology's impacts and implications on individuals, particularly as it is anticipated to significantly evolve in the coming years.

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No one is an island, and it takes a team to survive and thrive. Dr. David Wolfgang, Dr. Joe Champ, Dr. Tara Opsal, and Dr. Elizabeth Williams — your thoughts, spirits, and fingerprints are upon all these pages. You fielded my absurd questions with grace and kindness, and you gifted me the wisdom of your experiences in the research craft in long talks tucked away in your offices, in your homes, and in your classrooms. Every line of this work is inspired and informed by you: your voices guided me even when we were apart, those whispers we hear when writing alone telling you to turn right instead of left at the cypress in the distance. I also thank you from the bottom of my heart for your belief in me and for sticking with me to the end — one day I will share with you the gravity of the why. I am a better person and now equipped to do the work I need to do — and will do — because of you.

I would also like to thank the faculty and leadership of the Colorado State University Department of Journalism and Media Communication. You are wonderful, brilliant, and inspiring, and you positively changed the trajectory of my life in so many ways — the luck of my convergence with you akin to catching lightning in a bottle. I have been granted a new fate because of you and I will do everything in my power to sing your praises and represent you and the department as best as I can as I travel out into the world again, this time with a far clearer

mission and with far greater ability, confidence, and zeal. I will not let you down and as Tom Petty sang, I won't back down.

Finally, I am indebted to the many beautiful and gracious people I spoke with about their social media experiences for hours on end. We laughed, we became serious, and we each rolled up our sleeves to better understand the how and why of these technologies *together*. I knew little until you shared your views with me. You were my teachers, and I will do my best to make sure your lessons are not lost.

DEDICATION

*For Ashley E. Teatum, who is my north star, parting the mists and
fires, giver of stillness and light.*

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CHAPTER 1 — INTRODUCTION

With the pandemic forcing Sam to spend more time at home, social media became a welcome escape for the 18-year-old college student. There, she found a comforting place apart from the strictures of home where she could stretch her imagination and meet like-minded people across the world. At the time in 2020, the United States and the international community were contending with the deadly COVID-19 virus and health protocols that encouraged and, in some cases, mandated social distancing and isolation. A Dungeons & Dragons fanatic and lover of all-things fandom, Sam, during this time, reveled in the endless streams of content the platforms channeled her way from the latest D&D tidbit to fan-generated takes on popular shows she adores. With health protocols in her locality discouraging in-person contact and the added cabin fever of college coursework at her place, not the classroom, she found herself spending more time on the platforms and avoiding “real-world” responsibilities. The lure of the easy instant gratification Twitter, Snapchat, and other social media environments provided was just too enticing, especially while being trapped under one roof, away from friends.

But soon she began to detect something else about social media, far less conspicuous than the pronounced river of content on her feeds that gave her joy, a powerful, less visible undercurrent that seemed to further hook and reel her in, turning what may have been a short pit stop for an entertaining reprieve into a long, winding journey where the hours wheeled by without notice. Platforms like Facebook and Twitter knew her very well, in a kind of creepy way as she put it, and they seemed to be able to compel her to take actions she did not desire to take. “... It’s extremely well-tailored to like my interests because I spent a lot of time on it, especially

now like stuck at home,” Sam reflected in a Zoom interview with this researcher in 2020. “It’s unsettling but it still draws me in. ... It is creepy how well it knows me.”

That observation refers to personalization, an inconspicuous yet significant technology stitched into all major social media platforms that powers an array of conspicuous features that provide content and social recommendations to users automatically. Energized by complex algorithms that track users clicks and swipes, the technology is engineered to serve Sam and others instant recommendations aligned with their interests — a choice recommendation engine that not only offers these suggestions but also dictates the flow and composition of social media environments for billions of users worldwide. That technology, which “personalizes” feeds and other features for social media users, such as the unending streams of content shaped to their tastes on Twitter or Facebook, is the focus of this dissertation.

Like many participants in this study, Sam developed a sense of how personalization worked over time, not the technicalities, the underlying code, but how it essentially ticked — how it endeavors to get to know her better to give her an experience crafted to her tastes. If she “likes” fandom content on Twitter, for example, the platform’s algorithms evaluate those digital signals then offer her similar content. Because of how accurate it was at predicting content she desires, she found herself becoming increasingly absorbed, incessantly swiping, interacting, scrolling, and plunging down unanticipated “rabbit hole” after “rabbit hole” of content, outcomes after logging on she did not anticipate, nor in some cases want. And while on that machine-guided journey, two other outcomes also occurred, outcomes that other study participants shared with this researcher. Time and intentional thinking seemed to dissolve, she reported, producing for her a state akin to flow where the responsibilities of the “outside world” vanished and a

pattern of novel behaviors mobilized by the technology emerged, more clicks, more swipes, more content viewed.

Tommy, another study participant, echoed similar experiences. As designed, Facebook, Twitter, and Instagram's algorithms were so effective at delivering Tommy content and social recommendations he liked that mindless scrolling often ensued, he reported, and like Sam, a seamless flow of timelessness and thoughtlessness soon flowered.

For Sam, Tommy, and the 43 other study participants who offered their perspectives in interviews and focus groups for this research, *the meeting of person and personalization features* produced extraordinary responses and acts. Instagram's "Explore" feature, which delivers random, yet exceptionally personalized content, sent them blazing down rabbit holes and on serendipitous digital journeys that warmed the woes of being stuck at home. On their Twitter feed, they read the news they wanted to read, while finding themselves unexpectedly whittling away the hours there. Each platform's personalization algorithm sculpted what could be a disorderly flood of information into a sensible stream highly appealing to them. Their YouTube page was *their* YouTube page, filled with entertaining videos that have made them laugh before or tunes that had them boogieing again to beats they love. As Tommy noted, "I like it because it ... keeps me engaged, and maybe bring me to something that I wouldn't have looked at before." But like Sam, he observed another dimension of the technology, how it appeared to suddenly instigate a peculiar flow of behaviors, an "addictive habit" of "going down this rabbit hole of finding more stuff that I'd like, you know, maybe what I wasn't even looking for in the first place."

What Tommy, Sam, and others alluded to signaled something else that appeared to be at stake in their interactions with these features — their agency, the central concept of focus of this

dissertation. While philosophic and scientific debates on agency alone would produce enough pages to fill a city library, at root the concept is simple: agency is our capacity to act and to exercise control over our actions, often to achieve a goal or pursue an interest in an environment (Bandura, 1989). In the personalization environments, however, Tommy and Sam seemed to become a different actor, a human actor that maintained the freedom to make choices as expected, yet one that was being constantly nudged by a technology designed to learn and act on them, a nudging that also appeared to be impacting their behaviors, intentions, and goals, i.e., their agency. A collision of human actors and these technologies appeared to be unfolding, with the outcome of that interaction resulting in distinct trajectories from rabbit holes to others enacting intentional strategies to maintain control. But why was that happening and how, the roots beneath their descriptive reflections of and reported experiences with these tools?

To answer those questions, this project sought to understand the acts and choices of participants in response to these tools, shifting from the descriptive to the explanatory — to be able to explain those acts and choices through a theory-informed model that would shed light on how they occurred, why they occurred, and how they progressed. Put another way, utilizing the concept of focus, the purpose of this dissertation is to understand and explain how agency was deployed by participants in this milieu, including identification of individual-level cognitive and agentic processes that allow it to manifest.

By way of an exploration of the age-old agency question as applied to this extraordinary unique context, through a critical realist approach this research posits a model — informed by the agency-centric social cognitive theory, as well as novel concepts that emerged — that identifies individual-level agentic, behavioral, and other processes that appear to be activated when users engage with these features. These processes also shed light on the unique outcomes

participants reported, providing an explanation to the twists-and-turns of agency they experienced. A critical realist approach seeks to identify the less visible mechanisms producing events, turning social science research into a detective-like quest in search of how and why a particular phenomenon, or event, occurs (Fletcher, 2020). Fit of data with prior theory aids mechanism identification, the approach this dissertation undertook.

To that end, this research offers an empirically supported, theory-driven explanation of the shifts of agency they experienced in reaction to the tools, rabbit holes and the like, and the mechanisms, the cognitive, behavioral, and agentic processes, that appear to be enacted in response to them as interpreted by the researcher. In a critical realist, qualitative study of mental health recovery, Lauzier-Jobin and Houle (2021) fit prior psychological theory with collected data to help identify the mechanisms that aided meaningful recovery for people struggling with mental illness. Similar to their study where a mechanism can be located in a middle-range theory that explains events, this dissertation utilized the agency-centric social cognitive theory to shed light on the choices and agentic transformations of users in response to the tools, which participants spoke extensively about with this researcher during interviews and focus groups.

Social media's integration of personalization technologies has prompted numerous accounts examining how the tools can alter user behaviors, with agency either a central concept of investigation or implied. However, and necessitating the need for this study and its approach, there appears to be no research focused on these critical concepts uniting theory and empirical data. Despite the widespread utilization of the technology, with billions of people worldwide immersing themselves in these environments, and alarm raised by policymakers, journalists, and academics about its potential effects on individuals and society, the literature is largely theoretical, descriptive, or speculative. Further, the bulk of the discussion about user behaviors

occurs in the popular press and similar media sources. While these accounts are notable for heightening public awareness of the tools, the reports are largely theory free and descriptive, offering in the main narratives about users being funneled into continuous information streams because of the technology, though never shedding light on how and why beyond pointing out the obvious, the features perform well as designed, delivering engaging content that cajoles users to stay on the platforms longer. Demonstrating the need for this project, this dissertation can contribute to these critical, yet lacking discussions through its theory-driven assessment of how and why agency and behaviors can be impacted by these technologies.

In 2020 and 2021, social media algorithms and personalization became the proverbial talk of the town. A popular documentary and a series of press accounts brought widespread attention to the technologies under study here. A U.S. Senate hearing was also held where a Facebook whistleblower revealed company secrets, including internal conversations and confidential research that indicated the personalization technologies were causing users to be channeled into harmful and addictive content streams (Ordonez, 2021; Thorbecke, 2021). While social media algorithms have been scrutinized for years, the Netflix documentary *The Social Dilemma* shined a mammoth spotlight on the technology, with “the algorithm” even starring as a lead character in the film. Released in 2020, the film features interviews with former social media executives, social scientists, and technologists who characterize the algorithmically powered tools as instruments of manipulation that persuade users into spending more time on the platforms. To demonstrate these arguments, dramatized sequences show three men, as personifications of the algorithm, standing before control panels eying the next person they’re trying to manipulate. In one sequence, a teenage boy receives a notification on his phone that his ex is in a new relationship. Unknown to him, the algorithm-men sent it, and their lure works,

instantly hurling him into a rabbit hole of digital memories where time, like the experiences of Sam and Tommy, suddenly dissolves.

In the wake of the film, *The Wall Street Journal* published multiple investigative reports based on the leaked Facebook research and private conversations among company officials. Mirroring the experiences of study participants, internal research found Instagram's algorithms directed users into addictive information streams that harmed their mental health (Wells et al., 2021). Algorithms also channeled emotionally charged content to people's feeds, which provoked them to stay online longer (Bauder & Liedtke, 2021; Hagey & Horwitz, 2021). Additionally, Facebook researchers found 1 in 8 users reported compulsive use that negatively affected their sleep, work, and relationships, with some users unable to control how much time they spent on the platform — behavioral patterns akin to agency loss (Wells et al., 2021). Like Sam and Tommy's experiences, one participant reported: "I'm on Facebook every day, every moment. Literally, every moment; just not when I'm in the shower. I lose the notion of time" (Wells et al., 2021).

Scholars have taken a variety of approaches to examine the intersection of people and these smart tools, with agency a central or ancillary variable of the analysis. However, they typically offer theoretical, critical, or descriptive perspectives, a gap that this dissertation addressed with its theoretically informed empirical analysis. Empirical work has investigated the ties between agency and social media use, with social cognitive theory serving as a theoretical framework in several studies. But that work predominantly examines user interactions with other social media attributes and concerns, not the personalization features under study here.

In a critical work, Zuboff (2019) asserted social media companies developed the tools to control and profit off user behavior. Couldry and Mejias (2019) argued these technologies

represent a new variant of colonialism in which the self is invaded, autonomy is threatened, and control is weakened. Scholars have also formulated theoretical frameworks and models, like this research, to investigate how human agency manifests in social media and other technology environments (Hosseini, 2019; Kono, 2014). Sundar (2019), in his theoretical framework, conceptualized algorithmized environments as "agents" that can transform users' agency and cognition. Rose and Jones (2004) posited that human agency undergoes change in computerized environments. Likewise in another theoretical study, Anderson et al. (2016) claimed humans and algorithms engage in an interactional dynamic in which both express agency and a wide range of outcomes result. However, in addition to being theoretical, these studies fundamentally offer basic approaches to understanding agency manifestation and progression in these environments. The rich array of dynamics that enable humans to act or not, as afforded by social cognitive theory, are absent from these accounts (Bandura, 2001).

Integral to this study's model, Bandura's (2001, 2009) social cognitive theory of mass communication offered a rigorous and well-supported approach to help explain the swerves in social media acts participants reported in response to its personalized tools (Bandura, 1999). Despite its social psychology origins, media scholars have applied social cognitive theory to a variety of mass communication contexts (LaRose & Eastin, 2004; Lee et al., 2017; Velasquez & Quenette, 2018). Researchers have also utilized it to examine how social media may impact user agency. However, personalization attributes were excluded from analysis (Turel, 2021; Velasquez & LaRose, 2015), presenting a theory gap this research addressed.

Informed by Bandura's theory, this research offers an explanatory model, rooted in participants' reports, that captures the rich array of agency dynamics at play for individuals responding to these tools. The research also supports the extension of his theory to this context,

the only known study to the researcher to have done so. Qualitative data collected for this dissertation supported its extension. Through participants' experiences, it establishes that a social cognitive process is occurring in this context, similar to other studies that established that with other dimensions of social media. This finding, among others, provides a contribution to the psychology and mass communication literature. It also offers a framework that can be utilized in future studies, including testing and refinement of it through quantitative and other methodologies.

Ultimately, the model, an adaptation of social cognitive theory for this context, reveals what can happen to people's agency when they step into personalized social media environments. Further, in contrast to the dominant portrayal of "mindless users" under the sway of personalization technologies, as depicted in *The Social Dilemma* and other widely viewed accounts, this research found some participants exercised self-control in these environments, enacting intentional strategies that helped them preserve and exercise their agency, on their terms, despite the purported power of the tools. They performed as social cognitive theory would predict: they brought, as the data suggested, intentionality, forethought, and reflection to their encounters with these tools, which shaped different outcomes for them than for participants who described themselves as being less intentional with their choices, with rabbit holes and the like ensuing.

As a theoretical contribution, this dissertation advances a new model, Social Cognitive Machine Agency Dynamic (SCMAD), that demonstrates how and why that occurs, ultimately demystifying these little researched processes. As a practical contribution, this work demonstrates individuals can have the upper hand in these environments, so long as they acquire a clear understanding of the dynamics and consequences of use of these tools. The model

provides that guidance, building on past social cognitive work that sought to empower individuals to be free, non-constricted agents who can attain any realistic goal they desire, so long as they exercise their internal capacities to achieve it. This study's findings arise from the experiences and perceptions of 45 participants, gathered in 29 semi-structured interviews and 4 focus groups. Members of Generation Z, born after 1996, were recruited for the study because of their well-known substantial use of social media and general knowledge of its workings (Dimock, 2019).

The remainder of this research is organized into five chapters. Chapter 2 presents a review of the relevant literature, including more extensive discussion of social cognitive theory. Chapter 3 describes the study's methodology, such as procedures followed, data analysis methods, and description of the sample, as well as how critical realism informed the project. Chapter 4 and 5 present the findings. Chapter 6 presents a discussion of the explanatory model, ultimately drawing together the findings presented in the previous chapters into a unified framework. Chapter 6 ends with a summary, conclusion, study limitations, and opportunities for future research. Bibliography and appendices complete the dissertation.

Overall, this study demonstrates agentic variability manifesting in these environments. It also supports the use of social cognitive theory, in modified form, for this context, a contribution that adds to the growing, yet still nascent, academic literature on the topic and that provides a theory-driven perspective that nuances mainstream and other media discourses focusing on the technology and its impacts on people.

CHAPTER 2 — LITERATURE REVIEW

Introduction

The literature review will begin with a short history of social media, with focus on algorithm and personalization technology integration. That will be followed by discussion of platform use trends, which demonstrate the degree of time users spend interacting with the tools under study here. A short review of platforms that are part of the study will follow. This background will contextualize the research and also demonstrate its need.

The second part of the review will first highlight mainstream perspectives on the technologies, revealing conversations about its consequences, then it will pivot to academic studies. Project-relevant theoretical, critical, and empirical studies will be highlighted, as well as discussion of gaps and the positioning of the study in this literature. The review will conclude with an extensive discussion of social cognitive theory, the primary theoretical framework informing the study, and the project's research questions. Overall, the review will reveal the sparse research literature on the study area and why social cognitive theory emerged as a viable framework to assist investigation of the research questions.

Social Media History and Context

In a little over 20 years, social media has evolved from a curiosity to a global phenomenon that has amassed 4.6 billion active users worldwide (Johnson, 2021; Samur, 2018). Originating with now defunct, and basic, social networking sites like Six Degrees in 1997 and Friendster in 2002, it has matured into more complex platforms that have integrated a myriad of new features, including personalization algorithms (Barnhart, 2021; Ngak, 2011). Facilitating its growth, the platforms emerged from a shared set of technological and social networking

premises dubbed Web 2.0 that allowed users to rapidly network, communicate, and share information in digital environments (Bacallao-Pino, 2020).

Popularized in 2005 by media publisher Tim O'Reilly, the Web 2.0 label still captures the zeitgeist and functions of social media today: decentralization of information, participatory structure, dynamic user experiences, and undetermined user behavior (Fuchs, 2017) — the latter now an exception and the interest of this research with personalization technologies now encouraging particular user behaviors (Zuboff, 2019). Apart from that novel development, the other attributes made the “social” of social media possible, allowing users to readily communicate, network, and share information with others across the world in real-time (Fuchs, 2017). Early platforms reflected this technologically enabled social connectivity, such as Friendster and Myspace, which launched in 2003. These attributes are firmly part of today's platform experience, with these functions, content, and the later added personalization technologies predominantly driving social networking experiences for billions of users worldwide (Bacallao-Pino, 2020; Samur, 2018).

The Algorithmic Turn

The integration of algorithmically powered features, such as personalized feeds and similar widgets that are the focus of this study, fueled social media's draw and popularity as users stepped into more robust, highly curated environments distinct from their more socially oriented forerunners (Kim, 2017; Golino, 2021). Instead of displaying information on users' feeds in chronological order, as had been past practice, social media algorithms automatically sorted and selected information for users based on a number of proprietary metrics and close tracking of their online behaviors (Barnhart, 2021). Now instead of users “doing the work” of tracking down information they would like to review, the technology did that work for them,

funneling users identity-aligned and other curated recommendations — a choice recommendation engine that sifted through troves of social media moments and data for them with little to no user intervention (Kitchin, 2017; Kozyreva, 2020). Information thus became “personalized” with social networks prioritizing and selecting, through black-boxed algorithms, content, social, and other information recommendations for people, with emphasis on content they were predicted by calculation to enjoy more (Barnhart, 2021).

Algorithms gather the knowledge they need to perform these functions and predictions by tracking all user behaviors, such as likes and shares. The technology constantly “learns” about the user to deliver them, as programmed, “relevant” content tailored to their tastes and interests (Gilmanov, 2021) Major social media platforms, including platforms under study here, have integrated this technology and these affordances it provides. This invisible, programmed structure powers the visible features and widgets a person sees and responds to on the public-facing user interface, such as Facebook and Twitter’s primary feed, as well as an assortment of other personalized tools like Instagram’s Explore feature. In this study, participants reflected on their responses and experiences with these and other personalized features, with their commentary focused on them and not other dimensions of social media environments.

While personalizing content, these choice recommendation engines, however, also nudge users on to predetermined information pathways, thus affecting decision-making by automatically making decisions for them (Jesse & Jannach, 2021 Kozyreva, 2020). Some characterize this technologically enabled information flow as a form of social engineering, in which the technology adjudicates for people to enrich platform owners instead of the users being nudged (Frischmann, 2018) Personalization is a vehicle to produce and reinforce responses from

users, essentially amounting to more clicks, scrolls, and ad views (Frischmann, 2018). These actions, Frischmann (2018) posited, help sustain attention and engagement.

Overall, the transition to this technology signaled a stark departure from the socially oriented, non-commercial ethos of social media as conceived pre-Web 2.0 to greater commercialization, with targeted, personalized ads and recommendations aiding revenue growth by way of increased probability users stayed on platform longer to see more content (Golino, 2021; Kim, 2017). This shift also raises questions about how the technology may impact users on other dimensions, including platform behaviors and agency, the focus of this project. While the technology is performing as designed and fulfilling corporate objectives, little literature exists as to how the technology may be impacting, and whether consequentially, the behaviors and agency of users.

Platform Use and Immersion Trends

Use of the tools is considerable and pervasive, making the lack of research concerning. Nearly half the world is utilizing some form of social media, with some interacting with personalization features several hours a day (Dixon, 2022). Yet while people are engaging with social media and its features at near-saturation levels, little is known empirically about how personalization technologies may impact their agency, behaviors, and related processes. Demonstrating how significant these milieus have become in the lives of people, Hitlin (2018) noted “put simply, in some instances there just aren’t many non-users left.”

The social media user base has rapidly expanded. By 2025, users worldwide are projected to reach 5.42 billion; as of January 2020, use was estimated at 49 percent of the world population (Dixon, 2022). In the U.S., 82 percent of Americans between the ages of 18 and 49 engaged with some form of social media (Hitlin, 2018). Approaching that statistic from the perspective of this

study, that’s roughly 8 in 10 Americans interacting with the personalization features that largely animate the experience. When Pew began monitoring social media adoption in 2005, only 5 percent of U.S. adults reported logging on (“Social Media Fact Sheet,” 2021). By 2011, a year in which many of the major platforms had integrated personalization, 50 percent reported utilizing social media. As shown in Figure 1, in 2019, that number jumped to 72 percent (“Social Media Fact Sheet," 2021).

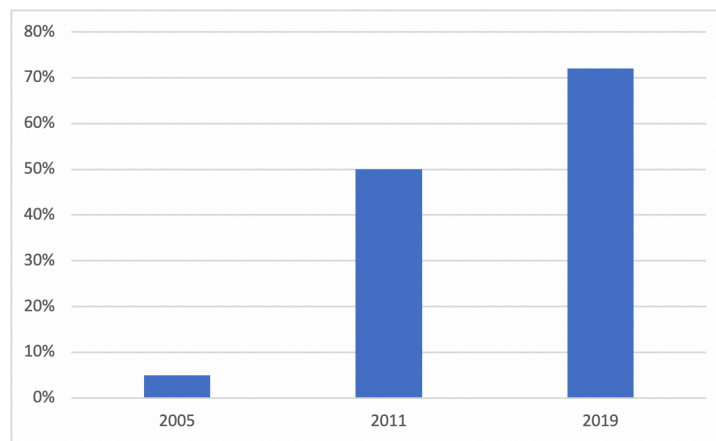


Figure 1 *Social Media Adoption Rates, U.S. Adults*

Many report visiting platforms daily. As revealed in Figure 2, Pew found 70 percent of Americans utilized Facebook daily; 59 percent, Snapchat and Instagram; 54 percent YouTube; and 46 percent Twitter (Auxier & Anderson, 2021) — all platforms containing personalization features in which participants' responses to them were examined in this study. Daily use is also not restricted to a single visit. Of that Pew sample, 49 percent reported logging on to Facebook several times a day; 45 percent Snapchat; 38 percent Instagram; 36 percent YouTube; and 30 percent Twitter.

Users, furthermore, are spending long durations of time in these environments teeming with algorithmically driven features. In 2021, estimated average daily time spent on social media was 142 minutes worldwide (Armstrong, 2021). Teenagers appear to be spending the most time

here. In a survey of 13- to 17-year-olds, 16 percent reported being on social media “almost constantly,” and 27 percent reported frequenting the sites nearly every waking hour (Richter, 2018). Among 16- to 24-year-olds, an age range close to this study’s sample, average daily time spent was estimated at just over three hours (Salim, 2019).

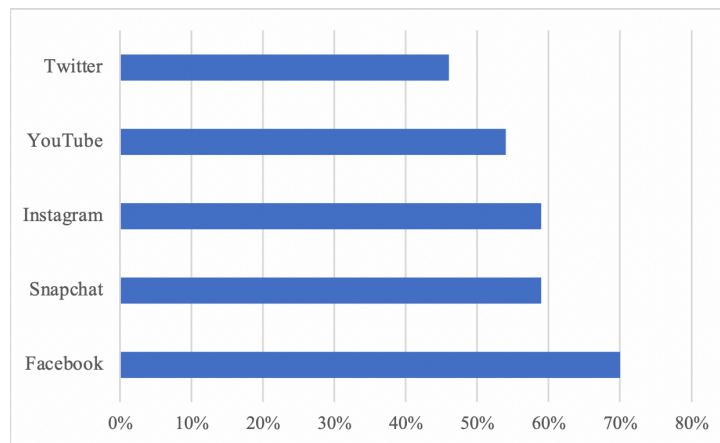


Figure 2 *Social Media Daily Use, U.S. Adults*

These statistics demonstrate the extensive time users are submerged in social media and interacting with its personalization tools. The following section will review platforms examined in this study, including discussion of the personalization technologies integrated into each. This will provide helpful background for the study and for the next part of the review: an overview of mainstream perspectives and academic studies of algorithms and personalization technologies, with emphasis on accounts that focus on user behaviors and agency.

Facebook History and Personalization Context

Launched in 2004 at Harvard University, TheFacebook.com contained limited, socially oriented functionality, allowing users to share experiences, photos, and class schedules (Hall, 2021). Within a day of launch, 1,200 students signed up (Hall, 2021; Phillips, 2007). The News Feed, a new social feature that would later be personalized, was added in 2006 allowing users to see friends’ status updates in real-time (Greiner et al., 2019). In these early years, the platform

contained no personalization technology ("Facebook Algorithm History," 2022). The social, Web 2.0 ethos pervaded. A transition to choice recommendation engines soon came however, an integration that would augment the platform's social foundation and substantially modify users' experience.

From 2009 onward, the company increasingly integrated algorithms and personalization features to deliver "meaningful" content to users ("Facebook Algorithms," 2021). Prior to this algorithmic turn, users had substantial control over the environment, with them administering more information choices and selections as opposed to this technology. An altered News Feed, however, would become one of the first major features to flip the script from user-centric control to algorithms playing a greater role in the information and social experience. Today, Facebook constantly refines its algorithms to provide a more personalized experience for users ("Facebook News Feed Algorithm History," 2021).

As of 2022, Facebook has the most active user base among all platforms with 2.9 billion users worldwide ("Popular Social Networks Worldwide," 2021). Following the company's integration of algorithms and personalization technologies, user growth increased from 372 million daily active users worldwide in the first quarter of 2011 to 1.73 billion in the first quarter of 2020 ("Active Facebook Users," 2021).

Twitter History and Personalization Context

Like Facebook, Twitter reflected the Web 2.0 ethos at launch, originating as a socially-angled microblogging platform that allowed users to send short textual messages to friends and acquaintances ("Evolution of Twitter," 2018; Murphy, 2019). Despite its limited feature set, the platform experienced explosive user growth, acquiring 175 million registered users by 2010 (Rao, 2010).

New features would be added, including augmenting, like Facebook, the social experience with the recommendation engines that are the focus of this research. Users' primary feed, the Timeline, for example, transitioned from displaying tweets in chronological order to ordering them based on a statistically-driven information relevance model (Romano, 2018). Similar features were added, such as personalization tied to geographic location (Shaul, 2021), a "For You" feature that suggested content based on what information users typically engaged with, and "Trending," which highlighted the most popular tweets and topics of the day, all machine selected.

As of 2021, Twitter had an estimated 322 million people utilizing the service worldwide. User base is projected to increase to 340 million by 2024 ("Twitter Users Worldwide," 2021). About one-in-five U.S. adults reported utilizing Twitter (Hughes & Wojcik, 2019).

Instagram History and Personalization Context

Launched in 2010, Instagram acquired 25,000 users on its first day of availability on Apple's ecosystem (Blystone, 2020). By the end of that first week of launch, the photo sharing app had been downloaded 100,000 times; by year end, it acquired one million users (Blystone, 2020). Similar to Facebook and Twitter, early versions emphasized social connection and peer-to-peer information exchange, with Instagram's niche the exchange of photos captured and shared by people on the service ("Instagram's History," 2021).

In a move that would significantly shape the platform's future technological direction, Facebook acquired it in 2012 and would soon integrate a host of new features, including personalization technology (Blystone, 2020). Product evolutions included a transition from the platform's chronological timeline to an algorithmically controlled timeline mimicking Facebook and Twitter's approaches (Blystone, 2020; "Instagram's History: Full Evolution of Instagram

Timeline, 2021). Other personalization elements were also added, including Explore, a still present feature that delivers organic identity-aligned content to users that participants extensively referred to in this study (Sehl & Cooper, 2021).

Like Facebook and Twitter, the synthesizing of foundational social features with machine learning and other recommendation technologies overlapped with explosive user growth. By 2018, the platform acquired 1 billion active monthly users (“Active Instagram Users,” 2021). Forecasters attribute growth to its Stories and Feed features, both of which personalize content to users’ tastes (Lebow, 2021). In a 2021 Pew survey, four-in-ten Americans reported Instagram use (Schaeffer, 2021).

TikTok History and Personalization Context

In contrast to the prior apps, as a new entrant, TikTok launched with a blend of the social and the machine. Released in 2016, users watch and publish short videos, the social element, and the platform’s algorithms track their digital movements and interactions to personalize the experience, the machine-guided aspect (D’Souza, 2021).

The algorithmically powered “For You” feature has substantially increased user engagement by learning what people like to watch and leveraging that information to channel precise taste-aligned content their way (“Brief History of TikTok,” 2020; Shen, 2021). To perform these functions, its recommendation engines also track how long a user lingers over a video and how many times they re-watch it (Barry et al., 2021).

According to Barry et al. (2021), “TikTok can learn your most hidden interests and emotions, and drive users of any age deep into rabbit holes of content — in which feeds are heavily dominated by videos about a specific topic or theme.” In similar fashion, some

participants spoke of how the platform's personalization elements impacted their behaviors. As of 2021, the platform netted an estimated 1.1 billion active users worldwide (D'Souza, 2021).

YouTube History and Personalization Context

When founder Jawed Karim uploaded the first video to YouTube, he was one month away from releasing a platform that would eventually eclipse a billion users worldwide (Leskin, 2020). Socially focused at launch, the platform allows people to upload and share videos. Its success prompted Google to purchase it for \$1.65 billion in 2006 (Hosch, 2021), a move that would result in greater commercialization of the environment, including more advanced choice recommendation engines bolted on to its social foundation (Chen, 2022; Cooper, 2021; Loeffler, 2019; McFadden, 2021). User interactions with videos now translate into them being automatically suggested content to watch (Loeffler, 2019). The platform's "home" section, for example, contains an algorithmically curated collection of videos derived from tracking people's platform behaviors. Other sections, like "Explore," function similarly, with Explore mimicking Instagram's feature of the same name by offering organic, highly personalized content on the fly.

Following these integrations, the platform's popularity persists. As of 2021, it was the second most visited site in the world following Google (Needle, 2021). By 2021, more than two billion logged-in users visited the site monthly, while active monthly users, logged and not logged-in, reached 2.74 billion (Newberry, 2021).

Snapchat History and Personalization Context

Launched in 2011, Snapchat carved its niche in this competitive social networking space through a novel mix of sociality and technological affordance. One key feature reflects its uniqueness and has driven its popularity: content eventually disappears after being posted, as

opposed to remaining archived on the site as is the practice of other platforms (O’Connell, 2020). Socially oriented at launch, photo sharing was an initial feature, followed by videos.

Similar to other platforms, the company increasingly tacked algorithms and personalization technologies on to this core, social foundation. Shifting away from chronological feeds in 2017, the company began integrating algorithms that more greatly dictated what content users saw (Barkho, 2018; Bell, 2017). Curated by machines and people, a “Discover” section was added. Users could also “train” the algorithm by signaling what content they liked by subscribing or selecting “see less” for content they disliked (Constine, 2017). In 2021, algorithmic control of the experience increased with the app offering personalized recommendations based on users’ location, friend interests, and other data.

Like other platforms, Snapchat’s intermingling of the social and the machine continues with other choice recommendation architectures in the pipeline that will further augment the platform’s foundational social experience (Duffy, 2021). Rapid user growth followed the integration of these technologies with 293 million people signing on in 2021 (Iqbal, 2021). On average, users opened the app more than 30 times a day in 2020 (Olafson, 2020).

Media and Other Perspectives: Interpretations and Critiques

In light of the extensive worldwide use and increasing integration of these technologies into major social media platforms, a number of perspectives from media and other sources have been offered that grapple with what comes of people’s interactions with social media algorithms and the choice recommendation engines powered by them. Though often anecdotal, speculative, and descriptive, these accounts provide rich analysis and commentary of the interaction of user behaviors and the personalized elements of social media environments. While the accounts gathered here do not employ agency as a concept of analysis, some imply it or hover in its

conceptual territory as user acts in response to the tools are a dominant focus, particularly anecdotes and observations of people being purportedly funneled into addictive information streams by the technology. These narratives affirm the concerns over the consequences of these technologies and the need for further study, specifically on the dimensions focused on in this dissertation. These accounts also represent the preponderance of analysis related to the research concern.

A simple Google search of “social media algorithms” will return an abundance of results from media and other outlets offering a variety of views on social media and the technology, from facilitating addictive behaviors on par with the power of tobacco over people to providing public service information that explains how algorithms work (Jones, 2020; McCluskey, 2022). In recent years, social media and its algorithms have become a hot and persistent topic among journalists, policymakers, think tanks, and other groups, particularly given the political and social turbulence in the U.S. during the Trump Administration and whether social media played a role in intensifying it, polarization trends, and extremism (Barrett et al., 2021). These accounts paint a markedly different portrait of social media and its algorithms than representations offered by the companies who characterize it as benign and helpful to consumers, a mere technical creation performing as designed and nothing more (“About personalization,” n.d.; “Personalization opportunities,” 2020).

For *Time* in an article headlined, “How Addictive Social Media Algorithms Could Finally Face a Reckoning in 2022,” McCluskey (2022) discussed how algorithms, for example, stimulate an addictive experience that entices users to keep scrolling and viewing advertisements “for as long as possible.” Algorithmic-powered tools, like those under study here, are harming the health of individuals and society in ways comparable to the tactics of the U.S. tobacco industry, with

widely used platforms like YouTube and TikTok funneling users down “dangerous — and addictive — rabbit holes” (McCluskey, 2022). For *The Guardian*, Hern (2021) reported on U.K. proposals to regulate algorithms that recommend posts and to give independent researchers access to social media data so they can examine whether these technologies are causing social problems.

In this vein, in a *New York Times* article entitled, “How TikTok Reads Your Mind,” Smith (2021) obtained internal company documents detailing why the app is “so hard to put down” as its algorithms essentially facilitate behaviors akin to addiction in order to increase the amount of time a user spends on the platform. Said in the article the founder of Algo Transparency, a Paris-based organization monitoring social media algorithms: “Each video a kid watches, TikTok gains a piece of information on him. In a few hours, the algorithm can detect his musical tastes, his physical attraction, if he’s depressed, if he might be into drugs, and many other sensitive information. ... It could potentially be used to micro-target him or make him more addicted to the platform” (Smith, 2021).

Other media accounts have also focused on the intersection of algorithms and user behavior, with agency implied or the accounts circling around it. In 2021, *The Wall Street Journal* published a thorough investigative series focusing on social media company practices and technologies, including its algorithms and personalization tools. Based on confidential, internal research conducted by Facebook and leaked to journal reporters, the series received substantial public and policymaker attention and motivated a U.S. Senate inquiry over fears the platforms may be harming people and society. Citing private company memos, the series revealed how Facebook addressed declining user engagement through modifying its algorithms (Hagey & Horwitz, 2021). Moreover, the reports indicated the platform’s algorithms altered user

behaviors, with behaviors shifting in kind with tweaks to the code ("The Facebook Files," 2021). Released memos also divulged company officials discussing how changes to its algorithms addressed business needs, i.e., revenue and profitability (Hagey & Horwitz, 2021).

Facebook-owned Instagram, a platform examined in this research, was also the subject of internal research. Instagram's Explore feature, it found, created problematic behaviors and potentially harmed some users' mental health, particularly teen girls (Wells et al., 2021). That feature delivers highly personalized information recommendations and several study participants intimated perceived behavioral and agentic impacts on them because of it. In addition, internal research discovered the feature funneled users into rabbit holes of harmful content (Wells et al., 2021). Teens also reported a desire to spend less time on the platform, yet they lacked the self-control to achieve that aim (Wells et al., 2021). According to the research, "they often feel 'addicted' and know that what they're seeing is bad for their mental health but feel unable to stop themselves" (Wells et al., 2021). Company research utilized focus groups, surveys, and diary studies to arrive at these and other findings.

In another part of the series, WSJ reporters discovered TikTok's recommendation engines will channel spools of content about sex and drugs to teen accounts (Barry et al., 2021). Reporters created fictitious teen accounts to investigate the platform's algorithms. The technology delivered one account at least 569 videos about drug use, as well as ads pertaining to drug products. Journal reporters also discovered that TikTok's algorithms can detect how long a user lingers over content, which helps the platform determine their interests with the longer the hover indicating increased content likability, thus higher potential engagement. These technologies enable the platform to "drive users of any age deep into rabbit holes of content" (Barry et al., 2021). On this point, Facebook research also indicated one in eight people used the

platform compulsively and to a degree it impacted their sleep, work, parenting, and relationships (Wells et al. 2021). Like the Instagram users, people reported lacking self-control over time spent on Facebook and that translated into problems in other areas of their lives, including losing task productivity, staying up late to scroll through the app, and deteriorating relationships (Wells et al. 2021). Suggesting agency being at stake, one participant reported: "I'm on Facebook every day, every moment. Literally, every moment; just not when I'm in the shower," a 22-year-old told company researchers. "I lose the notion of time." Another study participant recounted: "Every second that I wasn't occupied by something I had to do I was fooling around on my phone scrolling through Facebook. Facebook took over my brain."

The Facebook whistleblower, Frances Haugen, who leaked the research to the press, would go on to appear on the U.S. news program 60 Minutes soon after disclosing her identity (Feiner, 2021). There, she claimed Facebook optimized its algorithms to achieve corporate goals, in spite of the internal research highlighting harms to users because of the technologies (Pelley, 2021). She would also appear before a U.S. Senate committee where she discussed the research and her views on the company's technologies, including its algorithms (Silberling, 2021). In subsequent public appearances, Haugen declared the algorithms that underlie Facebook and Instagram can entice children to spend more time on the platforms by creating a highly engaging experience for them that may eventually lead to problematic use (Tate, 2022). She likened Instagram's algorithms to creating "little dopamine loops" that will hook and lure young users and portend addiction as they are constantly funneled new, alluring content (Tate, 2022). U.S. senators requested the company release its research on teen mental health, a query that Facebook purportedly evaded to which U.S. Sen Richard Blumenthal rejoined, "Facebook seems to be taking a page from the textbook of Big Tobacco — targeting teens with potentially dangerous

products while masking the science in public” (Wells et al., 2021). The senator’s remarks acknowledge the need to know more about the technologies, with this research arguing for non-private actors, such as social scientists, to contribute to these discussions.

Fueling concerns over the technology’s implications, in 2020 Netflix released *The Social Dilemma*, a widely viewed documentary that featured “the algorithm” in a lead role. Critically acclaimed, *The Social Dilemma* introduced the broad, general problem of this study — in what ways do social media algorithms affect us? — to an international audience. In interviews, ex-social media executives and social scientists offered a negative depiction of the technology. In their view, social media is deliberately designed to be addictive and manipulative, and the algorithm facilitates these objectives to secure corporate goals at the detriment of users. Harvard emeritus professor Shoshana Zuboff argued the technologies are profiteering instruments designed to enrich platform owners while depriving individuals of autonomy and free will, concepts affined with agency. In a separate interview, Chamath Palihapitiya, a former Facebook vice president, offered the modus operandi, in his view, of all social media platforms — to psychologically manipulate users to keep them engaged: “We did that brilliantly at Facebook. Instagram has done it. WhatsApp has done it. ... Snapchat has done it. Twitter has done it.” Also interviewed, Facebook’s first president Sean Parker said the platforms prey on human psychological vulnerabilities: “I think, you know, the inventors, creators ... it’s me, it’s Marc (Zuckerberg) ... it’s all of these people understood this consciously and we did it anyway” (Orlowski-Yang, 2020).

These accounts brought significant attention to these technologies, elevating a preoccupation of researchers and technology pundits into a mainstream issue with gravity where public and policymaker backlash against the companies followed in their wake. They also

provide vivid descriptions and anecdotes of astonishing user behaviors ascribed to the tools under study here, such as people falling into “rabbit holes” with some also tipping into addiction and complete loss of control. These reports indicate that interactions with these features and other dimensions of social media appear to result in the mobilization of novel behaviors that seem to place people at the mercy of the technology, as opposed to them controlling it and being vanguards of their agency.

However, these accounts are largely narratives, telling the story of people’s encounters with these choice recommendation engines and experts' qualified interpretations of the technology. The reports are largely descriptive and not within the realm of rigorous social science — describing the peculiar behavioral experiences of users and tying them to algorithms and personalization as a cause, yet failing to test those connections beyond exposition, or explain them beyond pointing out the obvious, that the technology is performing well as designed.

Even so, these accounts signal the great need to study the technology as it appears to be prodding people into compulsive, addictive behaviors where their agency appears at stake. What are we as diminished agents? Automatons. And while not invoking the term agency or utilizing it as a conceptual framework, the reports squarely contend with it: the acts of users are at stake according to these accounts and a structure, the personalization dimensions of social media environments, appears to be infringing on it, eroding people’s autonomy and self-control. Valuable to researchers exploring this topic, these reports represent the lion’s share of discussion centered on user behaviors, providing a foundation for this research to build on and a justification for its need. They indicate user agency is at stake — a consequential finding that received widespread public attention — though the less visible dynamics of how and why are absent, including in such widely viewed films as *The Social Dilemma*, a theory-driven, empirical

explanation that this research can contribute to these mainstream discussions and the academic literature reviewed below where gaps in understanding on this topic persist.

Scholarly Research: Approaches and Findings

Academic work targeting algorithms and personalization tools has burgeoned in recent years, with scholars taking a variety of approaches to assess their intersection with people and society. This work adds vital texture and nuance to the discussions occurring in the press and related sources, with some research focusing on user behaviors and agency, as well as utilizing conceptual frameworks and theory. This part of the review will first show how scholars have approached algorithms as an object of study, which informed the methodological stance of this research, particularly the scholarship of Taina Bucher. A short overview of general algorithmic scholarship will follow that will reveal trends and hot-button topics, such as echo chambers, political polarization, and information selectivity. This discussion will show the positioning of this research in the broader scholarship. Moreover, it will highlight topics that have received substantial attention, while bringing to light areas that have received significantly less attention, such as behaviors and agency, an imbalance that reveals gaps and offers opportunities for this research to address.

The remainder of this section will focus on the small body of studies that have examined the intersection of algorithms, personalization technology, user behaviors, and agency. Of all the algorithmic scholarship, this area is nascent, particularly the dearth of studies that unite theory and data, despite substantial media, policymaker, and public attention given to these areas as previously discussed. Theoretical, critical, and empirical studies will be highlighted, as well as discussion of gaps and the location of this study in this sphere of the scholarship.

Research Approaches

Research approaches to algorithms vary, but one framework is dominant in the social sciences, shifting the inquiry away from a technical approach interested in scrutinizing the code and the many facets and complexities of the technology to assessing the convergence of the tools with individuals, society, and other key areas of life. Companies and software engineers characterize algorithms and personalization engines as a technical achievement. Researchers, on the other hand, study the impacts of these innovations on people and society, adding nuance and texture to these representations. Social scientists examine how they interact with key domains of human reality, including culture, society, and politics (Seaver, 2014), and what the interrelations produce, including positive and negative outcomes.

Scholars conducting algorithm research generally plumb this broad scenario: what happens when the innovation meets the human (Kitchin, 2017). In this vein, they seek to move beyond the “code” and study what emerges from the interaction of the code’s outputs, e.g., personalized social media, and individual and collective human affairs (Lazar, 2015) — the stance this study adopted. Algorithms, however, can generate “impenetrable outcomes,” difficult for even their programmers to fathom particularly when considering not the code but the outcome on people (Wagenknecht et al., 2016, p. 537). The researcher’s role then is to detect the outcomes and search for patterns that explain them, a sequence this study executed. Thus, according to Gillespie (2014), when researchers invoke the term “algorithmic” the concern is less about its technical aspects, and more about examining the technology’s arrangement in social experience. Researchers explore these intersections, scrutinizing the technical’s association to the social and the social’s association to the technical. In this view, adopted by this research,

algorithms are evaluated as socio-technical entities, irrevocably intertwined with human activity (Wagenknecht et al., 2016). As Seaver (2014) noted, “our interest in algorithms is primarily shaped by a concern about what happens when the rigid, quantitative logic of computation tangles with the fuzzy, qualitative logics of human life” (p. 2). This study positioned itself at that fault line, where the functions of social media personalization algorithms tangled with the fuzzy, qualitative logics of cognition, behavior, and agency as cast through a social cognitive lens.

In this vein, researchers have focused on the interaction of algorithms, society, and culture (Beer, 2017; Lee & Larsen, 2019). Generally, these studies focus less on the mechanics of how algorithms operate and more on the ways it may be conditioning life (Bucher, 2016). To facilitate this type of inquiry, scholars collect user perspectives, in which people address what they know about algorithms and how they perceive them (Bucher, 2016). Following this approach, Wagenknecht et al. (2016) also urged researchers to investigate how people make sense of and perceive algorithms. In a different approach, Beer (2017) advocated for analyzing how “algorithms play out in practice,” including how they intersect with institutions, routines, and decisions (Beer, 2017).

Informing the methodological stance of this research, Bucher (2016) explored people’s experiences and perceptions of Facebook’s algorithms, i.e., how they made “sense” of them despite operating invisibly. Through interviews with Facebook users, she interpreted their attempts to understand the company’s algorithms as an *algorithmic imaginary*, in which users “imagine,” or intuit, how the technology works, rather than conducting extensive research about them. Gathering these “personal algorithm stories” also helped her understand how technology awareness intersected with use, e.g., users that had intricate knowledge of algorithms behaved differently on platform than someone with less knowledge. Her study demonstrated how the

meeting of algorithms and people can produce novel experiences, interpretations, and outcomes. Algorithms are more than the code they are composed of: They generate unique sense making and behavioral moments. This study took a similar user-centric approach as Bucher (2016) and other scholars (Hockin-Boyers et al., 2020), gathering participants' views to examine their experiences with and perceptions of the personalization dimensions of social media, particularly how they acted and reacted to them.

General Research Findings and Interpretations

Scholars' examinations of algorithms and personalization engines have produced a medley of findings from inquiries that have shown how they can transform journalistic work to how they can play a role in political polarization and echo chambers. This work indicates digital and social media algorithms, and the choice recommendation engines powered by them under study here, can produce a wide range of outcomes and impacts. The findings demonstrate the technology is not merely a benign, neutral instrument assisting users on their social media journeys as depicted by social media companies. Rather, it's a consequential entity and one worthy of study. To that end, interest among researchers has intensified in recent years, with Gillespie and Seaver (2016) compiling an extensive list of projects falling under the umbrella of critical algorithm studies alone. This and other algorithmic scholarship have unearthed new dimensions resulting from our interactions with the technology and demonstrates what can emerge from this intertwining, which will likely prevail for decades to come as algorithms become further woven into the fabric of human life (Harari, 2018). However, very little of this research (as will be shown here) directly investigates user behaviors and agency, presenting gaps and opportunities for this project.

In the scholarship, algorithms have been characterized as authority-like in nature, able to

impact everyday life, work practices, and economic systems (Lustig et al., 2016). In this vein, algorithms are increasingly governing human actions and affairs, including the news displayed on people's social media feeds (Lustig et al., 2016). They have also been cast as delegators of culture because of their ability to sort through and select from vast troves of information for people (Striphas, 2015). They appear to also stir social processes and order (Beer, 2017). For example, by organizing and selecting information for people, algorithms may be creating a shared social reality, ultimately shaping lives, perceptions, and behaviors (Just & Latzer, 2017). Beer (2009) contended, moreover, that algorithms are exerting great influence on the social fabric, capable of influencing social and cultural arrangements, as well as individual's lives. They are also increasingly intersecting with the work and practices of journalists, e.g., acting as gatekeepers that shape journalistic work (Brake, 2017). These studies further reveal how the methodological stance described above can power these forms of analysis, a tact also taken by this research.

Researchers have also examined the intersection of sociality and algorithms. Dijck (2013) investigated how algorithms are exceptionally interwoven with social moments online, e.g., digital social gestures, such as “liking” and “sharing,” are continuously monitored by social media algorithms, demonstrating how these basic gesticulations are intertwined with the operational logics of the technology. From a critical perspective, Couldry and Mejias (2019) explored the individual and societal costs of these innovations, arguing they are a new variant of colonialism — data colonialism — that harms individual autonomy and penetrates the self. Fuchs (2017) reflected this perspective, interpreting social networking sites and other digital technologies as intermediaries of corporate economic surveillance in which human moments are commoditized to accumulate capital. Evoking that surveillance architecture, Cheney-Lippold

(2017) contended algorithms transform people into calculable identities: “Algorithmic agents make us and make the knowledges that compose us, but they do so on their own terms” (p. 11). Extending this line of thought to a chilling degree, Harari (2017) argued that algorithms are “all-knowing oracles” that “evolve into agents and ultimately into sovereigns” (p. 346). Cheney-Lippold (2017), Couldry and Mejias (2019), and Harari’s (2017) work, in particular, demonstrate the perceived power and utter control of algorithms over users, concepts closely aligned with the concerns of this research though falling short of the direct, empirically supported analysis this study offers.

Significant attention has also been directed at exploring how algorithms and personalization technologies may influence people’s news and information consumption. Algorithms are playing a role in what news is viewed by users, not only impacting journalistic practices but also what news is consumed (Hermida, 2021). These studies explore hot-button issues that have received substantial attention in the press and among government officials, including whether algorithms are responsible for producing filter bubbles and echo chambers. According to one view, information filter bubbles occur when algorithms select information for users based on tracking and analysis of the content they typically engage with (Bakshy et al., 2015). In a study comprising 10 million Facebook users that assessed the impact of the platform’s algorithmic-powered News Feed on content consumption, Bakshy et al. (2015) found user choice played a stronger role than the algorithm in limiting exposure to information. In another study involving 376 million Facebook users, Schmidt et al. (2017) also found users limited their exposure to information.

These studies reveal the breadth and depth of algorithmic scholarship, as well as key areas of interest that hint at concerns related to this study, though never fully directing their

attention toward it. This study joins this burgeoning field, though with its focus on one specific, focused dimension that some of these inquiries glazed over — how user agency manifests in personalized social media environments and how the environment interplays with it, an area that remains undeveloped in the social science and mass communication literature. The following section will review literature exploring that specific dimension and related concepts, a discussion that will also position this research in these conversations and reveal gaps in the scholarship it addresses.

User Behavior and Agency

While algorithms and personalization engines have received substantial attention in the academic literature as reviewed above, how they may directly impact user behaviors and agency has received far less regard. As the previous overview of the scholarship made clear, the interaction of these technologies with individuals can produce a wide range of outcomes. However, less attention has been given to how the technology may impact human agency, a core human trait of indisputable importance and this study's focus. While media sources have explored the convergence of algorithms, social media, and user behavior, the literature on these dimensions remains scant, *particularly theory-informed empirical studies directly investigating how agency manifests and evolves in response to the personalized dimensions of the environment*. No study with that research design and focus was found. This study addresses that gap via its contribution, an empirically informed theoretical model that explains how individual agency expresses itself and unfolds in response to the personalized tools of social media.

However, a small, growing body of scholarship with other approaches exists exploring how algorithms, social media, and personalization environments intersect with user behaviors and agency. Velkova and Kaun (2021) noted agency still remains a neglected topic. Scholars

have advanced theoretical, critical, and empirical analysis, yet no approach appears to *strictly focus* on the interaction of the personalized dimensions of social media and user behaviors and agency, with some studies *addressing* those and additional dimensions, social media generally, or offering solely theoretical models that incorporate the concept. This study advances a research design that converges theory and observation and that focuses strictly on those concepts and those elements of the environment; this appears to not have been done before.

Nagel (2018), for example, examined how algorithms influence human actions, including how individuals enact resistance strategies like avoiding entering words to evade algorithmic detection. These acts of resistance and creativity reveal agency at work. In a critical work that received sweeping attention and praise, Zuboff (2019) presented algorithms and related technologies as instruments of surveillance that deliberately manipulate people's online behaviors for profit. In her view, the platforms nudge users along information pathways they are predicted to like so they stay online longer, a power that Zuboff (2019) also argued gives the platforms the ability to craft people's future self, thus stripping them of their autonomy, a dimension of agency. Mittelstadt et al. (2016) echoed similar concerns: Algorithms may subvert the autonomy and agency of people through that constant nudging, with the end goal for companies that have instituted these technologies to entice users to continually view content. In this vein in another critical work, Couldry and Mejias (2019) argued these technologies are a new variant of colonialism in which the self is invaded, autonomy is threatened, and control is weakened.

Other literature explores agency loss via cognitive and behavioral frameworks (Turel, 2021). In an empirical study, Turel (2021) assessed agency diminishment on social media (generally, not the tools under study) and how users can regain control. He found that users with

high reflective tendencies can increase their sense of agency over social media if they abstain from use and internalize advice about social media they received from the researchers. Other studies have also examined problematic social media use. Brevers and Turel (2019) identified strategies college students enact to regulate their social media behaviors, including restricting access by placing themselves in areas with limited internet connectivity.

Other studies found users are in control of their social media experiences. In an act reflective of agency, Hockin-Boyers et al. (2020) found some users “pruned” their social media accounts by unfollowing people and avoiding content that did not fit with their desired state of mind and goals. Gathering the accounts of female weightlifters who turned to the sport to recover from eating disorders, interviews revealed they exercised agency on social media by also intentionally engaging with content that assisted their recovery and wellbeing. This intentional, goal-directed social media use helped them build their own social media worlds and bypass harmful content the platforms may automatically display via its algorithms. As Hockin-Boyers et al. (2020) noted, they have “agency in their engagement with social media and regularly make conscious and experience-informed decisions about the content they view” (p. 16).

Cohering with these findings, Cotter (2019) found algorithms do not overtly determine user behavior. In her thematic analysis of the online communications of Instagram influencers, she found they shared knowledge about the platform’s algorithms and offered advice to each other on how to navigate and manipulate them. Instead of being passive users at the mercy of the technology, influencers learned more about it to interact with it more intentionally, particularly to their advantage. Similarly, Velkova and Kaun (2021) found users engaging in a reactive agency that works with the system. Users are not passive actors in these milieus; instead, they try to influence the algorithm to behave in certain ways, and they make strategic choices in these

environments (Velkova and Kaun, 2021). In this vein, Seargeant and Tagg (2019) found social media users determined what information was shared, debated, spread, and reacted to.

Representing acts of agency, users reported unfriending people who posted offensive content, as well as being hesitant to post content that would offend their social network. As a whole, their research indicated users intentionally shaped their feeds and social media experiences, with the study demonstrating that social media behaviors are not primarily dictated by algorithms and related platform technologies.

Countering these findings through an analysis of the web and social media data of one million internet users, Wu et al. (2021) determined internet and social media choice architectures induced a state of flow through subtle nudges that encroached user agency. They urged scholars to reconsider the “much-touted user agency” and to scrutinize the structural features of these architectures (p. 2982). In line with the interests of this research, they also cautioned that if people continue to be nudged by these architectures, they may develop new attitudes and behaviors — and they may not discern these changes are occurring.

Scholars have also developed a range of theorizations and theoretical frameworks that focus on the interaction of human agency and behaviors, and digital and social media environments. Some frameworks also ascribe agency to the technology, which this research initially explored but ultimately decided against because of ontological and theoretical complications. Kono (2014) advocated utilizing actor-network theory to explore what emerges from the intersection of technology and human psychology. This approach would view technology environments as a site of intermixing human and technology actors, where the technology actors may also “direct and regulate behavior and thinking of the human agent” (p. 58). To examine this convergence, Hosseini (2019) suggests the potential of uniting social

cognitive concepts with actor-network theory, which would aid investigation of social media and algorithm influence on cognition, as actor-network theory would help explain the technology environment while social cognitive theory would be useful for analysis of the individual. He also posited these technologies could affect human thought and behavior, as well as agency, a theorization explored by this research through empirical analysis.

Drawing on actor-network theory and Giddens (1984) structuration theory, Courtois and Timmermans (2018) developed a conceptual model, with agency at its core, to guide individual-level effects analysis of algorithms. They proposed treating platform owners, developers, users, and algorithms all as agents that dynamically influence and act upon each other. Also, these agents, e.g., the platform, its algorithms, and users, intermingle to guide and limit each other. Moreover, aligned with findings of this research, the technology agents “are not merely the outcomes of human agency, they affect it as well” (p. 3). Also utilizing actor-network theory, Anderson et al. (2016) theorized algorithms as agents as well that affect the actions of others, particularly human actors. Algorithmic agency emerges from learning human actors through observation. Their model of algorithmic agency posits machine agency is contingent on human agency/actions in a given information environment as depicted in Figure 3 represented below:

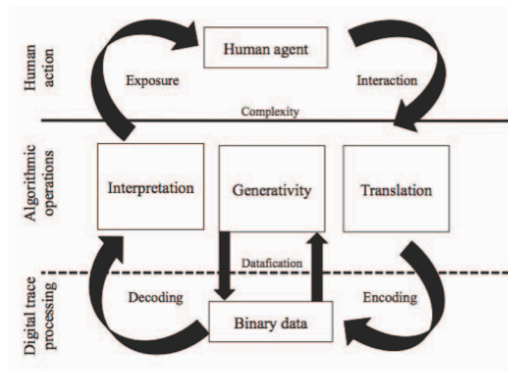


Figure 3

Anderson et al. Algorithmic Agency Model, © 2016 IEEE

Similarly in Rose and Jones' (2005) theoretical model, human and machine agents engage in an agentic dance where their distinct qualities intermix and produce novel outcomes, a theorization that coheres with aspects of this research. Focusing on the interaction of people and information technology, they theorize humans bring agency and properties of, such as self-awareness, interpretation, and intentionality (concepts closely aligned with social cognitive theory), to their encounters with agentic computerized systems (Rose & Jones, 2005). As agents, humans ferry their thoughts, intentions, behaviors, and history to the encounter, which influences the actions they take but within the conditions set by the technology, a sequence closely aligned with the findings of this research. As depicted in Figure 4 below, this sequence creates a double dance of human and machine agency:

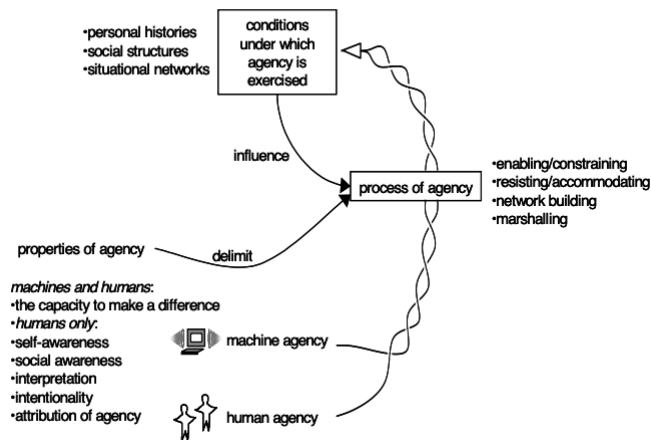


Figure 4

Double Dance of Agency Model

Aligning with these approaches, Sundar (2020) advanced a model called the Theory of Interactive Media Effects (TIME) that also casts technologies, like personalization algorithms, as agents capable of acting on individuals. As agents, these technologies redirect our attention and nudge us. However, algorithms and the like do not determine human behavior, Sundar argued.

Instead, a collaboration between humans and machines occurs where agency is negotiated, a theorization that also partly coheres with this study's findings. Disputing the popular media narratives of the helpless user controlled by the all-knowing machine, Sundar (2020) proposed these technologies can empower people by augmenting their abilities. His model calls for examining the functions and affordances of algorithmic and technological environments and how they intersect with individual agency, cognition, and desires. Instead of deterministic control, synergy can occur, giving rise to positive interdependence between individuals and these technologies, arguing that "the future of media lies in synergistic systems that deftly leverage and combine the strengths of both machine agency and human agency" (p. 84). Overall, these theoretical papers and models provided a strong foundation and justification for the path this study took, an empirical analysis of the theorizations they put forth married with a stronger theoretical lens, social cognitive theory, to examine agency expression in social media environments.

While still budding, scholarly interest in user behaviors and agency is firmly rooted, with several critical, empirical, and theoretical approaches advanced in recent years. Apart from the theoretical papers, many of these studies, however, do not directly examine agency and often only offer tangential assessments that are mixed with explorations of other concepts. The theoretical papers provide the most direct assessments, yet even these fall short of initiating a full-throated investigation of how human agency may express itself in response to the tools. The theorizations also do not integrate the rich array of cognitive and behavioral dynamics associated with human agency, as revealed by social cognitive theory and other psychological frameworks, only offering broad and generic explanations.

While overlapping with the concerns of this dissertation, the theoretical and other studies do not offer that depth of analysis, instead supplying broad findings on agency and other topics and utilizing theoretical frameworks that do not capture the rich dynamics involved. However, this lack presented an opportunity for this research, wherein a need became evident early in the study to locate a theory that narrowly focused on agency and that offered a sophisticated approach and model that would assist interpreting participants reactions to the environment as relayed in interviews and focus groups. Social cognitive theory fulfilled those aims, yet the theory has not, it appears, been extended to this study context. For this research, this presented a challenge in terms of assessing its validity, a challenge that ultimately translated into support for the theory and this study's contribution to the literature — an extension of a modified form of social cognitive theory that helps explain how agency unfolds in response to the algorithmically-driven personalized tools of social media.

Social Cognitive Theory as Framework

Theory Overview

A prominent psychology framework, social cognitive theory has been widely utilized by media researchers to assess how media influences individuals, including their behaviors (Baran & Davis, 2021; Pajares et al., 2009). Anthologized in field-defining mass communication texts, it offers a parsimonious theoretical framework and extensive conceptual toolkit for media research (Baran & Davis, 2021; Bryant & Oliver, 2009; McQuail & Deuze, 2020; Pajares et al., 2009). The theory's founder, Albert Bandura, helped spread its influence in media scholarship when he posited a Social Cognitive Theory of Mass Communication, a work that appeared in a principal field text, *Media Effects: Advances in Theory and Research* (Bandura, 2009; Bryant & Oliver, 2009). In that work, Bandura argued media can have similar influence on individuals and society

as social and physical environments. There and in other work, he sought to tie how symbolic environments — his terminology for media environments like television and the internet — can impact human cognition, behaviors, and agency (Bandura, 2001). Since extending his theory to media contexts from its traditional roots in physical, social reality, it has been applied to legacy media and new media, including social media (Pajares et al., 2009; Zhao et al., 2021).

Among the most eminent psychologists of the 20th century, Bandura was a professor of psychology at Stanford University and is most known inside and outside academic circles for his Bobo doll experiments (Do, 2011; “Eminent Psychologists,” 2002). Bandura investigated whether children would direct aggression toward an inflated plastic clown, a Bobo doll, after observing adults batter it (“Bandura and Bobo,” 2012). The experiment demonstrated people learn new behaviors through observation and imitation, findings that would lead to the development of a new social learning theory and that theory’s eventual progression to its more evolved successor, social cognitive theory (Do, 2011; Pajares et al., 2009), the framework utilized by this research.

These theories joined a wave of media scholarship in the 1960s probing the effects of television violence on children (Baran & Davis, 2021). Psychologists like Bandura offered an alternative approach that thoroughly focused on the individual (Baran & Davis, 2021). In his field, Bandura’s theories rejected the behaviorist paradigm that dominated psychology in the 1940s (Pajares et al., 2009). In contrast to that paradigm where environments and actions condition the individual, Bandura found humans are in symmetry with their environments and to that end, people are endowed with advanced cognitive processes, including self-regulation and reflection, that allow them to observe, adapt, make decisions, and initiate novel behaviors that may or may not reflect the social environments they are embedded within (Pajares et al., 2009).

People observe environments, and they may model the behavior they witness depending on reflections of what they observed (Baran & Davis, 2021). Social cognitive theory is rooted in that core human trait, in which agency plays a key role in life processes: people observe social and mediated environments, and they decide whether to perform the behaviors, values, and ideas they witness (Baran & Davis, 2021), a central theory premise that informed this study's model.

To this end, social cognitive theory posits an agentic view of individuality, centralizing the individual and their capacity, as an active, conscious agent, to shape the environment as well as be shaped by it (Bandura, 2009). People are not puppets merely hanging from the strings of fate. They can self-organize, be proactive, reflect on their past actions, regulate present and future behavior, vicariously learn, and constantly adapt and change (Pajares et al., 2009).

Granted these inherent qualities, people do not merely react to external pressures, or are utterly subjugated by them, as would occur in a uni-directional, deterministic view of reality. Instead, people can think about the environment, intentionally determine a course of action prior to proceeding, reflect on the best path forward while proceeding, and evaluate outcomes afterwards in which future behavioral pivots may occur (Bandura, 2001). In this vein, social cognitive theory posits a bi-directional, "transactional view of self and society," in which human functioning and adaptation occurs inside social systems where social systems can influence the direction of thoughts and behaviors but not fully determine it (Bandura, 2009, p. 94).

Key to this study and its interpretation of participants' responses to the tools, these individual-level characteristics represent elements of Bandura's agentic conceptual framework. In this framework, broadly, the researcher is charged with examining cognition, behavior, environment, and the interrelations between them, including how the interrelations may produce effects or outcomes (Bandura, 2009). The researcher investigates how cognition, behavior, and

agency operate within specific environments, including mediated environments. For this study and in contrast to the other models reviewed above, this framework provides a powerful lens to examine how the personalized dimensions of social media environments interact with the agentic dimensions of human cognition as individuals make choices and draw on cognitive resources in response to them. Those dimensions include individual-level expression of intentionality, forethought, self-regulation, self-reactiveness, and self-reflectiveness (Bandura, 2001), with analysis in this study centered on how these dimensions appeared to be activated and utilized by individuals interacting with the tools.

With this lens, now the researcher can interpret and analyze how human agency expresses itself and evolves in response to the tools and how that progression may produce unusual outcomes, like rabbit holes. Put another way by Bandura (2009): “because of the influential role the mass media play in society, understanding the psychosocial mechanisms through which symbolic communication influences human thought, affect, and action is of considerable import. Social cognitive theory provides an agentic conceptual framework within which to examine the determinants and mechanisms of such effects” (p. 94.). This study answered this call by identifying and analyzing the agentic mechanisms that appear to be activated when individuals’ respond to the environment of this study context — how the personalization dimensions of social media environments, the “social” aspect of social cognitive theory, or socio-symbolic, intersect with the acts of users who in response to those tools may draw upon inherent cognitive, behavioral, and agentic qualities to navigate them, the “cognitive” aspect of social cognitive theory.

For Bandura (2001), agency “is to intentionally make things happen by one’s actions” — a key conceptualization utilized by this research (p. 2). Reflected in this study’s model,

Bandura's triadic reciprocal causation framework captures the general processes through which intentional acts come to light (Bandura, 1989, 2009, 2018). In that framework, agency emerges from the interaction of personal/cognitive, behavioral, and environmental determinants — a process conceptualized by Bandura as emergent interactive agency (Bandura, 2001, 1989). Personal determinants comprise cognitive, affective, and biological states and events; behavioral determinants represent people's patterns of behavior; and environmental determinants are environmental events, essentially moments occurring outside oneself, social, structural, or mediated, that may be observed and navigated. Aligned with the interactional perspective of the theory, these determinants interact and influence each other bidirectionally (Bandura, 2001), with agency manifesting from it.

Offering more specificity as to how agency emerges and is directly expressed in this dynamic, Bandura (2001) constructed four dimensions of human agency that also conceptualize and operationalize them. They are intentionality, forethought, self-reactiveness, and self-reflectiveness. Intentionality is intentional action, meaning a clear decision and commitment to act is made by an individual, as well as potentially creating a plan of action to execute it. Forethought comprises setting future goals, predicting consequences of desired actions, and selecting the best perceived course of action, in advance, to attain the desired outcome(s), ultimately a type of agency that is future oriented. Exercising forethought helps better ensure “things happen” through carefully considered forecasts of the acts required to achieve a goal. This forecasting also provides motivation, guidance, direction, and clarity to pursuits. Its future orientation may also lend to restraining present behavior.

Self-reactiveness involves execution of the intended or forecasted course of action and reacting accordingly. Here, thought transforms into action: a self-directedness that may involve

interpretation of the environment and its conditions in conversation with evaluation of personal goals, all of which may determine reactions or actions taken. Self-reactiveness may also involve assessing and regulating behaviors, as well as determining if behaviors are in line with environmental affordances and personal goals. Goals and the environment can influence how a person acts, and to what degree, with both serving as factors that can influence agency expression and behavior. Self-reflectiveness is self-examination of actions and thoughts. In this vital, metacognitive dimension of human agency, individuals self-evaluate their motivations, values, goals, and pursuits. They also reflect on actions taken and predictions made, including outcomes that may or may not have occurred.

Social Cognitive Applications

Since Bandura extended his theory to mediated contexts, scholars have utilized it to examine how media influences cognition and behavior. Scholars have also applied social cognitive theory to specific dimensions of social media and social media use. That includes examining how the platforms facilitate health information access and health behaviors (Zhao et al., 2021) and how individual cognitive and behavioral patterns drive increased platform use (Khang, 2014). Social cognitive processes have been established for social media (Turel, 2021; Velasquez & LaRose, 2015), and agency dynamics in these environments have been demonstrated utilizing the theory.

Turel (2021) and Velasquez and LaRose (2015), for example, explored how users can regain control over their social media use, with agency and some concepts from Bandura's theory guiding the analysis. In both studies, however, the personalization attributes of social media were not a factor in the analysis. The theory, it appears, has never been extended to the personalization dimensions, presenting a gap and opportunity for this research. That said,

utilizing social cognitive frameworks, scholars have explored how agency is evoked in social media, yet no study was found exploring the interrelation of agency and the personalized tools of the environment. This study addresses these gaps, establishing a social cognitive process and extending the theory — in modified form through the model — to these dimensions of the environment. Ultimately, this study builds on extant scholarship and advances social cognitive theory into a new context, where it can offer insight into how individual agency unfolds and expresses itself in these novel milieus.

Bandura's (2009) extension of the theory to mediated environments likely contributed to scholars' confidence applying it to other research questions, opening the door to a better understanding of media impacts on people via this lens. In mass communication studies and other social science fields examining media, researchers have employed a medley of social cognitive concepts, with decisions as to what elements of the intricate theory to employ appearing to be contingent on study topic, context, and research goals. Given the sheer stockpile of available concepts beyond the theory's core tenets, scholars face an immediate challenge with deciding which concepts might be most useful for the problem at hand to avoid over-complexity and muddying a study's focus through conceptual cacophony. Often, scholars are selective in this literature, working with a narrow band of concepts that appear, from a review of their work, to fit research problems and goals.

Some topics are also more popular than others. Several studies have focused on the effects of television content on individuals. Martino et al. (2005), for example, investigated associations between exposure to sexual content on television and intercourse among adolescents. They found that adolescents who frequently viewed people talking about sex and enacting sexual behaviors on television felt more confident they could partake in safe sex, a

sequence that established a social-cognitive process, individual cognition and behavior influenced by television, a mediated environment. Mastro and Stern (2003) evaluated how race and ethnic portrayals in television advertisements impacted the self-perceptions of ad viewers. Analyzing 2,315 speaking characters in prime-time TV commercials, they found black and white viewers may be less likely to develop harmful self-perceptions from watching the ads, as opposed to Latino and Asian viewers who may develop harmful self-perceptions as the ads stereotyped them. Also utilizing a social cognitive framework, Martins and Wilson (2012) investigated whether exposure to aggressive displays on television correlated with aggressive behavior at school. Data indicated a significant relationship between social aggression viewed on television and increased social aggression among girls at school.

Among internet research, La Rose et al. (2001) investigated whether social cognitive theory is a viable framework to assess internet use and addiction. From data gathered in a survey of U.S. college students, they found their social cognitive model can explain variance in internet use, with self-efficacy, self-regulation, and outcome expectations contributing to variance. Theorists have previously utilized self-regulation, a concept employed in this study, to explore physiological addiction. La Rose et al. (2001) found extending that concept to internet addiction may reveal similar suspension of self-regulatory processes as seen in physical addictions. Overall, data indicated internet use as a social-cognitive process, revealing how this mediated environment can interact with and influence cognition and behavior, thus supporting the usefulness of the theory in this technology context. Following that study, La Rose and Eastin (2004) posited a social cognitive theory of internet uses and gratifications, which included self-efficacy, habitual behavior, and deficient self-regulation as determinants of internet behavior.

Utilizing a social cognitive framework, Xu (2021) evaluated adolescent electronic screen

viewing through assessment of individual, environmental, and behavioral factors. Taking a broad, exploratory approach, the research sought to examine the influence of personal factors (emotion regulation and self-efficacy), environmental factors (family, friends, and media), and behavioral factors (physical activity and sedentary behaviors) on the study's major criterion variable, screen viewing. The study supported use of social cognitive theory for this technology context as well.

Several applications of social cognitive theory to social media have been published in recent years. Using social cognitive and cognitive behavioral theories, Saleem et al. (2021) demonstrated how excessive social media use can impact work performance. The study offered a theoretical model that explains how social networking site behaviors may create harmful outcomes outside the mediated environment, particularly at work. Social cognitive theory provided them with a framework to assess the interplay of cognition, behavior, and environment, with behavioral patterns in the social media environment producing negative outcomes in work environments.

Also making use of a social cognitive lens, Lee et al. (2016) found external and personal antecedents associated with social networking use. Given the theory's foundational assumption that behavior can be influenced by external factors, they sought to identify external antecedents, such as peers and family networks, that may influence social media use. Social cognitive theory explains human behavior via environmental and individual-level determinants (Bandura, 2009). To that end in a study of adolescents in Singapore, they examined how external-environmental factors, such as the teens' relationships with parents, and individual factors, including depression, self-identity, deficient self-regulation, and habit strength, were associated with time spent on social networking sites. Demonstrating the intertwined influence of environment and

personal factors, they demonstrated teens' relationship with parents may cause psychosocial and self-identity problems, which can be further associated with deficient self-regulation, social networking site habit formation, and overall increased usage.

Khang et al. (2014) also utilized a social cognitive approach to identify antecedents predictive of social media use. Demonstrating the usefulness of social cognitive theory as a viable framework to explain social media use behaviors, survey data indicated goodness-of-fit with key social cognitive concepts, particularly the concepts' ability to shed light on social media use rates. The findings suggested the validity of the theory for studies of new media use and behaviors. For example, habit strength — which stems from cognition and behavior, two key dimensions of social cognitive theory utilized in this research — was found to be a strong antecedent of social media use. Further, they inferred that deficient self-regulation, another social cognitive concept employed in this research, was associated with habitual social media use. In other words, users' lack of control over social media appeared to intensify habitual use patterns (Khang et al., 2014).

Research Questions

Given this review, study context, and gaps presented, this study examined the following research questions:

1. How do social media users respond and react to the personalized features of the environment?
2. In what ways is individual agency expressed and how does it progress?
3. What other individual-level dimensions appear to be activated when individuals interact with the tools?

CHAPTER 3 — RESEARCH DESIGN

Overview of Methodology

To answer the research questions, this study sought participants that routinely interacted with the choice recommendation engines of social media platforms, e.g., Facebook and Twitter feeds. Members of Generation Z, ages 18 to 25 for the sample, were recruited because they were most likely, as digital natives, to spend significant time immersed in social media environments, enabling them to speak extensively about their perceptions of, and experiences with, the engines. To that end, a critical realist qualitative study, supplemented by a descriptive survey, was designed to capture their views and perceived reactions and to assist two key study aims — assessing agency expression and other dimensions that may surface during the interactions and to investigate whether social cognitive theory and its agency model were useful as an explanatory framework. A qualitative approach enabled the researcher to obtain a rich, thick description of their experiences in the environment, allowing for an emic inquiry that provided participant-informed answers to the research questions, and to also work with theory (Tracy, 2013). In other words, the design sought to foreground participant experiences, as an emic inquiry calls for, and seek points of convergence with the researcher's knowledge and frameworks, the etic lens. At length, participants reflected upon their responses to the features in interviews and focus groups, ultimately producing an abundance of qualitative data that afforded a detailed, complex, and textured portrait of their interactions and behaviors (Wimmer & Dominick, 2014), including how they perceived their agency expressed itself.

In the descriptive surveys, participants also provided time spent and other helpful social media use metrics, including which platforms they utilized. Coupled with the qualitative accounts, the data aided another study objective: acquiring an understanding of how participants

responded to personalization tools in multiple social media environments, with the survey data helping to confirm platform use and the qualitative data offering descriptions of use. Collecting a multitude of experiences with multiple tools — and assessing those experiences through the surveys and qualitative methods, including platforms used and features interacted with — enabled this research to examine how agency expression, and the dynamics thereof, manifested across platforms and to that end, if generalizations from the dataset could be advanced. A critical realist approach, the worldview informing this research, recommends assessing multiple cases as a pathway to forming theory-driven explanations (Martin, 2020).

In summary, the use of multiple methods, with the qualitative data predominantly serving the project, enabled a rich, detailed examination of the research questions (Creswell & Creswell, 2018) and supported the extension of social cognitive theory, in augmented form, to this context. The remainder of this chapter will review these and other elements of the research design in detail, including the project's utilization of critical realism and how that framework informed its ontology, epistemology, axiology, methodology, and study findings. Data analysis techniques will also be reviewed near the end of the chapter, as well as discussion of validity and reliability, including measures taken to address both.

Qualitative Research

With research focusing on agency expression in social media environments largely undeveloped, this project needed the flexibility and emergent design elements that qualitative research affords given little foundation to develop a quantitative, deductive inquiry. With a clear need to attain a greater understanding of the topic, a qualitative approach allowed the researcher to speak with participants about their experiences and interpretations of the tools. In qualitative research, a researcher is charged with understanding, describing, and analyzing peoples'

experiences, contexts, and milieus through their meanings and interpretations (Ravitch & Carl, 2016), an approach that can provide extremely textured and comprehensive participant-driven answers to research questions. Furthermore, the non-linearity of qualitative research, e.g., its fluidity and interactivity, enables the researcher to search out and explore novel concepts while also consulting theory throughout the process (Ravitch & Carl, 2016). With social cognitive theory as a candidate to help explain the swerves in online acts in these environments, this stance gave the researcher the freedom to conduct both an inductive and deductive inquiry, as well as offering a pathway to explanation if the data indicated that possibility (Babbie, 2014).

To this end, this study sought to know more about participants' experiences with, and perceptions of, the personalized features of social media, particularly how they perceived themselves responding to the tools and whether those responses indicated agentic and behavioral expressions. Qualitative methods — for this study, interviews and focus groups — offered this research the opportunity to explore participants' lived experiences with, and perspectives of, these online environments, as well as investigating concepts relevant to the study (Tracy, 2013).

Critical Realism

Critical realism provided ontological, epistemological, and methodological guidance to the project. The meta-theoretical paradigm offered a worldview compatible with the context, a structured approach to the study questions, and an orientation that works with qualitative methods (Vincent & O'Mahoney, 2016). Further, the framework also provided ontological, epistemological, and empirical justification and guidance to form a theoretical model explaining how individual agency manifests in social media environments (Fletcher, 2016). Integrating elements of positivism and social constructionism, critical realism offers an alternative approach that seeks to explain why events emerge (Martin, 2020). Consider how social media users may

react to the features under study here. A descriptive, or journalistic enterprise, would describe the interaction, e.g., telling the story of how a user fell into a rabbit hole of content, as participants described. On the other hand, a critical realist approach attempts to construct a theoretical explanation of that sequence. As Martin (2020) explained, “in critical realism, the objective of empirical work is to develop a causal-explanatory account of your topic.”

In this vein, a researcher seeks to identify mechanisms animating events, its objectivist/positivist orientation, while also acknowledging, epistemologically, that knowledge is value laden and situated, its constructivist elements (Archer et al., 2016; Vincent & O’Mahoney, 2018). On the latter dimension, the researcher brings their personal views, theory preferences, academic training, and biases to the research site, leading to the researcher, for these and other reasons, needing to acknowledge that multiple and conflicting explanations can exist (Fletcher, 2020). However, the researcher also utilizes a variety of social science research tools including empirical methods, theories, and other techniques to gather knowledge “out there” ultimately to arrive at a description and explanation of reality. To strike this balance of knowledge as approximation and realism, the researcher exercises judgmental rationality to determine which account of reality is more viable, while accepting that explanations are fallible and subject to falsification (Archer et al., 2016; Fletcher, 2020). Animating this study, to that end, the researcher’s overarching goal is “to identify the explanation that gets us closest to reality using rational explanation and judgment, and by using reliable methods to discern between competing claims” (Fletcher, 2020).

To illustrate, critical realist scholars work like a crime detective: analyzing the empirically observable event, e.g., a crime scene, and working backwards to ascertain how and why the event, or crime, occurred (Hoddy, 2018). From this lens, consider this research: The

researcher cannot climb into the minds of participants and observe their “agency.” The researcher can, however, gather participants' views and observations of their interactions with the tools and from their reports of those events, work backwards to attempt to identify the mechanisms that may be giving rise to what they describe. Further helpful to understanding events like this and arriving at an explanation, use of extant theory is highly encouraged throughout the investigation (Hoddy, 2018). This means the researcher toggles between theory and empirical analysis with the ultimate aim to form an empirically supported, theory-driven explanation of the event (Belfrage & Hauf, 2017).

Moreover, any theory from any paradigm is acceptable, as critical realism is meta-theoretical and theoretically and methodologically ecumenical (Vincent & O’Mahoney, 2018). One theory may be applicable in one context, while in another context multiple theories may need to be synthesized to offer an explanation. In this vein, ontologically critical realist scholars view reality as a complex, stratified, open system where multiple mechanisms interact to produce the diffuse phenomena we experience (Vincent & O’Mahoney, 2018). How complex a study is, or which stratified layer of reality is focused upon, can determine the number of mechanisms at play (Vincent & O’Mahoney, 2018), with the event itself, like a social media rabbit hole, serving as the primary determinant of theoretical and explanatory complexity. A broad study of how capitalism shapes U.S. culture would result in many mechanisms being identified, while a specific study of why water boils at 212° F would result in a far limited number of mechanisms being identified (unless we wormed our way into quantum mechanics). Thus, while reality is a complex, open system, the researchers concern themselves with their niche and utilize theories and explanations that best serve that niche.

Presenting challenges, mechanisms may lay dormant or surface intermittently, which means they may not be empirically detectable, or they may be irregularly detectable (Martin, 2020). For a researcher, this means the search for mechanisms potentially associated with an event is not rooted in observing and measuring its regularity, as positivist inquiry generally demands. Rather, the search for mechanisms is assisted by methods, e.g., the qualitative approaches employed by this research, extant theory, e.g., social cognitive theory, and inference making and interpretations by the researcher.

Summary of Procedures

For all participants, the researcher performed the following recruitment and data collection sequence. Participants received a recruitment message through one of three recruitment channels (detailed below) where they were asked to participate in the study. Participation involved voluntarily consenting to the study after reviewing consent text, completing a short descriptive survey, speaking to the researcher in an interview or focus group session for approximately one hour, and completing a written log describing the social media platforms they utilize and the content they typically engage with. Total study commitment was approximately 1.5 - 2 hours per participant. After completing these steps, participants received \$20 from the researcher, delivered electronically, or course extra credit for a select group of participants described below. The researcher also emailed participants debriefing material that described the study, provided them with social media resources, and thanked them for their participation (see Appendix A for these materials).

Study consent was obtained using Qualtrics' survey platform where participants reviewed IRB-approved consent text and were given the option to voluntarily consent. If consent was

obtained, a descriptive survey automatically appeared on Qualtrics. Following survey completion, participants were contacted to schedule their interview or focus group session.

Because of health and safety protocols enacted by the researcher's institution regulating person-to-person contact due to the COVID-19 pandemic, the researcher opted to conduct all recruitment and data collection remotely utilizing email, social media advertising, and Sona, for the former, and Zoom and web-based surveys, for the latter. For the researcher, Zoom sessions were held at a secure location where only he was present. Semi-structured protocols tailored to each method guided the conversation (see appendix B for all study instruments).

The sessions were recorded, then transcribed by Otter, automated electronic transcription software. The transcriptions and other study data, including the survey and media log, were imported into qualitative data analysis software, NVivo, for review. Data analysis involved several rounds of inductive and deductive coding, which resulted in the development of an agency model that fit with participant experiences.

Instrument 1: Survey

Participants completed a short descriptive survey on Qualtrics that served multiple study aims. First, the survey introduced participants to the research through informed consent text that detailed their obligations in participating, notified them about data that would be collected, and briefed them on how their identity would be protected, among other disclosures. Second, the survey collected key demographic data, including their age and social media use — two filtering criteria that if met allowed them to progress to the focus group or interview stage of the study. Third, the survey recorded other demographic and social media use data that provided useful background utilized in the findings chapters, ultimately helping to better contextualize their experiences with the tools and offer richer analysis. The survey was not utilized to make

correlations or any other analytic assessments, as the study was qualitatively oriented (Wimmer & Dominick, 2014); rather, the survey provided descriptive statistics pertaining to the characteristics of the sample (Babbie, 2014) and added the contextual layer of data to the qualitative findings. All study participants completed the survey.

The survey consisted of 12 prompts asking participants demographic questions and queries related to their social media use, as well as contact information, including their email address and phone number so the researcher could contact them to schedule the qualitative session. Demographic questions included their age, education level, place of residence, gender, and ethnicity. Social media use questions included which platforms they typically utilized, and how much time they spend daily and weekly on the platforms identified. Participants were also asked to describe in two sentences what a typical social media session involves for them, qualitative data that helped contextualize their responses to the tools. See appendix B for the survey instrument. 44 of 45 participants met the requested age range, with only one participant falling outside that desired range, while falling within the desired range of social media use and tool interaction.

Instrument 2: Interviews

In-depth, semi-structured interviews provided a thorough exploration of the research questions, as well as the flexibility to explore a range of views participants held about the tools (Berger, 2000). To that end, this method afforded the researcher and participants moments of “mutual discovery, understanding, reflection, and explanation” through conversations that were "organic" and "adaptive” (Tracy, 2013, p. 132). Interviews also helped the researcher gather information that could not be observed (Berger, 2000), for example, participants' reflections

about their platform movements and how they felt the tools impacted their agency, an internal cognitive process.

In the interviews, participants offered a wealth of views on the personalized features of social media and reflected on their interactions with them. These reflections included how they perceived they expressed their agency in these environments and how they believed their agency progressed. Participants provided rich, thick descriptions of their social media journeys, reflections that offered extensive accounts of how they felt the tools under study impacted them. The researcher's experience as a former newspaper reporter and training as a social scientist helped foster rapport and comfort with participants wherein they offered innumerable thoughts on the technology and extensively explored several dimensions of it (Lindlof & Taylor, 2019; Weiss, 1994), including dimensions of project concern and other insights the researcher had not previously thought of. A collaborative partnership was also sought where the interviewer and participant worked together to generate helpful information for the project (Weiss, 1994).

29 participants offered their perspectives on the technology in interviews conducted between July 2020 and December 2020. Only one interview was conducted with each participant, with the longest interview, 69 minutes, and the shortest, 34. Most interviews were about 60 minutes, and all were held over Zoom. Their accounts began to become redundant, with saturation being achieved, around the 25th interview with the researcher holding a few additional interviews afterwards to ensure no new critical concepts, themes, and views arose. After the 29th interview, it became clear the method and questioning was exhausted. In total, 1,575 minutes of interviews were recorded. Identified by pseudonym, the following (Table 1) is a list of interview participants, interview length, age of participant, and other project relevant and demographic data:

Table 1*Interview Participants Demographic Data*

Interview Participants	Interview Time	Age	Education	Locality	Social Media Platforms - Typical Use
John	52	21	Some college	Fort Collins, Colorado	YouTube, Snapchat, Instagram, Other
Sam	69	18	Some college	San Diego, California	Twitter, Snapchat, Instagram, Other
Tony	56	20	Some college	Colorado	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Mickie	56	21	Some college	Palmetto, Florida	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Janet	63	19	Some college	Jacksonville, Florida	Facebook, Twitter, Snapchat, Instagram, Other
Michelle	59	21	Some college	Page County, Virginia	Facebook, Twitter, YouTube
Raja	58	23	4 year degree	Massachusetts	Facebook, YouTube, Snapchat, Instagram
Rachel	41	21	Some college	Ashland, Wisconsin	Facebook, Snapchat, Other
Matt	60	20	Some college	Ozone Park, New York	Facebook, Twitter, YouTube, Other
Nicki	55	19	Some college	Knoxville, Tennessee	Facebook, Snapchat, Instagram
Tommy	64	23	4 year degree	Illinois	Facebook, Twitter, Instagram
Jackie	51	20	Some college	Richmond, Virginia	Facebook, Instagram
Jennifer	65	24	4 year degree	Austin, Texas	Facebook, YouTube, Instagram, Other
Sarah	65	18	Some college	Minneapolis, Minnesota	Facebook, Twitter, YouTube, Snapchat, Instagram
Janis	68	22	4 year degree	Barrington, Illinois	Facebook, Snapchat, Instagram
Jordan	68	23	4 year degree	Saint Paul, Minnesota	Facebook, YouTube, Snapchat, Instagram, Other
Barb	49	22	Some college	Connecticut	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Tyson	44	23	4 year degree	Elkhorn, Wisconsin	Facebook, YouTube
Bobbi	63	22	4 year degree	California	Facebook, YouTube, Instagram, TikTok
Jimmy	55	22	4 year degree	Pennsylvania	Facebook, Twitter, YouTube, Snapchat, Instagram
Tammy	65	20	Some college	South Carolina	Facebook, Snapchat, Instagram, TikTok
Janis	34	25	High school graduate	New Orleans, Louisiana	Facebook, YouTube, Instagram, TikTok
Bobby	60	21	4 year degree	Brooklyn, New York	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Jam	37	25	4 year degree	Michigan	Facebook, YouTube, Instagram
Larry	61	25	Master's degree	Akron, Ohio; Colorado	Facebook
Charles	35	21	Some college	New York	Facebook, YouTube, Snapchat
Montana	37	25	4 year degree	Colorado	Facebook
Brian	43	20	Some college	Cresskill, New Jersey	Facebook, YouTube, Snapchat, Instagram
Sally	42	23	4 year degree	California	Facebook, YouTube, Snapchat, Instagram

A semi-structured protocol guided the interviews. The protocol was created to directly explore the research questions, as it contained relevant concepts in the question stems, and to systematically probe participants about the experiences and views they held about the technology, some of which they may not have been conscious or aware of until asked (Berger, 2000). However, flexibility was built into its design and into the interview sessions to allow participants to share impressions outside the parameters of the protocol and the research framework.

The protocol also contained questions that explored specific agency and behavioral concepts, as well as several open-ended questions that were more general in nature to avoid pre-

determining their responses (Berger, 2000). Overall, through these and other techniques, the protocol guided participants to discuss how they engage with their social media feeds and other personalization features, how they act or behave in reaction to the recommendations, what impact they believe the technology has on them, and how they manipulate or control the experience. See appendix B for the interview instrument.

Instrument 3: Focus Groups

Focus groups allowed participants to share their views and perceptions of the technology among each other with the researcher taking a more passive role in the conversations. This method was chosen, in part, to offset researcher influence and potential bias that can occur in semi-structured interviews where the researcher takes a more active role in the discussion (Weiss, 1994; Wimmer & Dominick, 2014). Focus group responses are more freewheeling and less inhibited with the discussion leading to a “snowball effect, as one respondent comments on the views of another” (Wimmer & Dominick, 2014, p. 137). Focus groups foster these group dynamics, potentially surfacing ideas and views not anticipated by the researcher (Babbie, 2014). This method was also selected to add another layer of qualitative data to the study and to triangulate this data, as a validity strategy, with data collected in the interviews (Flick, 2004).

While prompts were given to respondents to focus the conversation on the study topic — drawn from a semi-structured protocol created for this method — participants largely engaged in a free ranging discussion and veered into new territory. In these conversations, participants provided a wealth of perspectives, opinions, and perceptions of the tools, including how they believed it impacted their agency. Participants also discussed how they perceived the technology altered their behaviors, as well as steps they took, in their view, to preserve control and maintain

agency. Similar to the interviews, participants offered complex accounts of how they responded to the features and described unique outcomes arising from their interactions with them.

Four focus group sessions were held in December 2020. Each session was scheduled for an hour, with the longest sessions lasting 70 minutes. Focus group size ranged from two participants, (several respondents failed to attend despite promising to do so), to six participants. They were recruited using a U.S. western university’s software, with the participants attending that university and conducting degree work. Participants met study criteria, except for one attendee who was outside the desired age range. After the fourth session, it became clear redundant data was being produced and to that end, conceptual saturation was also being achieved. This session was held as the interview phase was winding down, where redundant data was also being yielded. 269 minutes of discussion from the sessions were later transcribed and analyzed. Identified by session number, the following (Table 2) is a list of the sessions, participants in each, age of participant, and other project relevant and demographic data:

Table 2

Focus Group Participants Demographic Data

Focus Group Participants	Age	Education	Locality	Social Media Platforms - Typical Use
Focus Group 1	20	Some college	Omaha, Nebraska	Facebook, Twitter, YouTube, Snapchat, Instagram
Focus Group 1	19	Some college	Fort Collins, Colorado	Facebook, Snapchat, Instagram, TikTok
Focus Group 2	21	Some college	Fort Collins, Colorado	Facebook, Snapchat, Instagram
Focus Group 2	18	Some college	Colorado	Facebook, YouTube, Snapchat, Instagram
Focus Group 2	23	Some college	Fort Collins, Colorado	Facebook, Twitter, YouTube, Snapchat
Focus Group 2	40	Some college	Monument, Colorado	Facebook, Instagram, TikTok
Focus Group 2	20	Some college	Pueblo, Colorado	Snapchat, Instagram
Focus Group 2	22	Some college	Fort Collins, Colorado	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Focus Group 3	19	Some college	Fort Collins, Colorado	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Focus Group 3	23	2 year degree	Thornton, Colorado	Facebook, Twitter, Snapchat, Instagram
Focus Group 3	20	4 year degree	Fort Collins, Colorado	Facebook, Snapchat, Instagram
Focus Group 3	21	Some college	Loveland, Colorado	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok, Other
Focus Group 3	20	Some college	Fort Collins, Colorado	Facebook, Twitter, YouTube, Snapchat, Instagram, TikTok
Focus Group 4	18	2 year degree	Johnstown, Colorado	Twitter, YouTube, Snapchat
Focus Group 4	21	Some college	Colorado	YouTube, Snapchat, Instagram
Focus Group 4	19	Some college	California	Twitter, YouTube, Snapchat, Instagram

The researcher created a focus group protocol to guide the discussion, which contained a list of questions and probes (Lindlof & Taylor, 2019). The protocol explored topics and concepts pertaining to the research questions and study topic; however, flexibility was built into the protocol to allow participants to share views and perceptions of the technology not captured by the research framework. Participants exchanged views and built upon their views, resulting in a multi-voice exchange that ultimately generated rich, thick data (Babbie, 2014). This data also corresponded with the interview data, ultimately aiding study validity (Cho & Trent, 2006; Flick, 2004). See appendix B for the focus group instrument.

Instrument 4: Media Log

A document containing two prompts was distributed to interview and focus group participants asking them to list the social media platforms they utilized in rank order from most frequently to least frequently and to concisely describe the types of content they typically engaged with. Participants were asked to complete this document following the session. Zoom's chat feature was utilized to transfer it to them and, in turn, they utilized that feature to transmit the document to the researcher.

While the interview and focus group data largely drove this study's findings, this data helped contextualize participants' social media use, particularly informing the researcher as to what specific types of content and other information they were exposed to as they reacted to the tools. This provided another texture — and a third layer of qualitative data — regarding the experiences they reported. Ultimately from these multiple layers of data, a richer, deeper, multi-dimensional report was produced — behaviors and agency expression, as afforded by the interviews and focus groups, and the overall look and journey of their social media experiences, as afforded by what participants reported on the media logs.

Recruitment

Participants were recruited nationally, ultimately resulting in 29 interviews, 4 focus groups containing 16 participants, and about 32 hours of transcript data. The study's recruitment strategy was designed to attract a large pool of candidates that would fit study participation criteria and to that end, be more likely to offer quality responses to the research questions, namely through members of Generation Z, who were more likely to exhibit some degree of social media use and knowledge (Auxier & Anderson, 2021; Dimock, 2019; LeDuc, 2019; Ravitch & Carl, 2016). In this vein, recruitment was devised to attain a non-probability, purposive sample that would fulfill these needs (Babbie, 2014) and provide a sufficient degree of qualitative data to address the research questions. In all, 45 participants were recruited.

Given the challenges the COVID pandemic imparted on research activities, three channels were utilized to conduct recruitment remotely: software affiliated with a U.S. western university that offered undergraduate students the option to participate in the study (where they received extra credit); queries to professors at that university to distribute recruitment materials to their classes; and paid Facebook ads that offered users throughout the United States the option to participate.

Respondents who participated in the interview phase of the study were mostly recruited through multiple rounds of the Facebook advertising, with 26 of the interviews acquired from these efforts. Those participants comprised a diverse mix of working professionals, college students, and U.S. residents from coast-to-coast. The other three interview participants were recruited through professors at the U.S. western university who distributed the recruitment materials to their undergraduate students. SONA recruitment software was also utilized to seek subjects for the focus group phase of the study. Given the challenges to recruit and schedule

focus groups during a pandemic, the choice to utilize this software was made as it streamlined the process, such as facilitating scheduling and remote communication. This channel produced the four focus group sessions, with 16 undergraduate students participating in the sessions. Recruitment and scheduling of all sessions occurred from July 2020 to December 2020, with the final interview taking place on December 18, 2020 and the final focus group on December 10, 2020. Formal data analysis began shortly afterwards in January 2021 and continued through May 2022.

Participants who fit study criteria (as provided to them in recruitment materials) and who consented to participate were included in the final sample (see appendix A for recruitment materials). Study criteria was as follows: must be 18 to 25 years old and have used social media for at least two hours in a single day. Free of researcher influence, all participants were funneled from the recruitment channels to a web-based descriptive survey where they read text conveying study background and IRB information, then had the choice to voluntarily consent. If they consented, they then completed a descriptive survey where they reported their age, social media use, and other metrics (see appendix B for the survey). After validating participants fit study criteria, the researcher contacted them to schedule an interview or focus group session. Following the session, participants were asked to complete a media log. They then received the compensation.

Participants

Participants comprised 45 U.S. residents and represented multiple races and gender identities, as well as wide-ranging personal and professional backgrounds, and educational attainment. The sample strove for inclusion and representation and included participants versed in the environments who provided rich context and robust accounts, with the sample overall

aiming to meet high-water marks of productive and fruitful qualitative research, the goal that is to “rigorously, ethically, and thoroughly answer your research questions to achieve a complex and multiperspectival understanding” (Ravitch & Carl, 2016, p. 138). Several major geographic regions of the U.S. were also represented, including the Northeast, Southeast, West, and Midwest.

Meeting a key recruitment criterion, all reported experience with social media, including utilizing it for multiple hours each week, with 21 of the 45 reporting spending 10 or more hours weekly immersed in different social media environments where they reacted to a variety of the personalized tools under study for extended durations of time. The median participant age was 21, meeting the other participatory criteria, with only one participant, age 40, who took part in a focus group session falling outside the desired 18 - 25 range. With that exception, participants fell within the desired range, with the youngest participant, 18, while the oldest was 25.

Collected from the survey, participants reported representing multiple gender identities — 21 males, 21 females, 1 gender non-conforming, and 2 non-binary. A range of racial and ethnic backgrounds were also reported: 24 White, 5 Black, 6 Hispanic, 6 Asian, 3 multi-racial, and one opting not to identify. Educational backgrounds were also varied, including attaining high school, undergraduate, master’s degrees, as well as reporting “some college” as education level at present. For the interviews and focus group sessions, participants discussed their perceptions of the tools for nearly 31 hours with the researcher. The median session time was 59 minutes, with a max of 70 and a minimum of 34.

Research Ethics and Human Subjects Protection

The researcher sought Institutional Review Board approval in May 2020. An application requesting exempt status was filed with the researcher’s IRB and approved June 2020. Exempt

status classifies the research as low risk, as the study meets criteria indicating it will pose little to no harm to participants. IRB also approved a researcher request to compensate participants through a one-time \$20 payment or course extra credit, with the latter compensation necessary, as opposed to consistent compensation across the sample, because of recruitment procedures devised by the educational institution where some participants were acquired. The researcher determined these forms of compensation would not exert undue influence on participants and were appropriate for the population and research activities ("Compensation for Participation," n.d.), particularly the length of time required to participate.

Study participation was voluntary and participant consent was recorded on Qualtrics, where a record of consent has also been maintained. Participants were also informed they had the right to withdraw from the study at any time. No participants withdrew from the study or reported issues to the researcher. The researcher received no reports from IRB of adverse events, nor did the researcher need to file an adverse event report to IRB.

Overall, the research presented little to no risks to participants as it asked them in interviews and focus groups general and specific questions about social media use, behaviors, and views; however, after the sessions, the researcher distributed debriefing material that offered helpful resources, including links for assistance with social media addiction. For transparency, the debriefing material also disclosed specifics about the study. All reported data was also anonymized to conceal participants' identities, per IRB guidance.

Dr. Kris Kodrich was the study's principal investigator, and Stephen McConnell was co-investigator. Stephen most recently completed IRB research and human subjects training in October 2020. Though not required, he also completed IRB member training in October 2020. Dr. Kodrich most recently completed IRB research and human subjects training in February

2020. The researchers reported no conflicts of interest. The project's approved IRB protocol is #2098 and titled, Machine over Mind? The Clash of Agency in Social Media Environments. The protocol expires June 18, 2025.

Data Management and Analysis

Transcripts from the interviews and focus groups provided extensive data that needed to be reduced and subjected to several rounds of qualitative analysis. The broad aims of this study phase were data management, data reduction, and conceptual development (Lindlof & Taylor, 2019), with the goal to progressively transition from descriptive to analytic analysis where empirically supported theoretical claims could be potentially advanced (Creswell, 2009; Tracy, 2013). As part of data management and reduction, interviews and focus groups were transcribed utilizing an AI transcription platform, Otter. Transcripts were then ported to qualitative data analysis software, NVivo, where the bulk of data analysis and coding occurred.

Memos

In NVivo, the researcher wrote memos about the project from general research reflections to specific topics, such as theory development (Lindlof & Taylor, 2019). Assisting data analysis, several memos were analytic in nature where the researcher “focused on the meaning of codes and on the connections between them,” among other reflections (Tracy 2013, p. 196). These memos aided the transition from coding descriptively, e.g., labeling patches of insightful text, to analytically understanding participants' experiences, ultimately enabling the researcher to weave the codes into a coherent model and a sensible narrative of what emerges, agentially, from the human-machine dynamic (Tracy, 2013). These memos were critical to developing the explanatory model, as well as making early, broader decisions about eliminating irrelevant codes and concepts.

Preliminary Coding

Formal data analysis began January 2021 shortly after data collection ceased. However, throughout the interview and focus group sessions, preliminary coding occurred where transcripts were analyzed in NVivo to determine if the research questions and key project concerns, like agency and user behaviors in response to the tools, were being addressed (Saldaña, 2016). During this stage, which involved open, flexible coding of the transcripts (Babbie, 2014), it became clear that project-relevant and novel concepts were emerging and that social cognitive theory could potentially shed light on the research questions as participants responses to the tools, i.e., their agentic choices, mirrored agency sequences outlined by Bandura. During this stage, the researcher also began preliminary labeling and classification of concepts, derived from constant interrogation of the data (Babbie, 2014).

Codebook

During this informal open-coding stage, a preliminary codebook was also developed that integrated social cognitive theory concepts, as well as concepts from actor-network theory, an early candidate theory (Creswell, 2009). A critical realist inquiry recommends utilizing theory throughout the entire research cycle, including during data analysis (Fletcher, 2016; Hoddy, 2018). As Tracy (2013) recommended, the codebook became more systematic and refined as it evolved, ultimately in its finished form encompassing select concepts, definitions, and theory conceptualizations. See Appendix D for final codebook.

Formal Coding

Following preliminary data analysis, a formal, first round of coding then occurred which emphasized techniques that sought to intentionally analyze participants' descriptions, explanations, actions, meanings, and accounts of the tools (Saldaña, 2016). Sensitizing concepts

and codes from the codebook also informed this stage. This resulted in an iterative analysis in which the researcher shifted between emergent readings of the data and use of models and theories (Tracy, 2013). Overall, during formal coding the researcher toggled between emic and etic approaches (Tracy, 2013). The researcher was also cognizant not to pour participants' views into rigid a priori theoretical bins, as that would harm discovering emergent, novel findings (Corbin & Strauss, 2015; Creswell & Creswell, 2019).

This and subsequent stages of coding were also more intensive, in that line-by-line and incident-by-incident analysis of the transcripts occurred, as opposed to the selective coding that unfolded during the preliminary round. Analysis involved searching for processes, conditions, actions, and events reflective of agency, behavior, and other project relevant dimensions. More than 100 theoretical and non-theoretical codes were developed. In this stage, the researcher, as Saldaña (2016) suggested, compared “data to data, data to code, code to code, code to category, category to category, category back to data” — an analytic process that was iterative, recursive, and cyclical, and in which codes/concepts were constantly developed and refined (p. 68).

A second round of coding was then conducted — a shift to more focused coding in which constant comparison of codes and reported experiences occurred, as well as forming interconnections among codes. In this stage, a higher level of abstraction was sought, in which codes transitioned from being mere mirrors of the data to instruments that help explain and theorize participants' experiences (Tracy, 2013). The overall aim of this stage was to develop — if the data indicated the potential — a theoretical framework of what was happening across participant experiences, i.e., shifting to theoretical coding where core constructs, concepts, and properties are developed (Saldaña, 2016). This demanded constant returning to and evaluation of the data, eliminating codes not capturing agency maneuvers and expressions, and further refining

the codebook and conceptualizations — an intensively analytic stage that also sought to make strict ties to the research questions and project concerns. Code overlaps and patterns were further evaluated, as well as negative cases (Tracy, 2013). During this stage, the researcher pinpointed patterns in the data and formed conclusions from them that ultimately generated the study's theoretical model (Tracy, 2013).

Critical realism methodology intensively guided this final stage of analysis, wherein the researcher was charged with identifying mechanisms explaining participants' reports — an analytic move demanding substantial theorizing, evaluating how participant experiences fit with extant theory, making interpretations and inferences about their experiences, and determining the relevance and fit of emergent findings to the model (Fletcher, 2016; Hoddy, 2018). During this phase, the researcher constantly asked, “what are the mechanisms,” and are participants experiences fitting with developed emergent and extant theoretical concepts? Codes were further whittled, and concepts and properties extensively refined, including honing conceptualizations — overall, an interactive and recursive process from the first stage of data analysis to the last, resulting in a finalized codebook and explanatory model (Ravitch & Carl, 2016). For example, many behaviors participants reported were initially coded as agency, as the behaviors represented this broad act; however, further analysis showed how the behaviors represented finer dimensions of agency, such as self-regulation and forethought, as well as other shades of agency represented by the emergent concepts. Finer dimensions of agency, as well as the broad concept, were incorporated into the codebook and some concepts were eliminated or refined, particularly the emergent concepts, as coding and analysis progressed. The codebook was utilized and evolved into its final form through these stages.

Reliability and Validity

The research incorporated several techniques to enhance the validity and reliability of its findings. While validity and reliability are much debated in qualitative scholarship (Creswell & Miller, 2000; Guba, 1981), following Morse's (2015) suggestion this research utilized conventional social science terminology and recommendations to address and improve the quality of its findings. To improve validity, with validity as a goal of research to accurately represent phenomenon, the researcher followed these strategies recommended by Morse (2015): prolonged engagement; thick, rich description; triangulating data; and evaluating researcher bias. Creswell and Creswell (2018) noted that utilizing multiple validity strategies helps check the accuracy of findings, with the authors recommending the approaches taken here.

The researcher collected the perspectives of 45 participants, which amounted to nearly 31 hours of direct interaction that produced substantive, rich accounts of their interactions with the tools. Furthermore, triangulation across methods, participants, and theory was sought, with the overall aim to achieve correspondence among empirical observations, theory, and developed concepts (Creswell & Miller, 2000; Flick, 2004; Morse, 2015). Systematic coding, analysis software utilization, and codebook development aided this strategy as, for example, participant reflections in interviews and focus groups could be analyzed and constantly compared with developed concepts and theories. This also helped vet if data from the focus groups overlapped the interview data.

Researcher bias can occur in qualitative work, and it is particularly susceptible to bias because of the methodology's interpretative dimensions. The researcher is an instrument in the research from observing behavior to asking questions to interpreting and making decisions throughout the study (Creswell & Creswell, 2018). Given this, the researcher took a reflexive

stance and implemented active strategies that led to constant questioning of his interpretations and perceptions. Qualitative researchers should reflect on their role in the study, including how their identity, experiences, and research training can shape the research and outcomes (Creswell & Creswell, 2018), thus potentially introducing bias as the personal and professional frameworks they bring to the study may lead to interpretations that stray from participants' actual views and experiences. As an active strategy, following the guidance of Ravitch and Carl (2016), the researcher wrote an identity/positionality memo early in the research process, along with subsequent, related memos, that reflected on his identity and other external and internal factors and how they may influence the research. These memos also outlined and reflected on the assumptions and beliefs he holds about the technology and the theories he sees applicable to it, a process that provoked questioning of those assumptions and beliefs, and the desire to collect data that may refute or nuance them.

As part of that desire, the researcher was highly interested in emergent data and concepts participants might offer, particularly concepts, views, and ideas outside his research frameworks and training. This stance ultimately spurred the production of a substantial modification to social cognitive theory and a greater understanding of how people behave when interacting with these tools — not as mindless users who are under the sway of the technology, as popular, deterministic accounts presented and the researcher presumed, but as active users who though influenced in some cases also make strategic choices and are cognizant of the technology and its potential power over them. As Lindlof and Taylor (2019) made clear, “reflexivity is the heartbeat of qualitative inquiry,” allowing us “to manage the twisting, turning road of a study with greater confidence and insight” (p. 92). While our research is situated, we can “hear richer nuances in

the voices of people” if we are reflexive and if we better understand ourselves. This research immensely benefited from this stance.

To enhance reliability, that is working toward consistency of findings and the ability to obtain similar results if the study was replicated, the research utilized Morse’s (2015) criteria, which largely mirrors the validity criteria — development of a coding system, thick description, and triangulation. As previously described, explicit, systematic phases of coding and data analysis were conducted, including the development of clear definitions in the code book (Morse, 2015). These tactics support replication if another researcher decided to test the concepts/model generated in this study. Coupled with the validity strategies, the study sought to conduct a rigorous inquiry, while acknowledging that these strategies and the interpretative elements of qualitative research may prevent complete achievement of that aim, an aim that is elusive yet one that should be sought (Morse, 2015).

These strategies, the project itself, and the overall research design also corresponded with Tracy's (2013) eight "big-tent" criteria for effective qualitative research: exploring a worthy topic that is relevant, timely, significant, and interesting; demonstrating rich rigor through use of theoretical constructs, data collection and time spent with subjects, a sufficient sample, and complex data collection and analysis processes; maintaining a stance of sincerity, such as researcher reflexivity and transparency regarding methods and project issues; attaining research credibility through thick description, concrete detail, triangulation, and multivocality; seeking resonance with audience through "evocative" representation and transferable findings; offering a significant contribution, including conceptually, theoretically, practically, and methodologically; maintaining an ethical posture through human subjects protections; and seeking meaningful

coherence, e.g., fulfilling study aims, utilizing methods and research processes that fit with study goals, and interconnecting literature, research questions, findings, and interpretations.

Moreover, in terms of validity and reliability, saturation was also achieved in which explicit, full development of constructs, concepts, and properties transpired (Bowen, 2008). During the final stages of data collection, it became apparent that gathering more accounts would not result in new insights (Creswell & Creswell, 2018). The last stage of data analysis reflected these saturation principles, in which finalization of codes and the codebook occurred. Theoretical centrality was achieved, transitioning from descriptions to analytic abstraction, including identification of the agency and behavioral mechanisms that appear to be activated when individuals react to the tools. These mechanisms and other concepts are described in the findings chapters that follow.

CHAPTER 4 — FINDINGS, SOCIAL COGNITIVE THEORY

Introduction and Summary

This study sought to understand how social media users reacted to the personalization dimensions of social media environments, for example Facebook and Twitter’s primary feed. Through that exploration, the study investigated how users’ agency was expressed and how it progressed as they responded to those and other similar tools — an inquiry that also lends itself, as critical realism calls for, to potentially uncover other cognitive and behavioral dimensions that may be activated during users’ interactions with the choice recommendation engines.

Detailed in this chapter, participants conveyed an array of actions and choices that were reflective of social cognitive theory concepts, including agency and specific dimensions of, as well as other cognitive and behavioral elements that underlie the theory. Those findings and its connection with Bandura's (2009) theory are detailed in this chapter. Additionally, participants described other actions and responses that were not reflective, as interpreted by the researcher, of the theory. These emergent findings are reported in the next chapter.

Participants also connected their experiences to specific personalization tools, which helps to further concretize their accounts and the findings. Overall, the findings offer a comprehensive, contextualized portrait of participants' interactions with different social media choice recommendation engines and specific tools, while also connecting their interactions with theory. To assist these aims, other project data is incorporated, including descriptive statistics from the surveys and supplemental qualitative data from the media log.

The chapters are organized by concept, with findings pertaining to “agency,” for example, folded into its own section and so forth. The first conceptual set focuses on participant experiences reflective of broad social cognitive theory constructs, such as emergent interactive

agency and triadic reciprocal causation, dimensions that also help establish that a social cognitive process is unfolding in users "dance" with these tools. Participant responses demonstrative of other key theory and agency concepts follow, such as experiences reflective of intentionality and self-reflectiveness, two unique agentic expressions. Following this chapter, emergent findings are reported — novel agency and behavioral expressions that do not appear to be captured by the theory and that support the need to adapt it to this environment.

Agency

Participants expressed numerous ways they responded to the algorithmically driven features of social media environments, from their feeds to other features offering information and social recommendations. Their responses are reflective of social cognitive theory's conception of agency. Bandura (1989) conceptualized individual agency as a "capacity to exercise control over one's own thought processes, motivation, and action," and that "people can effect change in themselves and their situations through their own efforts" (p. 1175). In short, an agent can "intentionally make things happen by one's actions" (Bandura, 2001, p. 2). People evaluate their surroundings, model or reject behaviors they see in the environment, and actively make choices as they progress through life. How these attributes cut varies individually, and it is contingent on, and constrained by, the environment they are navigating (Bandura, 1989; Bandura, 2001).

To that end, participants reported a wide array of idiosyncratic responses to the personalization features that comprise social media environments. In these responses, participants demonstrated agency, e.g., a sense of their actions and deliberate control over them in response to the offerings of the tools, while also discussing moments where their agency morphed in reaction to them. John, a 21-year-old male, who reported spending more than 10 hours a week traversing social media, described different responses to YouTube's "Home"

feature. That feature offers an extensive list of algorithmically sorted videos that unceasingly refreshes, with the list offering identity-aligned video recommendations based on careful tracking of user behaviors. Suggestive of agency, John will open that feature with an idea of the type of video he wants to watch and search through the offerings to “see if there’s anything related to that.” If he does not find what he is looking for, he will refresh the page and “sometimes I’ll watch something else” that pops up. At times, he reported taking other actions that were suggestive of the power of the platform, or environment, over him, far less structured and more freewheeling than the prior responses. After watching a video, the platform supplies more suggestions to him and that sometimes nudges him to go on tangents. These “random tangents” take him on unanticipated flights of video watching where time also flies by: “And then an hour later, I’m like, oh, wow, it’s an hour later.”

Sarah, an 18-year-old female who spends 2 to 3 hours a week engaging social media, said she turns to her Instagram and Twitter feeds to control her boredom and “kill time.” Demonstrative of agency, she also utilizes social media to seek out new content and information pertaining to her educational interests and hobbies, as well as news and politics. The algorithmically driven feeds, however, sometimes stimulate her curiosity by way of funneling her interesting suggestions, resulting in what she characterized as entering a “long rabbit hole” where she is entertained, as desired, but “some of it is a little bit mindless.” Highlighting the Facebook feed, which is powered by algorithms populating a vertical digital strip with endless suggestions, Sarah related that while addicting she maintains control — in her words, “to the point that it’s not hindering me from actually doing my goals and like meeting deadlines on time. It’s just that like whenever I’m in the rabbit hole, it will last like 30 minutes and then I just get out of it.”

Other participants reported strategies and tools they deploy to sculpt the choice recommendation engines and the information it offers. Tyson, a 23-year-old college graduate, who utilizes Facebook and YouTube, said he customizes the recommendations Facebook furnishes through unfollowing and muting people, like high school friends and other people “who I don’t really want to listen to.” Tyson roves about the platforms more than 10 hours a week, where he particularly enjoys watching videos on YouTube and participating in writing groups on Facebook. For these sessions and indicative of agency, he intentionally sets aside blocks of time to watch YouTube or scroll Facebook, scheduling these moments so social media does not interfere with his writing goals. When asked if the recommendations ever lure him into violating these blocks of time, he stated: “Not really, no, because I do know when to stop.”

Jackie, a 20-year-old female, who reported navigating the platforms more than 10 hours a week to be entertained and to read posts, said she is very intentional with social media, including being selective about who she follows and what content she engages with. Janis, a 22-year-old college graduate who spends most of her social media time on Instagram where she enjoys stumbling upon fun memes, said she intentionally manipulates Instagram's algorithm if undesirable ads appear on her feed. She will also purposely search for information she is not interested in to ensure her feed provides more diverse suggestions. Recognizing the platform's commercial bent, as well as desirous advertisers who have similar aims, she stated does not want to be a “mindless consumer,” so she seeks to “make it harder for them.”

Jane, from focus group 3, said she deliberately turns to certain platforms and feeds for particular content she is interested in viewing. For example, she hops on Twitter for her music interests, Instagram for lifestyle and celebrity content, and Facebook for news and political information. "That's how I kind of control what I see," she said, as opposed to other participants

who intentionally sculpted each platforms' feeds to more greatly surface types of content they enjoy.

Other Foundational Dimensions

In addition to agency, emergent interactive agency, triadic reciprocal causation, and the elements that comprise them are also foundational to Bandura's agentic framework. Personal, behavioral, and environmental factors underlie emergent interactive agency (EIA) and triadic reciprocal causation (TRC), with a person's agency *emerging* from the factors and the *interaction* of them. During interactions with the tools, participant reports supported enactment of these processes, particularly the emergence of unique agentic expressions that appeared associated with personal, behavioral, and environmental factors, all of which are also indicative of EIA and TRC processes unfolding in this context. To clarify, consider a social media user that enjoys sports and comedy, two personal factors or determinants that can influence behaviors and agentic expressions. Driven by the desire to find more of this content, the user decides to customize their Facebook feed, so sports and comedy content appear more frequently — a behavior and agentic expression associated with the interaction of these personal factors and the environment. Further in this hypothetical, their agency *emerges* from the interplay of these factors, resulting in emergent interactive agency and triadic reciprocal causation.

Establishing these processes and others through participant reports helps support use of social cognitive theory in this context, indicating that "social cognitive" processes can occur in a non-social, media environment during users' interactions with the tools. Modeling, observation, and vicarious learning are other foundational social cognitive concepts, and they are also key to enabling agentic expression, EIA, and TRC (Bandura, 2009). Those dimensions are further delineated and explained in Figure 5 below:

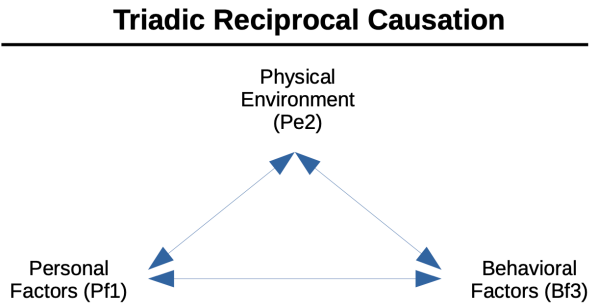


Figure 5

Bandura Triadic Reciprocal Causation Framework

Personal Determinants

Participants noted a variety of personal goals, interests, values, and characteristics and discussed how they intersected with the platforms’ choice recommendation engines. Personal factors influence agency expression, behaviors, and interactions with environmental conditions (Pajares et al., 2009). To illustrate, goals guide future behaviors, which may result in attaining goals, e.g., the goal of completing this project motivates the behavior to write it. Personal determinants can include cognitive, affective, and biological events and these factors can bidirectionally interact with environmental conditions — a goal may be fostered or inhibited by external affordances (Bandura, 2009). Personal factors may also inform solutions to problems, as well as evaluations of outcomes (Bandura, 2009).

Participants brought a variety of personal factors and interests to their interactions with the tools that also appeared to shape unique outcomes. Demonstrative of a personal characteristic influencing behavioral and agentic outcomes, John utilizes social media for work breaks, which means his time interacting with the tools can hinge on length of time away from work:

Basically, it's just a break from work. Like, it's pretty easy to finish with one assignment and jump over to social media for like 10 minutes and check it out, and then jump back over to work. So, it's a nice quick break that I can do without getting too involved in because typically, if I start like playing a game or something, then that'll end up being a more extended amount of time. So, if I just want a quick break, social media is nice.

Nicki likes social media because it helps her keep her ear tuned to the affairs of friends and family, with Facebook being her top choice for that activity followed by Instagram — all indicative of personal characteristics. She also utilizes the platforms to stay updated on news and other important information, with her describing social media as her “number one news source.” However, her preferences and aims sometimes shift because of the choice recommendation engines — a sequence demonstrating how personal characteristics can be bidirectionally influenced by environmental conditions. Reflecting on past interactions, she described how she will hop on the platforms to learn about elections and the pandemic, but the choice recommendation engines can quickly sidetrack those aims if those topics are not the first information that appears. Other interesting content will surface, and she will “just kind of follow that” and “go down that rabbit hole instead.”

Jackie uses Instagram to run a mental health awareness account that has a considerable following. On that account and reflecting both personal interests and goals, Jackie posts material that is important to her and to also spread awareness about eating disorders, substance abuse recovery, and other mental health topics. Related to these personal interests and endeavors, Jackie also likes Instagram’s Explore feature, which automatically surfaces these types of

content. That feature and the content it channels her way leads her to comment on posts in part to get more exposure to her mental health awareness account, a sequence indicative of the bi-directional influence of personal aims, agency, and environmental factors.

Like other participants, Jennifer said she turns to social media to stay in the loop with her social circle. As a preference, she also utilizes the platforms as a news source to learn “what’s going on just in the world in general.” Facebook and Instagram serve this need, and the recommendation engines deliver her content about current events she desires to see.

Demonstrating connections among preference, behavior, and the engines, if the content “feeds into something I’ve been feeling or something I’m trying to understand better” she will click on it and read the story the post links to on an external site. Sometimes, she will also click “see more” on the post, though not review the external site where the article was published. On the other hand, if the engines on both platforms channel her content that is not aligned with her interests or identity, her platform behaviors change, she reported. “I mean if it doesn't apply to me, I usually scroll past it,” she said. Further, if the content is highly disagreeable to her, she will utilize platform features that allow her to mute it so it is less likely to appear, a cycle indicating the intersection of personal interests and agency expression, i.e., emergent interactive agency and triadic reciprocal causation.

Barb intentionally cultivates her Instagram feed so it displays her interests, a move reflective of personal factors, emergent interactive agency, and triadic reciprocal causation. A fashion aficionado, she’ll see new outfits and stores on her feed, some of which she saves to review later. Her actions have resulted in a “pretty cultivated” Instagram experience “to what I like.” When other features, such as the Explore page, surface random content outside the scope of her interests, she tries to not tap on them, so the feed does not receive a signal indicating she

likes the material. She'll also report inappropriate material: "If they're like really weird, I'll like report them and say like not interested and stuff like that." She takes similar actions on Twitter, muting content shuffled her way by the engines that is not aligned with her interests. "So, I try to control that one," she reported.

Ihor, who participated in focus group 3, has conflicting thoughts about the technology, finding it to be helpful because it delivers him "all this personalized content" that is "supposed to be ideal for me." But it also makes him "pretty uncomfortable." He noted: "It's almost like an extension of my thoughts in my brain," as the engines sift through his posted content to inform its suggestions, which despite its helpfulness he considers "creepy." Reflecting personal factors, he summed up his opinion of the engines as "uncomfortability" and "convenience." Sal, who also participated in focus group 3, said he uses YouTube for learning, and he likes its choice recommendation engine because it "keeps feeding" him content it detects he is interested in, or perhaps "something else better."

Behaviors / Behavioral Patterns

As part of the triadic reciprocal causation model of agency, behavior manifests through the interacting determinants of environment and personal dispositions (Bandura, 1989). As detailed above, individuals' personal characteristics interact with environmental conditions, which in turn influence particular behaviors and behavioral patterns. These determinants bi-directionally influence each other and produce patterns of behavior and agency (Bandura, 2009). In essence, behavior is influenced by social systems/environments, but people can also act uniquely in those environments, including pushing the bounds of what is possible, with personal factors, such as cognitive, affective, and biological events, potentially dictating what behaviors and agency expressions manifest. Participants reported behaviors that were reflective of these

interactions with, important to this section, the engines seemingly playing a salient role in the patterns of behavior that emerged, as well as individual proclivities.

Jennifer related how she usually approaches her Instagram and Facebook feeds passively and that results in light interactions with the tools for her, such as scrolling, reacting, and making the occasional comment. For the most part, her passivity, a personal characteristic, results in reading posts on the feed, as opposed to more overt interactions. Sam, who likes Twitter, Snapchat, and Instagram, said she approaches social media, as a preference, to relax — or in her words, “numb her mind” — so she interacts, as a behavior, with suggestions offered by Instagram and Twitter that does not challenge her thinking, or make her think deeply at all. The tools — i.e., the environment — give her content that comforts her, and the tools also reduce the friction of her having to actively seek out content on her own, a sequence suggesting the engines foster patterns of behavior for her, with her behaviors further influenced by her cognitive proclivities. So, she’ll find herself immersed in fan content, arts, comics, and memes. “And I’m not necessarily thinking about much else. It’s just sort of a way to just like keep my mind engaged, without forcing it to do any kind of deep thinking, I guess,” she reported.

Janis conveyed she turns to social media for humor. Motivated by that personal interest, she’ll hop on Facebook and TikTok where the recommendation engines — and the content they surface — not only satisfy that urge, but also nudge her to watch more videos. She may then be channeled by the engines onto an entirely different path, away from comedy and off to other topics. In an example demonstrating the bi-directional influence of personal characteristics and behaviors in association with the environment, she’ll tap on one funny video, a behavior tied to her interest, yet that will surface more videos because of the recommendation engines. Then, “they’ll have another one that has another one that’s funny.” Soon, she’s “scrolling down the line

the whole time” and “getting away from what I thought about what I was going on there to do,” a sequence in which the intersection of the personal and the environment sprouts anticipated and unanticipated behaviors and outcomes.

Among other behavioral outcomes, some participants reported spending more time on the platforms if the recommendation engines offered them content aligned with their interests, a cycle that can also initiate a myriad of additional behaviors, such as scrolls, likes, and other reactions. Bobby, a 21-year-old undergraduate degree holder who reported spending more than 10 hours a week on social media, related how Facebook knows him well, particularly the content he likes. He is cognizant of their agenda (to keep him engaged), but regardless of that insight, he ends up spending more time on the platform than he anticipated — sometimes up to three hours. Several participants from focus group 3 relayed similar experiences where the engines and the content they suggested appeared to influence their behaviors, such as "watching them (videos) forever because they're recommended," and also needing to be "careful" with what videos and accounts were interacted with to avoid unwanted content from surfacing.

Larry, a 25-year-old master’s degree holder who cherishes Facebook, said the platform offers him desirable suggestions fitting with his interests, which keeps him “more and more and more on the platform,” statements demonstrating linkages among personal interests, behavioral patterns, and the environment. Content suggestions encourage clicks, he reported, which leads to more suggestions that might also bait him and induce further interactions. Overall, Facebook's personalization engine makes it “more easy” for him to get what he wants from the platform, though that comes at the expense of addiction:

Well, what I mean is that the pop ups might be so interesting, that (they) really keep me glued in the platform. That means I will have to spend more and more and more time. And I look in again and again trying to see if there's something new that has come up.

Charles, who utilizes Facebook, Twitter, and Snapchat and spends more than 10 hours a week immersed in these environments, relayed a similar experience. When the recommendation engines effectively deliver him content he is interested in, it compels him to stay “a little bit longer” on the platforms, with that comment indicating new cycles of behaviors.

Environment

Environmental events and conditions can influence human behavior and agency, and participants offered numerous scenarios where the personalization tools constituting social media environments impacted them as they perceived it on these and other individual-level dimensions. Human functioning emerges from the interplay of personal, behavioral, and environmental influences, which coalesce uniquely in individuals to produce behavioral outcomes (Pajares et al., 2009). Through this dynamic, people express agency where they can also influence, or act on, the environment, as opposed to being purely reactive and constrained by it (Pajares et al., 2009). Utilizing this innate cognitive capacity, humans can adapt to and manipulate environmental conditions, as well as reflect on their behaviors and intentionally set a new course if desired outcomes are not being attained (Bandura, 2009).

However, people are also products of systems, shaped and constrained by social and other conditions to a certain extent and predicated upon the individual who retains the capacity as an agent to “to perform independently in any given environment” (Middleton et al., 2019, p. 928). The latter trait partly arises from individuals’ observational capacity — enabling, for

example, observation of actions in environments, including how certain actions produce outcomes, with those observations informing adjustments in future behaviors (Bandura, 2001). Researchers, including Bandura, have extended social cognitive theory from its physical and social environment origins to information and technology environments (Middleton et al., 2019). Valkenburg et al. (2016), for example, characterized social cognitive theory as a transactional understanding of media effects where theorists assume reciprocal causal relationships among users, factors in the media environment, and outcomes of use.

A lover of TikTok, Janis conveyed a strong sense of how the choice recommendation engines comprising that environment work and how it helps her find content and other information she is seeking. She observed how its video suggestions help broaden her search of “what I’m looking at.” She also noticed how it detects what videos she likes and, in turn, gives her similar videos or “at least somewhere around that.” The engines also help her find new people to follow and “new challenges” — a TikTok phenomenon where users challenge others to perform activities, such as dancing wildly to a new song. For these reasons, the engine serves her well — “it’s a good feature, a feature for me.” But while these expressions are reflective of her agency, or independence, in the environment as she has a sense of how it works and tinkers within it, she also noted how the suggestions take her on unanticipated journeys where the environment, in a sense, appears to turn the tables on her. Sometimes she will be watching “funny videos,” then she will tap the next suggested video, unrelated, and the next, and the next, with a new cycle of behaviors, from all appearances, initiated by the environment.

Bobby observed how the recommendation engines of Facebook and Twitter are tailored to his interests — an aspect that he thoroughly likes and believes he gains from. The engines help him with purchases, give him ideas, and channel him new information that he may not otherwise

see. In a sense, they are also a teacher, aiding his learning, especially for one of his interests, computer coding. The engines suggest coding apps and sites to him, a cycle in which his agentic expressions, including desiring to engage with this personal interest, correspond with the affordances of the environment and the converse, the environment feeding him information he hungers for. Like Janis though, the engines can steer him on to different and unforeseen paths, progressions where the environment appears to give rise to unexpected agentic and behavioral moments. He will hop on Facebook with the intent to quickly leave to move on to other activities, but “I end up being there since I got something that is personal to me and specific to me that I like” — a statement demonstrative of the bi-directional influence of personal factors, environmental conditions, and the rising of novel patterns of behavior from those intersections, as well as emergent interactive agency and triadic reciprocal causation. He is aware that the technology operates this way and that its intent is to encourage him to spend increased time on the platforms: “So they just plug it at me and showed me this what you like, check out this.”

Charles reflected similar sentiments. He observed how Facebook’s recommendation engines offer him content related to his previous searches, an arrangement and feature he appreciates. When that occurs, the engine serves as a reminder for him, surfacing recommendations tied to information he was viewing in the past. That sequence, however, causes him to spend more time online than anticipated. Joshua and Lee, who participated in the first focus group, also noticed how the engines deliver them content they like. For Lee, she feels the recommendations are “pretty spot on,” particularly workout content she enjoys that appears on her Instagram and TikTok feeds. For Joshua, he noticed how YouTube finds “similar related content” for him based on previous videos he watched. That sequence often leads to him subscribing to additional channels springing from those recommendations.

Different social media environments can also produce different outcomes for individuals, participants reported, a sentiment Larry reflected in his experiences with Facebook, Twitter, and Instagram. Generally, Larry said these platforms' suggestions can be addictive, keeping him “glued” to the milieu. But for him, Facebook is the most effective at drawing him in because of the content it offers, particularly political news and social moments — items that its choice recommendation engine sifts through the ocean of available information and fetches for him. Facebook’s engines are always providing new streams of information and “new content always attracts attention.” That interaction of him and the technology also nudges him to “dig in and see what it is all about,” demonstrative of the emergence of a pattern of behaviors through the interplay of environment and individual. “So, the more I inquire, the more I stay glued there,” he reported.

Modeling, Observation, Vicarious Learning

As described previously, a key element of social cognitive theory is our ability to observe, learn, and model behaviors in the environment, then utilize this acquired knowledge to enact similar or divergent behaviors. Observation, modeling, and vicarious learning assist people in accumulating an understanding of the world and themselves. Individuals’ ability to vicariously learn and observe is what helps them navigate environments, as well as make decisions and choices within them, i.e., agentic expressions.

Modeling, observation, and vicarious learning are critical elements of triadic reciprocal causation and emergent interactive agency, as these cognitive processes can inform and influence how we think and behave (Bandura, 2009). That includes our agency as we decide to model behavior we have witnessed and enact it — or reject it outright. These processes also afford individuals critical information to achieve aims and to execute agency more adeptly. Many

participants expressed how they observed personalization tools and learned about them via those observations, as well as through outside knowledge. They also demonstrated how they modeled the behaviors of the engines, i.e., learning how the features operate and enacting behaviors responsive to them, ultimately to produce outcomes they desired.

John notices nuances about YouTube's personalization engines that also inform how he behaves on the platform. He observed how, at times, YouTube surfaces videos he does not typically see appear, videos he coined the "black sheep," an antiquated phraseology, because of their novelty and how they are often outside the scope of what he leapt on the platform to engage with. He observed three of these types of videos may appear in one day, while other days they may not appear at all. Additionally, sometimes he does not see this type of video, but only because he opted to not scroll long enough for them to surface:

... YouTube will give you a pretty long list and you'll see like the first six, just when you're watching the video, and you have to scroll down to see the rest, so it also can sometimes depend on where on that list it puts it and if I do end up scrolling down.

Indicating her observations of YouTube, Sarah offered an accurate portrait of how its personalization engines work. She relayed how the platform tracks how long users watch videos, in addition to tracking how often users click and interact with them. Analyzing those engagements, the engine will recommend similar content in the hopes of persuading people to spend more time on the platform, she noted, a depiction that precisely mirrors how the technology works. She also recognizes the engines influence her behaviors, including fostering patterns of addictive behavior.

Tyson noted how he has developed an intuitive sense of how YouTube's choice recommendation engines work, acquired in his words from spending "lots of time" in the environment. Informed by this acquired knowledge, he actively controls what appears on his feeds by "choosing what to click on," knowing that by carefully choosing what to click on "you'll choose what shows up later." Correctly relaying to the researcher how the technology broadly operates, he said algorithms track what videos users watch and this data is analyzed to funnel similar videos to them. In his words:

... The algorithm says this user spent 10 minutes today watching this video on this subject, we must serve them more videos on this subject (to keep) them engaged. So that's the way I understand the algorithm works.

Marcy, who participated in focus group 4, described two primary, public-facing features of the choice recommendation engines — the content suggestion element that offers her recommendations based on what she previously engaged with and the paid, advertising element that channels targeted ads to her, yet they appear, in her words, like "regular posts or regular videos." She dislikes the ad aspect of the engines because she does not "want to be sold stuff." She added: "I'm just here to like, you know, have a good time and relax or whatever."

Structured, Classical Agency

In this section, specific social cognitive theory agentic dimensions will be delineated — dimensions that reveal the variety of ways agency can be expressed as determined by Bandura and detailed in his theory (see Figure 6 below). Participants' experiences demonstrative of the dimensions are highlighted in separate sections below, revealing how their agency appeared to

express itself and evolve in reaction to the tools and in accord with social cognitive theory's agentic conception. Put another way, these dimensions, supported by participant experiences, show unique agentic expressions unfolding in social media personalization environments, particularly how the choices and acts individuals make in response to the tools can be connected with inherent cognitive and agentic proclivities that individuals exercise in other settings, such as physical environments.

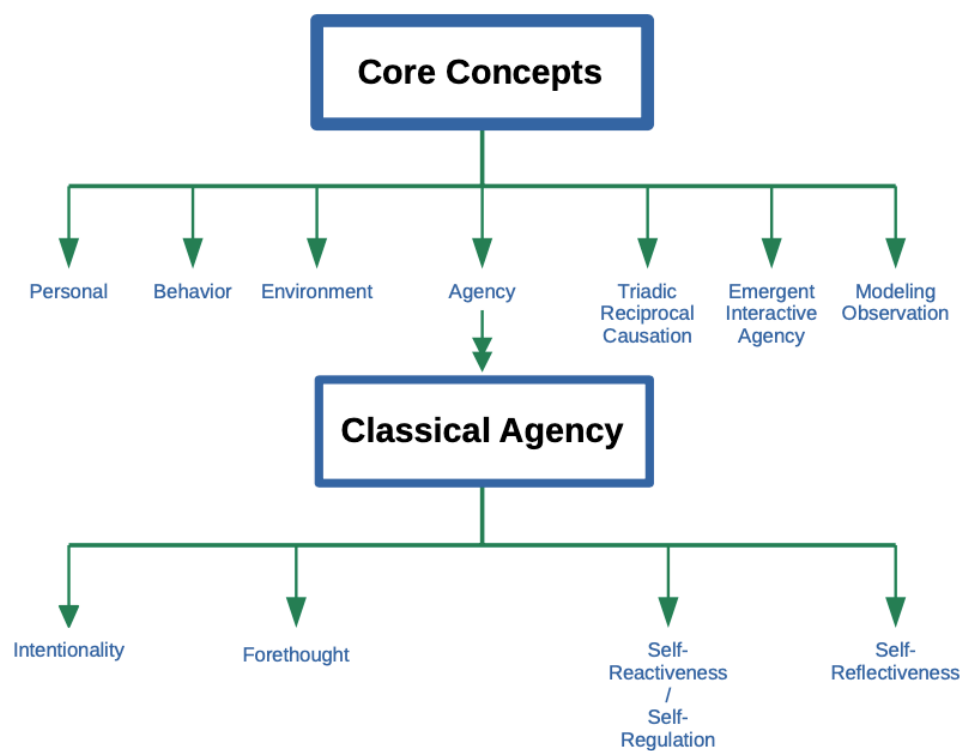


Figure 6

Social Cognitive Theory Core and Agency Concepts

Intentionality

Participants proactively shaped their social media experiences, tinkering with their feeds and other choice recommendation features and utilizing them to their advantage to execute personal aims and goals. As social cognitive theory posits, individuals can shape their

environments and experiences through agentic acts and to that end, direct the trajectory of their lives (Bandura, 1999). One pathway is through exercising intentionality or “acts done intentionally” (Bandura, 2001). That is, people can make deliberate choices and execute them, including, for example, whether to adhere to the desires of others or exercise self-interest (Bandura, 2001). In essence, intentionality is a proactive commitment to carry out individually desired aims (Bandura, 2001). This dimension of human agency can be simply stated as, “I intend to” and carrying out that intention. Yet how well or precisely that intention is discharged may not be fully developed at this stage of agentic expression (Bandura, 2001).

A 20-year-old male who relishes Facebook, Twitter, and YouTube, Matt is employed in the cloud gaming industry. One day on YouTube, he noticed a personalized ad on the platform for a company that competes against his employer — delivered by the features under study here. “It weirded me out personally that Google would try and personalize ads to that sort of razor specific type of content,” he said. Throughout the interview, Matt expressed strong distaste for Google’s algorithms and choice recommendation technologies, finding them to be invasive and “creepy,” particularly YouTube. When he saw the competitor ad, that was a tipping point where he decided to act, executing a key step to directly address the technology’s surveillance of him: “It made me very uncomfortable to the point where I just turned off ad personalization entirely at that point.”

A frequenter of social media who is immersed in the environments up to 10 hours a week where she likes to scroll and check out stories that interest her, Rachel conveyed that she is intentional about her social media use and what appears on her feeds, particularly on Facebook. Spending about a half hour a day there, she uses the platform as her primary news source, particularly to understand what happened in the world while she was asleep, an intentional action

that she repeats. Illustrating her broader mindset, in life outside social media she reported being incredibly intentional about her actions, able to effectively stay “on focus with what I’m doing” and that inclination translates to social media where she does not get “sucked down that rabbit hole” when alluring recommendations appear. She is the “type of person” that sits down and finishes her work, then “it’s free time,” while friends she knows are susceptible to losing themselves in their social media worlds.

A New England Patriots fan, Raja wanted to ensure he was always alerted to the latest news regarding his favorite team. So, he liked their team page on Facebook, an intentional action that increased the likelihood their content would appear on his news feed, a process he follows for other content he wants to appear there. When Patriot’s content surfaces on his feed because of the recommendation engines, he’ll read it, then sometimes click on the link appended to the post, which directs him to websites offering more team information.

The 23-year-old, who mainly uses Facebook and reported spending 8 - 10 hours a week on social media, has also established moments in the day when he chooses to use the platform, a sequence suggestive of intentionality. For example, he will hop on Facebook while on lunch break at work. Occasionally, he heads there to satisfy an intention of his, e.g., if a high-profile, local event occurred he will open Facebook to read news about it. Social media is where he reads the news, and he knows that is where he will find that type of information — the place where he can indulge these desired aims.

Jennifer, who cycles on and off with using social media, is very intentional with the recommendations Instagram offers her. She described a variety of actions she takes depending on the recommendations the engines provide, all of which are reflective of acts done intentionally in response to environmental conditions and considerate of her personal preferences. She will

reliably breeze past content that does not appeal to her or that is utterly uninteresting. If content is highly disagreeable to her, typically political content, she tends to mute it, so she does not see it again. If she is indifferent to what is appearing on the features, she will rapidly scroll past free of further interactions. She noted it is rare for her to block recommendations, but if she feels strongly enough about it, she will take that action and she observed the algorithm is “usually pretty ... effective” at removing the suggested content from her feed.

Forethought

Participants were not mere reactors and responders to the choice recommendation engines, uncritically approaching the technology and allowing it to push them in any direction it suggested. Rather, some exercised forethought, knowing what they wanted to achieve from the experience and technologies, and planning in advance for how to achieve it. These acts were reflective of Bandura’s dimension of human agency where to control and sculpt outcomes people engage in forethought. They set goals, they predict the consequences of actions, and they reflect upon paths, before walking down them, that are more likely to lead to the attainment of desired goals and outcomes, while steering clear of scenarios that are more likely to harm these ends (Bandura, 2001). In this type of agency enactment, people forecast what they want and use those forecasts to regulate and motivate future behaviors. In this vein, several participants expressed how they forecasted goals and outcomes they wanted to attain from social media and the choice recommendation engines. Those forecasts also corresponded with future behaviors that ultimately led to the achievement of their objectives on the platforms, they reported, though in some cases the engines sidetracked them despite exercising forethought.

A fan of Facebook and Instagram, Nicki heads to the platforms animated by the goal to peruse the news, as social media is her top news source. “So sometimes I’ll get on with the goal

of like, today, I want to find out what's going on in the pandemic or what's going on with the election,” she said. However, while exercising a pattern demonstrative of forethought, with behaviors linked to that forecast, Nicki conveyed how her news goal “gets sidetracked pretty quickly,” especially if news is not the first information that appears on her feeds. This sequence reflects the bi-directional influence of environment and agentic expression, whereas forethought is exercised yet potentially sidetracked. Another goal she forms in advance is a desire to check out a specific person’s posts. So, she’ll turn to the platforms' primary feeds to find it — opting to scroll there instead of directly searching for it.

John, who typically uses YouTube to listen to music or watch videos, will bookmark videos the engine recommends for future viewing sessions, a sequence suggestive of forethought. In addition, John occasionally hops on YouTube motivated by a goal to view particular content. However, reflective of the bi-directional influence of environment and agency expression and the varying intensity of influence of each, a sidebar of personalized videos appearing on part of the platform occasionally offers non-goal oriented recommendations “that’s actually really cool” and if time allows, he will watch that instead.

Jimmy, who does quick checks of Facebook and Twitter to see what his friends posted, said he logs on to the platforms driven by a forecasted goal about once a week, particularly if he wants to find “something that’s cool” he's heard about. But like the other participants, he also recalled an experience where the recommendations offered him an unanticipated fork to his path. He wanted to see a “cute cat video” he had previously viewed, a sequence soon reflective of forethought as he forecasted where and how to attain that goal, then enacted a cycle of behaviors that would guarantee fulfilling it. He searched and after viewing it, a platform’s recommendation

engine then offered other suggestions:

You know, like, one second, I'm looking at cats. And the next thing I'm looking at one of those, one of those hydraulic press videos ... like, you know, those things like where apparently it's like super satisfying, where they put things under hydraulic press, and it presses them flat ... something like that.

Self-Reactiveness / Self-Regulation

In contrast to the other dimensions of agency that are more deliberative and reflective, self-reactiveness and self-regulation are action and behavioral oriented. In this vein, to be an agent is “to give shape to appropriate courses of *action* and to motivate and *regulate* their execution” (Bandura, 2001, p. 8). Thus, individuals *act* and *react* to the situations before them — *self-reactiveness* — and they *regulate* their behaviors to attain the goals and outcomes they desire — *self-regulation*. As the previous dimensions of agency delineate, people not only develop intentional courses of action and forecast the best path forward, they also *react* to environmental and personal conditions, and they *regulate* their behaviors, in the face of those and other conditions, to achieve individual goals, aims, and desires (Bandura, 2009).

Reflecting on her interactions with Facebook’s main feed, Rachel conveyed several experiences indicative of self-reactiveness and self-regulation. While engaging with that tool, Rachel noticed the posts that appear are not in chronological order. She observed posts that were several days old, which made her a “little bit angry.” But fresh posts are also part of the mix, she detected, so now she checks postdates, a behavior suggestive of self-reactiveness to the engines. Indicative of other shades of self-reactiveness, she also ignores old posts and keeps scrolling

until new material appears. Suggestive of self-regulation, Rachel also controls her social media use, so it does not detract from offline activities. She said she is cognizant of how the platforms and technology can pull you into a rabbit hole where control is lost — an outcome she tries to avoid, though it happens from time to time: “I mean, maybe once or twice, I’ve seen something and then I’ve been like, okay, I’m gonna go look into that more and then it pops into something else that I’ve got to go look into.” Despite this flow, indicating self-regulatory behaviors she will shut down Facebook when she needs to return to offline activities, overall describing herself as “good at” directing her focus where she feels it needs to be steered and not letting the platform hijack other life aims.

Like Rachel, Jimmy also conveyed experiences reflective of self-reactiveness and self-regulation with the enactment of both reinforcing each other in his case in the following scenario he offered. Similar to Rachel, Jimmy is sensitive to the power of the engines over him. The suggestions the tools offer can drop him into a rabbit hole at any moment. That outcome “wastes a lot of valuable time,” he reflected, and he tries to prevent it from happening. To do that and suggestive of self-regulation and self-reactiveness, he sets use time limits: “Because I know that social media these days ... can be distracting, and it can just keep you from doing whatever is more important.” Within that self-regulated limit — and also indicative of self-reactiveness — he will check Facebook and Twitter, “then it’s back to work.” If the engines offer him enticing content and his time limit has expired, he saves the content for later review.

John also described agentic expressions suggestive of self-reactiveness and self-regulation in his interactions with YouTube’s personalization engines. He often looks at the time length of the suggested videos and that indicator signals to him whether he has the time to watch it, or not, a sequence demonstrative of self-reactiveness and self-regulation. Though not always

successful, like Jimmy, John as a regulatory strategy also tries to set aside blocks of time to constrain his use of YouTube, for example if he just finished a physics class problem, he will watch 15 minutes of videos, stop, then return to his offline physics homework. This imposition also influences how he reacts to the video suggestions the engines offer, with the desire to stay within his time limits also encouraging him to evaluate the video length indicator. “And oftentimes, I'll look at the times on those and be like, oh, this is a 12-minute video, I'd be willing to watch this one. But this 30-minute video, probably not,” he reported. After watching the shorter video, he will switch back to offline activities like the homework — a sequence indicating how social media self-regulation and self-reactiveness preserves his offline goals, while also balancing those needs with his desire to peruse YouTube. This strategy, however, sometimes disintegrates with “random tangents” occasionally arising on YouTube where he at the end of a sojourn egged by the engines suddenly recognizes an hour has slipped by unnoticed. He is susceptible to that erosion of goals and desires, he reported, especially if its feeds offer him quality suggestions that perk his curiosity and converge with his interests.

Ashley, from focus group 2, reported that she is constantly reacting against the recommendations offered by YouTube in an effort to nudge the engine to deliver her content precisely attuned to her interests. Every time she is on the platform, she will manually signal to the engine her disinterest in suggestions straying from her tastes, she noted. She also relayed how one time she "completely deleted" her YouTube account "because it was offering me a ton of like wrong videos, and I couldn't figure how to like not get those recommended anymore." Vidal, from focus group 4, took a similar action by deleting TikTok but for a different reason. He conveyed that he "spent way too much time on it," in some cases "four hours straight and it was just bad." Despite platforms' being designed to keep people online longer through algorithms and

other technologies, he does not feel social media should be regulated because it is the "user's choice" to be there. "It's still your choice to stay on it," he said.

Self-Reflectiveness

Participants reflect on their interactions with the tools, reflections that also indicated cognizance and self-awareness regarding their actions and behaviors in the environment. These reflections also appeared to influence platform behaviors, such as informing tool engagement and use. As the previous dimensions make clear, agency expresses itself in a variety of forms, and these expressions — innate human capacities as social cognitive theory posits — allows people to attain what they desire from the environments pervading them. Self-reflectiveness is another dimension of agentic capability — or expression — in which people examine themselves, including their functioning, decisions, and “adequacy of one’s thoughts and actions” (Bandura, 2001, p. 10). These reflections may also inform future actions. Through these self-reflections, people evaluate their motivations, meanings, pursuits, actions, and values. They also reckon with the outcomes of behaviors and observe the impacts of their actions upon others (Bandura, 2001). In essence, this self-reflective dimension of agency allows individuals to inspect their actions and thoughts, particularly as to how they align with environmental conditions and goals and to determine if any adjustments should be made.

Sally, a 23-year-old female who uses social media to learn about the ongoings of friends, said she reflects on which feeds and platforms will satisfy her mood. She then acts on those reflections. If she’s in the mood for videos about games, for example, she will think about which feed will best serve her — in this case, Facebook over Instagram. “I’ve definitely reflected on it, because I feel like I know what each platform is going to give me, like the content,” she said. In a different case, during the 2020 social justice movements she noticed how Instagram’s

algorithm was feeding her unrelated content she did not want to see, as she characterized it “like influencer ... crap and stuff.” Reflecting on this, she decided to avoid the platform’s Explore feature, which seamlessly channels algorithmically selected organic content to users with little to no intervention by them: “So that's how I've kind of reflected on that where I felt like the algorithm wasn't giving me what I wanted to see in that moment. So, I just didn't want to visit that page, like the Explore page,” she said. Because of these reflections, Sally, who reported she immerses herself in social media environments more than 10 hours a week, ended up finding social justice commentary via her own interventions, heading directly to content and pages, and sidestepping the algorithm all together. In these examples, her reflections guided future behaviors, as opposed to the technology deterministically maintaining control and ferrying her around, her account suggests.

Brian conveyed thorough reflections he has had about his social media use and the engines. Those reflections, admittedly, drove him to deactivate and delete his accounts. “Do I actually care about these quote, ‘connections?’ These quote, ‘assumptions,’ these quote, ‘personalization.’ And then realizing like, wait, no, I really don't care about it,” he said. After taking those actions — and upon further reflection — he felt his life was better off: “And I realized, like, wow, my life is so much more greater. I don't feel like there's a control over me to be on that app, to engage in stuff that I don't really care about after a certain degree.” After a few weeks, however, he returned to the platforms and that decision reactivated typical cycles of behavior for him in the environments.

Jimmy related how he occasionally reflects during his social media journeys, especially if he gets tugged into a rabbit hole. In the aftermath of that outcome, he will suddenly become aware of what happened and wonder why it did: “When I stopped, I'm thinking like, oh my gosh,

what the hell was that, what the heck have I done?” A fan of Facebook, Twitter, Snapchat, and Instagram, Janet, a 19-year-old female, also reflects on the feeds, including what they are offering her during her social media sessions. She will ponder why certain content is surfacing and why certain companies are marketing their wares to her. She will also reflect on how content that is appearing relates to other content she has looked at in the past, “especially if it seems like kind of random.” She will also think about the ads that appear, especially ads that do not pertain to her interests or wants. It makes her think: “Where are you getting this from?” Regardless of these reflections, however, her interactions with the tools are, at times, automatic and devoid of reflection, she reported.

Supporting the Theory

The findings presented above support social cognitive theory as a theoretical framework to help explain the acts, behaviors, and outcomes that can emerge from interactions with the tools. The findings also comprehensively address the research questions: How do social media users respond and react to the personalized dimensions of the environment? In what ways is individual agency expressed and how does it progress? What other individual-level dimensions appear to be activated when individuals interact with the tools? Overall, the findings demonstrate a spectrum of agentic variability and expressions manifesting in these environments. The next chapter will present emergent findings. Supported by participant experiences, the novel concepts outlined there support the need to augment social cognitive theory for this context.

CHAPTER 5 — FINDINGS, FLUID AGENCY

Introduction and Summary

Participants demonstrated other actions and behaviors that did not appear indicative of the sequences and flows of agency expression as delineated by social cognitive theory. While participants relayed experiences that aligned with the concepts elaborated in the previous chapter, they also reported other outcomes and agentic expressions that were far less structured, intentional, and deliberate than as presented by Bandura's theory — a far more *fluid* and *reactive* agency that still resulted in decisions and reactions in response to the tools and that still indicated bi-directional influence of person and environment, yet of a far less methodical, systematic, and anticipatory orientation.

Participants relayed these outcomes of their experiences engaging with the tools during interviews and focus groups, essentially representing emergent data and revealing a medley of novel agency expressions as interpreted by the researcher from their reports. These concepts presented the need to posit a modified version of social cognitive theory for this unique technology context — this study's contribution to the literature — in addition to further supporting social cognitive theory for use in this milieu. Emergent concepts are as follows with researcher generated conceptualizations and illustrative examples from the data also provided. This section and the concepts also will highlight points of contradiction in the previous accounts where participants expressed engaging in incredibly intentional actions on the platforms, such as utilizing forethought and self-reflection, only to have those plans and sequences seemingly overridden by the engines.

Pivots

Participants reported turning to social media and the tools to seek goals and to carry out specific intentions, a sequence delineated by social cognitive theory, yet the recommendations swiftly brushed away those plans resulting in unanticipated behaviors and other outcomes. This dimension of fluid agency was termed pivots, in which participants intentioned, desired actions — forms of which constitute social cognitive theory’s agentic framework — are seemingly altered by the engines, i.e., nudging them *to pivot* in a new, undetermined direction like a fork magically, and suddenly, placed on a forest path. This dimension, and others below, highlight how the environment can modify — and in some cases, subvert — even the most well-intentioned goals and aims. See Figure 7 in the text that follows for the five dimensions of fluid agency.

As previously noted, on occasion study participant John has goals in mind when he opens YouTube. But that goal will suddenly shift, or be modified, when a “good recommendation” pops up on a highly fluid section of the platform that is automatically populated with machine-curated videos courtesy of the choice recommendation engine. These recommendations trigger him to pivot from his goal to the information pathway offered by the technology, with new behaviors arising in kind. If the engines are “nailing the recommendations,” as he put it, he is even more likely to be enticed to shift his priorities, particularly if the recommendations are “spot on.” As noted in the literature review, a key ingredient of the technology is its ability to “personalize” information, i.e., channeling identity aligned information to users based on finely tracking their platform movements, with the aim to keep them engaged and there longer. In John's case, it worked, and he pivoted away from his goals. In the scenario he offered, he will

now watch multiple videos — instead of watching just one and redirecting his focus back to his goals.

Nicki offered a similar sequence, though wedded to her interests and taking place on different platforms, namely Facebook and Instagram, which demonstrates how the general nature of the personalization technology spans multiple platform environments and how it can elicit similar behaviors from users in each. As noted above, Nicki hops on the platforms to check out the news. However, that goal will be sidetracked “pretty quickly” if “that’s not the first information that I see once I get on.” Instead, the recommendations offered by the platforms’ engines mobilize new, unanticipated behaviors, triggered by suggested content unrelated to her goal yet still interesting to her, she reported. So, she will follow that new pathway and “go down that rabbit hole instead” — a sequence indicative of a pivot.

Mirroring these experiences, Jimmy offered an example of when he also pivoted away from a goal because of the engines. For his goal, he craved to re-watch a cat video he saw on YouTube. However, the engine offered another video and automatically played it. So “one second I’m looking at cats” and “the next thing I’m looking at one of those, one of those hydraulic press videos,” he noted with a laugh reflecting on these types of videos where the content creator uses a high-powered hydraulic press to smash objects into smithereens. Like these accounts, Tony also recounted experiences suggestive of pivots. He has set goals of yearning to watch a particular YouTube video, such as of inspiring American entrepreneurs and elite military units. However, he estimated 90 percent of the time that goal is deflected by recommendations offered by the engines. “I get sucked into it and watch, like at least one or two more videos because it was based off of a recommendation,” he said, adding the suggestions

coax him down a path of watching more videos than intended. In his words:

If I had the goal to watch just one YouTube video, I mean, that's awesome. But the recommendations just set up so well, that it just drags me in even more every single time. It just sucks me in, and I just can't get out of it sometimes.

Flows

Several participants described a state in their social media travels akin to what psychologists call flow where a person is aware of their environment and the actions they are taking in it, yet they are not intensively analyzing themselves or minutely scrutinizing their behaviors (Ovington et al., 2018). For participants, there were occasions when intensive, critical thinking did not appear to be deployed, nor were carefully plotted action plans forecasted or developed, they reported — the latter of which are agentic expressions indicative of intentionality, forethought, and self-reflectiveness, i.e., structured, classical agency. In contrast, flow signals a far more seamless and far less intensive thought and behavioral state, with the choice recommendation engines also serving a more distinct role in that shift of agentic expression. In this dimension of fluid agency, meta cognitive and other reflective states do not appear to be in play; instead, the participant seemingly enters a less analytic and behaviorally intentional state, responding and reacting to the suggestions provided by the engines, yet not, from the appearance and interpretation of their reports, critically analyzing their interactions or themselves in the moment, e.g., how their choices may lead to certain outcomes on the platforms.

Jennifer characterized some of her interactions with her feeds as unconscious scrolling, a state that “ebbs and flows” depending on the recommendations offered by the engines. She will

scroll for long periods of time — which she described as a “series of scrolling” — particularly if no content draws her in. Ebbs, or more focused interactions, result when the engine provides relatable content, like about her friends and family — “if it's something that's posted by either a close family member, or a close friend of mine, then I usually pay a lot more attention.” On the other hand, less intriguing, non-affined recommendations result in the flow states where long periods of scrolling and passive engagement ensue — more unconscious and unstructured in nature.

Reflecting on his interactions with Facebook and Instagram’s feeds, Jordan characterized his responses to these tools as more reactionary and “very passive,” as opposed to him being intentional with the experience as structured agency would presage. Overall, he does not feel he controls the feed or the experience; rather, he believes the feeds are in control of what appears, which also results in his dependency on the engines, an agentic expression that is far less overt than the sequences outlined by Bandura. He described, instead, interactions more akin to flow, where he is aware of the environment and his actions, yet he is far from intensively analyzing his time spent there, or carefully plotting goals and aims. Describing his experience, he said: “So a lot of it is just ... just passive scrolling, whatever comes up.” As he navigates the feeds, he said “there’s really not a whole lot” going through his mind.

In a similar experience, Tammy related how Instagram Reels — an algorithmically powered feature that swiftly aggregates videos — stirs her to “mindless scroll.” The feature offers “one video after another.” And because of how it lays out videos in a seemingly endless scroll, she also finds herself viewing content “I just don’t really care about.” In that mindless scroll state she described, she further related it is “pretty slim” she will more actively, or intentionally, engage with the experience. She also conveyed that this state, suggestive of flow,

occurs “a little bit every day,” which was “really sad to admit,” she said with a laugh. “As far as mindless, completely mindless scrolling goes, I would say maybe 30 minutes a day,” she noted. The engines are responsible for these behaviors, she added. Characterizing the experience in her words:

Like, I live alone. So, it's like, oh, I just sat down to eat, and I don't want to eat and not do anything, or I just got home from work. And I'm laying down, and I'm not really trying to make my brain work at all type thing.

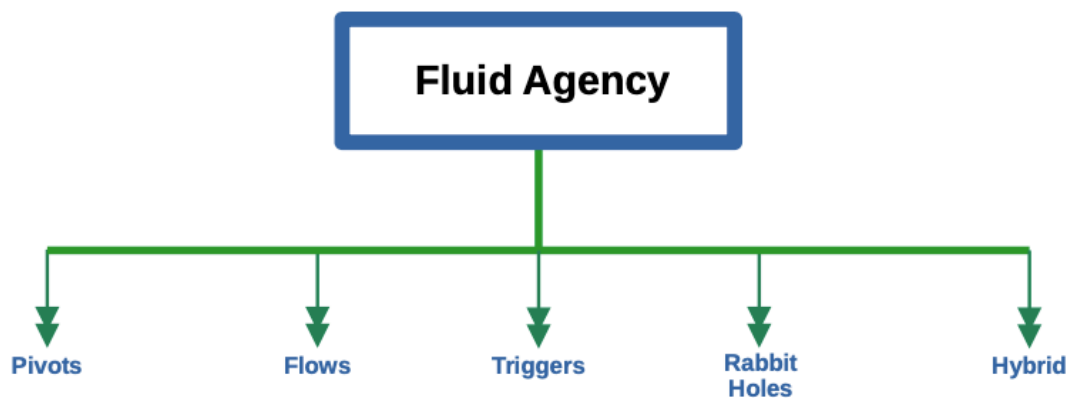


Figure 7

Fluid Agency

Triggers

Participants discussed how the engines triggered them to engage in a myriad of new, unexpected actions — some of which deviated from their desired intentions and goals. Key to this dimension is that *specific features and suggestions* appear to spark — i.e., trigger — new intentions and behavioral patterns. For this dimension, some participants entered the

environment with a goal or plan in mind, but the engine “triggered” them, through recommendations offered by specific features, to embark on a novel, unexpected path.

Critical to understanding this dimension of fluid agency and the distinction that sets it apart, isolated features of the engines trigger different behavioral patterns. Further, participants’ agency appeared to morph from the more structured, classical type as social cognitive theory delineates to the more fluid variety, posited uniquely in this dissertation, in which decisions were made yet through far more flexible approaches. Additionally, and similar to the fluid agency concepts delineated above, this dimension also highlights how the environment — the machine-powered, algorithmically-driven features — can influence and reshape the agency of users.

As previously described, John chisels his social media sessions to stick within predefined blocks of time. This more structured agency is reflective of self-regulation, where a person regulates their behaviors to help achieve personal aims. However, while evoking that structure, various features of YouTube’s recommendation engine trigger him to go on “tangents” where he may, in one example, watch a sequence of recommended videos, particularly related to a favorite game he plays, *Magic: The Gathering*. In that example, the engine suggests specific videos about the game. Reflecting on this sequence, he said: “But so sometimes I’ll go on tangents where it’s like, oh, I just watched a game and recommends me another magic game and I’ll click on that.”

A different content type and feature can also coax him in an unforeseen direction. At times, the engine offers suggestions outside the scope of what he intended to view and outside the scope of his usual interests. These types of suggestions appear on an isolated, platform sidebar where personalized content is incessantly poured there by the engine. “So then oftentimes, I’ll pause and like, oh, that’s interesting that that showed up, do I want to watch this? Yes, or no? Go from there,” he reported. This uncommon content catches his eye and causes him

to pause and to reflect if he wants to examine it more. The platform's homepage also triggers patterns of behavior for John. There, a slew of algorithmically sorted videos appears for users — courtesy of the platform's underlying choice recommendation engine. If the suggestions converge with his interests, it will trigger him to click and watch — and lead to potential viewing of more videos.

Janet noted several different features of the engines that can trigger her to enact a wide range of behaviors. Notifications pertaining to suggested content nudge her. When the engines recommend other user accounts to follow that can also coax further engagement. Other elements of the engines, such as “trending topics” sections, are not as powerful, she reported, but they can redirect her. Sam described multiple features that appear to trigger behaviors. When she sees “something’s trending” (an algorithmically driven feature) on Twitter, she will occasionally click on the organic topics highlighted in that section, particularly if it “piques my interest.” Twitter’s trending feature “quite regularly” activates these sequences, e.g., displaying a viral topic in that section of the platform and enticing her to click on it. Instagram’s Explore feature also triggers a similar sequence, surfacing unexpected content that prompts her to unexpectedly engage with it. She will “swipe over” to Explore and “then suddenly it’s a whole bunch of things ... something that I’m into.” In her words, she said:

I'm like, oh, sick, but also, it's like, oh, okay, I guess this is what I'm gonna look at today. ... Sometimes it is a little unexpected. It's like, oh, I didn't realize that I had, like, interacted with enough content for you to show me a whole bunch of stuff related to this, like, okay, I guess this is happening now. Like, let's, let's go on.

Rabbit Holes

Several participants reported an unanticipated outcome they attributed to the engines where their agency appeared to be constrained, time seemed to disappear, and a pattern of novel behaviors emerged where they appeared to have less control. This dimension of fluid agency was classified as rabbit holes, a term used by some participants to describe this peculiar outcome of their interactions with the tools. Participants unambiguously described entering “rabbit holes,” whereas the image implies, they reported losing sense of place, self, and time because of the allure of the suggestions the engines provided. For this outcome, participants were swept into the world of the recommendations, and they appeared from their reports of their experiences to be engaging in highly unstructured decision making — little to no intentionality, forethought, self-reactiveness, or self-regulation. In the midst of the rabbit hole, the technology appeared to have more sway over their actions and behaviors, instead of them dictating control and defining goals as classical agency would have it. Overall, they seemed along for the rides dished by the engines — and not enacting intentional choices or behaviors — hence off into the “rabbit hole” where they emerged later after a lengthy, freewheeling traverse.

Tommy offered his experiences of them. He enjoys the engines because they keep him engaged and display content suggestions he may have never seen before. However, he also noticed the tools seem to encourage addictive behaviors for him, what he termed a rabbit hole. Describing this outcome of his interactions with the engines, he noted:

But then I also feel like there's a loss of, you know, privacy and maybe like an addictive habit to it, like, it wants me to keep, you know, going down this rabbit hole of finding more stuff that I'd like, you know, maybe what I wasn't even looking for in

the first place.

These rabbit holes occur frequently for him, and in that state, he does not feel “like I’m really thinking” while scrolling. “I’m just scrolling,” he said. He also loses track of time, so much so that five minutes becomes ten minutes, and so on and so forth. “You know, five minutes turns into 10 minutes turns into half hours just looking at different things, seeing different analyzations, different opinions on something,” he said.

Like Tommy, Bobbi conveyed how she loses track of time when she gets hooked and tugged by YouTube’s video suggestions. While she subscribes to content creators and intentionally watches their videos — a clear agentic expression indicative of social cognitive theory’s structured forms of agency — she ascribed about half her YouTube usage as watching “recommended videos in one way or another.” To that end, she relayed how she sometimes watches YouTube all day, either letting it play in the background while she is working or during leisure moments where she is more attentive to the suggestions. These long watch times — and the rabbit hole outcome — she attributed to the pure “succession of recommended videos” offered by the platform’s choice recommendation engine. Joshua, from the first focus group, related how he gets pulled into a rabbit hole “nearly every single time I get on social media,” particularly on Instagram where he will hop on the app lured by a notification or direct message. But he is soon “swayed towards my feed and then to the Explore page.” Suddenly, 30 minutes has passed, and he had “no intentions of doing that beforehand.” Ihor, from the third focus group, described the effectiveness of TikTok’s algorithms on him, nudging him to stay on the platform far longer than anticipated. Instead of a rabbit hole, he likened the experience to a “black hole”

where "an hour later" he wakes up from what felt like a trance. "And I'm like, what did I just do?"

Like these participants, Sam also described how the technology constantly pulls her into rabbit holes of never-ending suggestions that she enjoys and follows along with — and of particular relation to this outcome, a key feature driving it, Instagram's Explore feature. She characterized that feature as uncannily precise in its ability to detect her interests. And like a recurring spring, she observed how that tool constantly flushes her feed with fresh suggestions related to what she has been recently engaging with on the platform. "And I'll be like, oh, cool, I'll go down another rabbit hole and then it'll start repopulating based on what it wants to see and things that I'm interested in," she said.

While helpful, she described the choice recommendation engines as "creepy" because it can identify her interests so well and by way of carefully combing through her platform interactions. Despite this knowledge, she reported succumbing to numerous rabbit holes because the engines know her well and instantly shuffle affined content her way. "There's just constantly like pulling my attention. And when it's so like specialized ... specific ... targeted ... that I'm more compelled to go down rabbit holes than if it was ... about things that I don't necessarily care about," she reported. "It's extremely tailored and it's unsettling, but it still draws me in." For her, Twitter's "For You" tool also initiates this cycle. Its suggestions are compelling enough to suddenly tip her into a behavioral pattern indicative of the rabbit hole concept described here. In her words, she noted:

Like there's a lot that's talking about D&D (Dungeons & Dragons), and things that are talking about, like, all of the protests going on, it's like ... these are exactly things that

you're going to be into, and it just creates, like ... just an endless sort of scroll at least for a little bit.

Social Cognitive MAD (Machine Agency Dynamic) Model

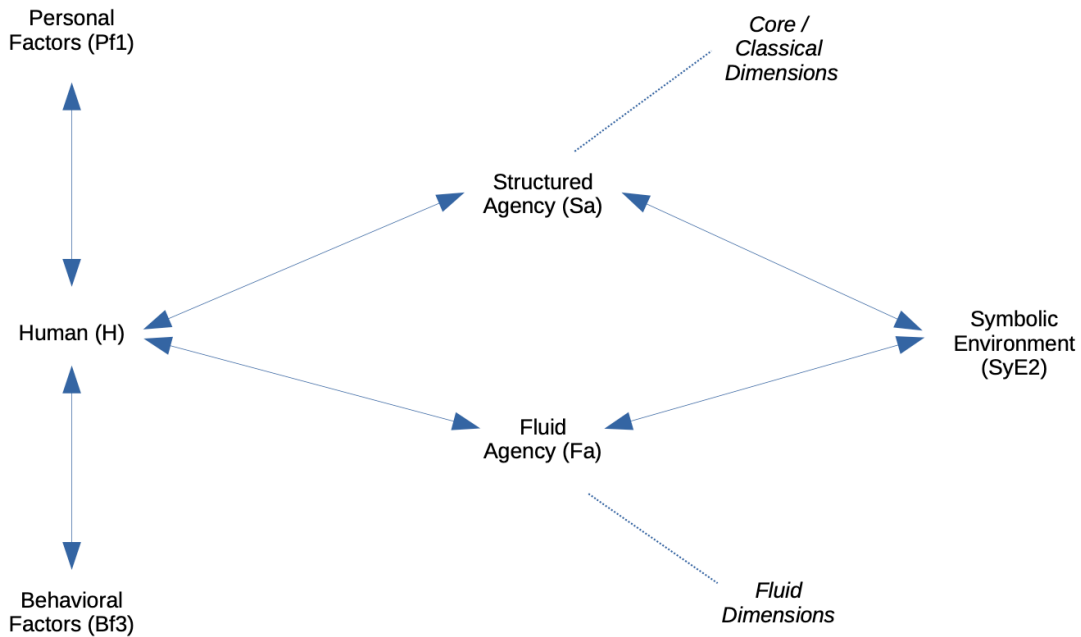


Figure 8

Author's SCMAD Model

Hybrid

Participants described social media sessions where multiple agentic expressions appeared to be mobilized in response to the tools (see Figure 8 for an overview of the agency expressions and the study model). In these sessions, participants seemed to toggle between structured forms of agency and the more fluid responses delineated above. Participants reported making choices that can be interpreted as intentional in the environment, agentic expressions more in line with social cognitive theory, then describing moments where they seemed to flip to a more fluid and less deliberative agency. In essence, participants appeared to fluctuate between these modes, an

outcome representative of this dimension, hybrid agency. This toggling appeared to correspond to several factors, including their objectives, the offerings of the information environment, the platform, and the engines.

Ultimately, this agency dimension reveals how several of the concepts sketched above can be activated and intertwined in a single session. For this reason, in this section, some repetition of participant accounts occurs, as some of their accounts that were indicative of structured and fluid acts described above will be combined below to show how they represent hybrid agency.

Jennifer's experiences are indicative of this shifting of modes, and the magnitude of each shift, for her, appeared to depend on the platform she was utilizing. For Facebook, she said about 60 to 70 percent of her interactions with its primary feed are "unconscious," i.e., less intentional and fluid, while 30 to 40 percent are conscious, i.e., more deliberate and intentional. For Instagram, she said about 80 percent of the interaction is unconscious, while the remainder is more effortful and deliberate. Offering another and more specific example indicative of hybrid agency, she relayed how she is deliberative on Instagram, logging on, for example, with a goal to search for particular information, a sequence reflective of structured agency. However, the platform's choice recommendation engines will surface "something else" that catches her eye and that causes her to click on it — a more fluid expression. In those moments, she tells herself that she will return to what she intended to look at. "And then I'm like, I just want to look at this, you know, comic real quick," she said. From there, it "devolves" and soon she is asking herself, "I'm like what was I going to look for, aw man!"

Like Jennifer, Tammy also appeared to toggle between structured agentic expressions in response to the tools and what she characterized as mindless scrolling — a more passive and

fluid form of engagement. For about 30 minutes a day, she is “completely mindless scrolling.” However, the experiences she relayed also involve more intentional acts, for example, when she wants to deliberately “sculpt” her feed so that content she dislikes does not appear. To deter certain suggestions from surfacing, she decreases the time she spends scrolling on her feed. She also reduces overall social media usage, so the engines do not become “too specific on me.” However, while taking these more careful actions, she will occasionally switch to “mindlessly scrolling,” with these transitions all suggestive of hybrid agency. Reflecting on these experiences, she said: “I’ll really go like, most of the time, I try to tailor it. Um but then again, there’s times that I might like mindlessly scrolling.” In another instance of hybrid agency, she tracks where she generally spends her time and determines moments in the day that are best suited for social media use, sequences suggestive of self-regulation. But when she immerses herself in social media, she will sometimes scroll for 30 minutes and “not even realize that 30 minutes went by” — with these sequences suggesting a toggling from self-regulation to a more fluid state within the platform environment.

Like the other participants, Michelle also offered an account suggestive of toggling between intentional and more fluid forms of agency. When she opens YouTube, she usually has something in mind that she wants to check out, e.g., a topic or content, so she will initially ignore the suggestions the platform offers her. However, the engines surface recommendations on a sidebar that entice her at times. These recommendations can trigger behaviors indicative of fluid agency — and a shift to hybrid expressions — where she’ll “click on one thing, and then, you know, it’ll bring up something similar by the same creator, so then I click another thing, and I kind of go down that rabbit hole,” she reported.

Adapting the Theory

The results presented in these chapters indicate social media users engage in a variety of acts during their interactions with the choice recommendation engines, with some of these agentic expressions reflective of the theoretical understanding of how individual agency can unfold as posited by social cognitive theory. However, emergent findings detailed in this chapter also suggest the need to adapt the theory to this unique environmental context. Novel shades of agency, particularly the rapid shifts in expression described above, are not accounted for in the theory and the reviewed extant literature.

Emergent findings support the need to refine the theory for use in this unique technological context. These findings particularly demonstrate how the tools and the suggestions they provide appear to induce rapid, less structured decision-making in contrast to the structured agentic sequences delineated by Bandura where individuals form goals and regulate their behavior to achieve them. Instead, other shades of agency appear to surface, some of which indicate the power of the technology over the individual. A more detailed summary and discussion of these findings are presented in the next chapter, including discussion of how critical realism contributed to the project and theory development, as well as presentation of the explanatory model.

CHAPTER 6 — DISCUSSION AND CONCLUSION

Discussion

Today, social media's choice recommendation architectures are behaving as designed, nudging users on a variety of information and social pathways through carefully calculated suggestions (Kozyreva et al., 2020). Powered by complex algorithms, these technologies underlie all major commercial social media platforms (Kozyreva et al., 2021) — features that this study's participants extensively reflected on. But despite these tools' power and reach, little is known theoretically and empirically about how individual-level cognition, behaviors, and agency can be influenced by these key elements of social media environments, as well as why they, performing as designed, can encourage new behaviors and shifts in agency as conversations with participants found. What are some of the potential psychological mechanisms involved in that interaction of individual and engine (e.g., Facebook's algorithmically powered feed/choice recommendation engine), including agency and the enhancement or erosion of?

Social Cognitive Theory and SCMAD Model

Supported by participant experiences, this research attempts to bring clarity to that knowledge gap and question by positing a new model that integrates Albert Bandura's social cognitive theory of mass communication (Bandura, 2009) and adapts it to this technology context through new concepts that capture agentic expressions not represented in the original theory. Aiding greater understanding of how individual agency can express itself in response to these engines and the information suggestions they offer, the Social Cognitive Machine Agency Dynamic (SCMAD) model, this author's creation, benefits from social cognitive theory's extensive focus on individual agency and the interplay of factors that lead to its emergence (Bandura, 1989a). Through a social cognitive lens and the model, participants responses to the

tools become explicable via a psycho-environmental framework, e.g., demonstrating how participants' cognitive factors, such as personal goals and inclinations, appeared to influence their platform behaviors, as well as how the environment — i.e., the personalization engines — appeared to, in turn, influence them. Through the model and a social cognitive approach, explanation trumps description wherein the ambiguities of how and why some participants were able to "control" their social media experiences can be resolved by casting it through this theoretical perspective — understanding that "control" as a set of classical agentic processes ranging from intentionality to self-regulation, with personal and other factors also appearing to be involved. Derived from the qualitative data, the model also comprises novel agentic concepts that help extend social cognitive theory for use in this unique context. These novel agentic concepts, like rabbit holes and flow, bring clarity to why Sam, Tommy, and other participants appeared to be swept into a long-lasting swirl of recommendations where they seemingly lost control of their agency and themselves, including time.

Overall and shedding light on research questions one, two, and three, the SCMAD model offers a robust toolkit to help explain the psycho-environmental dynamics and swerves in agency that participants reported regarding their interactions with the engines and addresses deficiencies in the extant social cognitive literature through the emergent findings (Bandura 2018, Baran &

Davis, 2021; Lee et al., 2017; Pajares et al., 2009; Velasquez & LaRose, 2015; Xu et al., 2021; Zhao et al., 2021; Zheng & Lee, 2016; Zhou et al., 2020).

Social Cognitive MAD (Machine Agency Dynamic) Model

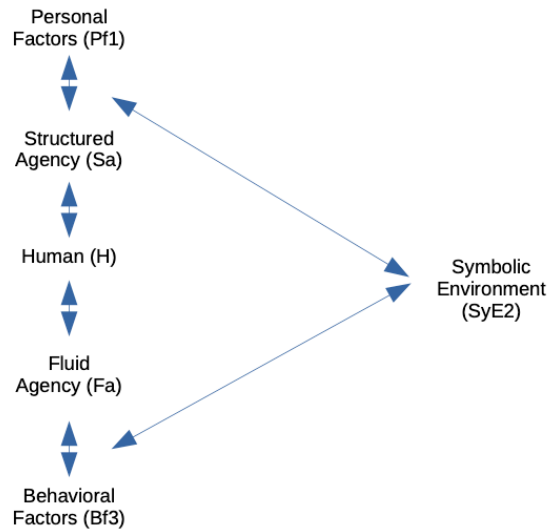


Figure 9

Author's SCMAD Model, Alternate Diagram Iteration

Drawn from a diverse range of participants' reported experiences with the engines (e.g., their Twitter feed, Instagram Explore feature), the findings suggest correspondence with individuals' reactions to the tools and the suggestions they provide and social cognitive processes (Bandura, 2009). Put another way, the findings support use of social cognitive theory, and thus part of the SCMAD model (see Figure 9), to help explain users' reactions to the choice recommendation engines, and with that, the swerves and variability of agency they reportedly experienced from tumbling down rabbit holes to enacting overt, strict measures of control. Participants conveyed experiences that were reflective of them exercising intentionality (e.g., knowingly sculpting the recommendations to their tastes), forethought (e.g., considering the steps they needed to take in the environment to fulfill their needs), self-reactiveness/self-

regulation (e.g., taking direct, overt actions such as deleting their social media accounts because they did not like the recommendations provided), and self-reflectiveness (e.g., reflecting on which platforms and feeds will provide a more satisfying experience). Why Ashley and Vidal deleted their YouTube and TikTok accounts because of perceived issues with the engines can now be understood as outcomes animated by explicable psychological and agentic processes (self-regulatory and self-reactiveness), i.e., a desire to shelve entities that did not satisfy personal goals and aims and connected with an array of cognitive processes in clash with an environment not attuned to them, as opposed to a superficial understanding, they just deleted their accounts. Why Jimmy hops on a platform and navigates to content he previously heard about reflects a complex and inconspicuous set of dynamics than this skim-of-the-surface description can provide, the potential activation of the human capacity to engage in forethought and envision the set of steps needed to achieve the goal before setting out to do so.

Overall, the findings and model bring clarity to the choices they made in response to the engines and its offerings, demonstrating how they regulated themselves and reflected upon their experiences in some cases and engaged in intentionality and forethought in others, all manifestations of agency delineated in social cognitive theory. In this vein, the findings support extending social cognitive theory, as represented by prior research, to this context (Bandura, 2009; Devi et al., 2017; Pajares et al., 2009; Turel, 2021; Valkenburg et al., 2016; Xu, 2021; Zheng & Lee, 2016). The findings also demonstrate how researchers could benefit from this rich toolkit, containing an enduring empirically supported theoretical foundation, to advance greater understanding of the cognitive, behavioral, and agentic impacts of use of these technologies (Bandura, 1989; Baran & Davis, 2015; Bryant & Oliver, 2009; Jenkins et al., 2018; McQuail & Deuze, 2020; Pajares et al., 2009; Valkenburg et al., 2016).

With extending social cognitive theory to mass media in the Social Cognitive Theory of Mass Communication, Bandura (2009) shifted focus from physical, social environments to symbolic, mediated environments, like television, where “a vast amount of information about human values, styles of thinking, and behavior patterns is gained” (p. 98). However, no study was found applying social cognitive theory to the personalization dimensions of social media, *making this study the first known attempt to do so*. Scholars have assessed the intersection of individuals and social media from a social cognitive perspective, though often treating the platform environment itself generally and not evaluating the personalization dimensions; theory concepts are also selectively utilized, such as self-efficacy, triadic reciprocal causation, symbolization, and self-reflection (Khang et al., 2014; Velasquez & LaRose, 2015; Zhao et al. 2021).

Consistent with the findings of this research, these and other studies supported utilization of social cognitive theory in social media contexts and also demonstrated the activation of social cognitive processes in these milieus (Khang et al., 2014; Lin & Chang, 2018; Saleem et al., 2021; Turel, 2021; Zheng & Lee, 2016; Zhou et al., 2020). This study builds upon this work and signals a new direction: theory applicability to the personalization dimensions of the environment, those elements that largely drive the experience and that are consequential and influential, particularly on human behavior (Kozyreva et al., 2020).

Social cognitive theory and the SCMAD model also help nuance critical theory, theoretical work, and popular media portrayals of users relationship with the technology, such as presented in the docudrama *The Social Dilemma*, where people are generally depicted as hapless responders to the engines with little to no control and with rabbit holes and the like ensuing (Bauder & Liedtke, 2021; Hagey & Horwitz, 2021; Orłowski-Yang et al., 2020; Wells et al.,

2021; Zuboff, 2019). A social cognitive lens — particularly the theory’s triadic reciprocal causation framework which casts individuals as both products and creators of environments (Bandura, 1989; Pajares et al., 2009) — help avoid the trappings of deterministic interpretations of the interaction (Bandura, 2018; Valkenburg et al., 2016). Social cognitive theory, in contrast, affords the researcher a far more nuanced framework that captures the complexity of this unique technology environment and its intersection with people, including the cognitive and behavioral proclivities that drive people to act or not, to regulate their behavior and set goals or to release control and allow the technology to do more of the work (Bandura, 1989a, 1999, 2001, 2002, 2009, 2018).

As the theory asserts, people are not monolithic or a mindless, shapeless block of users all equally under the sway of persuasive technologies, like the ones under study. We are unique individuals who contain a novel blend of characteristics and inclinations that lead to the expression of a range of cognitions, agency, and behaviors in the environment before us (Bandura, 2009). Life outcomes fall from this web, and agency emerges from the interplay of these and other factors (Pajares et al., 2009), with participant experiences revealing how personal inclinations and goals intersected with the affordances of the personalization tools (i.e., the environment), resulting in individualized agentic and behavioral expressions. These experiences also corresponded with two of the theory’s primary concepts, triadic reciprocal causation (see Figure 10 below) and emergent interactive agency (Bandura, 1999, 2001, 2009).

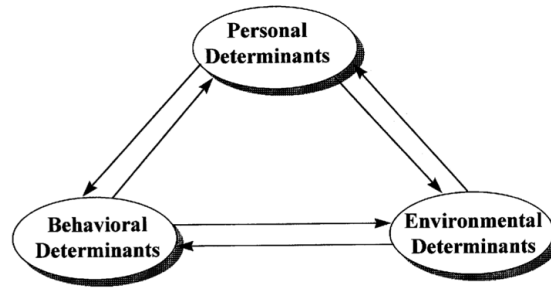


Figure 10

Bandura: Interacting Determinants of Human Behavior and Agency

While not free of limitations, a social cognitive theory perspective, the driving theory of the model, can help explain how and why some individuals can exercise greater agency in response to the choice recommendation engines — e.g., avoid being funneled into enticing rabbit holes — and how and why others may “fall prey” to the technology, experiences that participants shared and that were reflective of social cognitive processes. Consider Barb, the fashion aficionado, who deliberately sculpts her Instagram feed to display her interests and who saves outfits and stores it displays to review later, a set of traits and actions demonstrative of the intersections of personal, behavioral, and environmental determinants, as well as emergent interactive agency and triadic reciprocal causation. Also illustrating these intersections, when the tools surface content outside her interests, she avoids tapping on them to not signal she "likes" it. Here, her agency and personal interests collide with the engine, resulting in her assuming control, yet still within the constraints and affordances of the environment in this case.

Provided by the theory and model, media accounts could benefit from this nuanced perspective, as well as inclusion of the psychological dynamics involved when people engage with the tools (Bandura, 2009). This shift in stance to the explanatory, identifying root causes, effects, variables, and mechanisms (Babbie, 2014; Fletcher, 2020; Martin, 2020), particularly the psycho-social/psycho-environmental factors in this context, is more likely to offer a greater

understanding of how these innovations may modify people’s cognitions, behavior, and agency. With more sophisticated versions in the pipeline, powered by advanced AI and machine learning, the need is clear (“Request for proposals,” n.d.).

Inductive Findings / Theory Augmentation

Derived from the qualitative sessions, emergent findings demonstrate the deficiencies of social cognitive theory for this context, necessitating the need to adapt it to transform it into a more effective and rigorous explanatory framework. The findings suggest how participants engaged in *far less structured* thought processes and behaviors at times in their interactions with the engines — sequences that did not appear to have corresponding concepts and explanations in the available theory literature. These emergent findings — the model’s fluid agency construct and related dimensions depicted in Figure 11 below — indicate the need to evolve social cognitive theory beyond its physical and television media roots, where the bulk of the scholarship has been directed, to address the unique environmental conditions and dynamics of the personalized elements of social media (Martins & Wilson, 2012; Mastro & Stern, 2003; McQuail & Deuze, 2020).

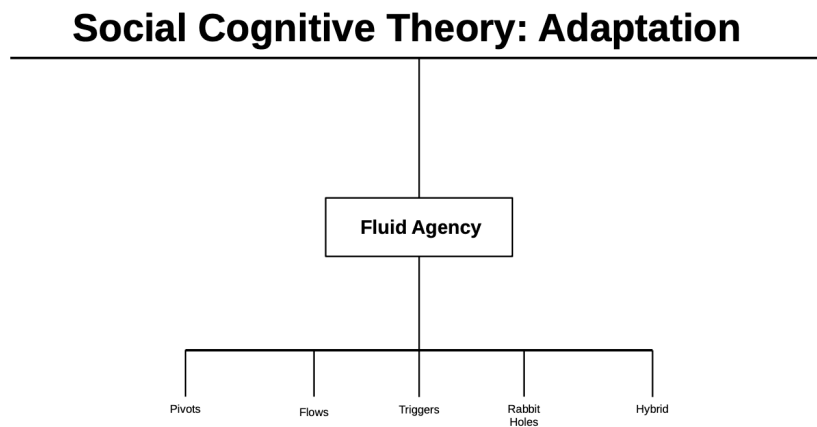


Figure 11

Fluid Agency Construct and Dimensions

Given its unique environmental composition, participants reported responding to the engines in ways social cognitive theory concepts, particularly the agency dimensions (Bandura 1989, 2001, 2009; Pajares et al., 2009), did not adequately capture. Consider again Sam's experiences where it appeared all classical agency dimensions broke down or were not activated when she reported tumbling into a rabbit hole of content where her sense of time, self, and place seemed to suddenly dissolve. Active, structured agentic processes like intentionality, forethought, and self-reflectiveness did not appear to be in play from the account she gave. Or Ihor who described TikTok's algorithms as so compelling that he seemed to enter a trance and be plucked into a "black hole" where "an hour later" he suddenly reappeared and asked himself "what did I just do?"

The incongruence between their experiences and extant theory conceptions is not surprising as the theory is a product of the 20th-century, despite Bandura and other social cognitive scholars' recent efforts to expand its reach into other types of mass and digital media (Khang, 2014; Turel, 2021; Velasquez & LaRose, 2015; Zhao et al., 2021). From their Twitter feed to Instagram's Explore feature, participants reported instances of *unsystematically* reacting to these tools — more *organically*, more *rapidly*, and *far less deliberately* than the sequences delineated by Bandura and others (Bandura, 1989). Moreover, some participant behaviors quickly “turned on a dime” with little to no reported intentionality, forethought, and reflection — three classical agency dimensions (see Figure 12 below) — during their interactions with the tools. Some participants also reported entering the environment desiring the engines to do the work for them, as opposed to them being an active agent exercising overt control and angling their behavior toward predefined goals, a sequence reflective of agentic expressions in social

cognitive theory. In these scenarios, the agentic power appeared to shift to the technology or environment more manifestly.

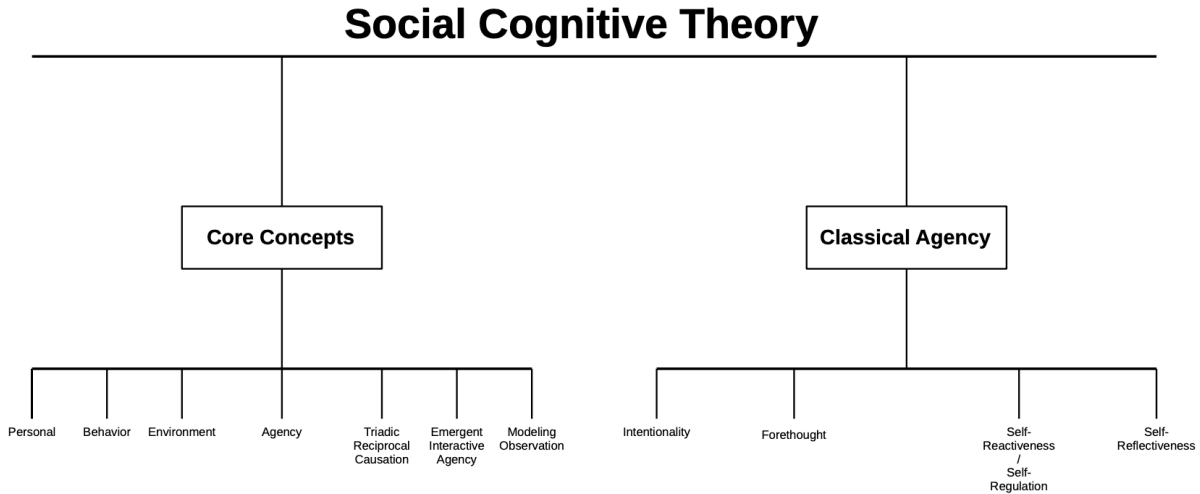


Figure 12

Social Cognitive Theory Key Concepts

These and other findings are reflective of the fluid agency concepts of the SCMAD model. In this mode of agency, participants were still agents: they responded and reacted to the tools, though they did not report in these instances exercising methodical, intensive thinking or intentional behaviors during the interactions, such as forethought, self-regulation, and self-reflectiveness (Bandura, 2009). The interactions appeared more freewheeling and, in some cases, chaotic — not orderly or goal-oriented. Their agency also seemed to morph at some point after entering the environment and shift in surprising new directions, resulting in unique thought processes and behaviors, like flow, hybrid, and other modes of fluid agency. In some instances, the choice recommendation engines of various platforms appeared to erode their agency, with participants in some sense “going along for the ride” offered by the engines’ social and information recommendations. These agentic expressions were consistent with depictions in critical scholarship and popular media where users appeared to be more manifestly influenced by

the environment and in some cases, controlled by it (Orlowski-Yang et al., 2020; Wells et al., 2021; Zuboff, 2019). In these cases, classical agency concepts like forethought and self-regulation (typical acts we are all familiar with) seemed to be no longer in play; the person shifted to more fluid agentic expressions.

Among some participants, their intersection with the algorithmically driven technologies also seemed to produce a type of cross-over agency, e.g., a shift from structured to unstructured interaction at some point upon entering the environment. Some reported being initially deliberative and goal oriented (classical agency), then transitioning to less controlled and non-directional behaviors because of the tools (fluid agency). Specific personalization features in multiple platform environments also seemed to trigger this and other fluid sequences.

Summary of Model: An Agentic Dance

To use an analogy, an *agentic dance* appeared to unfold among participants and the tools, with idiosyncratic outcomes emerging, from that dance, from structured to unstructured responses — or a hybrid of the two — depending on the individual and the particular tool encountered. This dance produced anticipated and unanticipated outcomes: anticipated - participants entering the environment with a forecasted goal in mind, e.g., desiring to maintain control and balance online and offline goals; unanticipated - unexpected, undesired plunges into “rabbit holes” as Sam and other participants reported. These capers of people and machine were partially reflective of Rose and Jones’ (2005) double dance of agency, a theorization that cast human agents in dance with machine/technology agents with unique properties, or outcomes, emerging from that agentic interplay.

In summary and addressing research questions two and three, a range of individual-level cognitive, agentic, and behavioral mechanisms appeared to be activated during participants

“dance” with the engines, with several suggestive of social cognitive processes, like its self-regulatory and forethought dimensions, and others representative of emergent mechanisms not captured by the theory, as interpreted from participants’ experiences with the tools disclosed in the interviews and focus groups. Identifying these mechanisms that can drive acts — as this research sought — is critical for scholars attempting to understand and evaluate the psycho-environmental dynamics involved in individuals’ immersion in social media environments and their engagement with the suite of machine-driven features that largely animate the experience. This approach can shed light on complicated psychological processes involved in these encounters, which may be shaping the trajectories and outcomes of that encounter, in addition to the technology. This research posits the SCMAD model as one explanatory framework.

Isolated Social Cognitive Processes and Interrelations

Regarding specific social cognitive processes, participants revealed how personal factors and goals influenced how they approached the choice recommendation engines of several social media platforms. Some participants noted a thirst for certain types of information, and they turned to the engines to achieve their aims. Others desired to limit their online time to prevent hobbling offline goals, so they imposed constraints on their social media use, e.g., reducing interaction time length and being cognizant of outcomes they did not want, such as tumbling into “rabbit holes” that would harm their offline goals. These sequences are also suggestive of how the “dynamic interplay” of cognitive and environmental factors can influence behavior and choices, a foundational premise of social cognitive theory and the heart of agency as product of cognitive predilections and environmental affordances (Jenkins et al., 2018; Pajares et al., 2009; Zhou et al., 2020).

This interplay appeared to produce unique outcomes for participants in their interactions with the tools and its suggestions — as social cognitive theory would predict, further supporting its inclusion in the SCMAD model. Several participants noted the influence of the environment on their behaviors and goals, including suggestions offered by the engines that conflicted, at times, with the actions they intended to carry out, ultimately leading to occasions where they were undesirably sidetracked. These and other similar instances in the qualitative data further support the bi-directional influence of environment, behavior, and personal factors in this context, as the theory would predict, with the data also suggesting some factors as more influential, or weighted, than others among some participants in some cases. One participant described her immersion in social media as a “battle,” while others who reported being conscientious, about the choices they make offline, transferred that mindset to the tools. There, they emulated their approach to life and challenges, reportedly regulating their behaviors, attaining what they desired, and swiftly exiting.

However, while participant experiences and interpretations of them indicate connections among these and other dimensions, this study cannot make statistical correlations or determine or predict strength of influence among the factors (Babbie, 2014; Shoemaker et al., 2004; Wimmer & Dominick, 2014). A critical realist inquiry seeks to approximate the mechanisms that generate events and outcomes, with the aim to explain how and why events emerge and empirical work and theory guiding those interpretations and assessments (Martin, 2020; Vincent & O’Mahoney, 2016). In this paradigm, the research aim is to “develop a causal-explanatory account of your topic,” which includes identifying potential mechanisms that may give rise to events and outcomes, as well as pinpointing potential relationships among mechanisms. Additional discussion of how critical realism informed this research follows below, including ontologically,

epistemologically, and methodologically, as well as discussion of the limitations of the approach and its effects on the model. Future research will need to conduct tests of the model, such as quantitative techniques and experimental designs focusing on the mechanisms (the model's concepts) that the qualitative data point to being activated. Other methodologies will also help determine correlations and the degree of bi-directional influence, for example, among the dimensions of the triadic reciprocal causation model of social cognitive theory and the SCMAD framework (Bandura, 2009). Overall, the model posited here suggests relationships and eliminates irrelevant variables for the context under study (Shoemaker et al., 2004).

This research provides a foundation for future studies. Numerous participant experiences with a variety of choice recommendation engines in multiple platform environments indicated the activation of core social cognitive theory processes and its agency dimensions: intentionality, forethought, self-reactiveness, self-regulation, and self-reflectiveness. Put another way, the data suggested these agentic expressions, or the deliberate, systematic actions participants took in some cases in reaction to the tools. Their experiences corresponded with the concepts.

As posited by social cognitive theory, these inherent cognitive and agentic qualities afford individuals with the ability to be “self-developing, proactive, self-regulating, and self-reflective” and not mere “reactive organisms shaped and shepherded by environmental events or inner forces” (Bandura, 2009, p. 94). Just as predicted in the physical world, these qualities did not cease at the social media gates: some participants reported approaching the engines with intent and forecasted, thoughtful direction — desiring to achieve a goal, to fulfill a personal need, or to sculpt the recommendations the engines offered to their interests, including muting or blocking content they deemed offensive or unappealing. These are classical agentic acts, representing a key pillar of the agentic conception of social cognitive theory (Bandura, 2009) and

supporting their inclusion in the SCMAD model. Several participants offered reflections and perceived experiences with the engines that were suggestive of them exercising intentionality, forethought, and self-reflectiveness, among other elements of classical agency. They committed to acts, plotted them, reflected, and reacted as they desired, in some cases, despite the “power” of the engines and its suggestions.

Furthermore, participant accounts fit with other key social cognitive concepts, demonstrating additional theoretical alignment and further suggesting the enactment of cognitive and behavioral traits that enable individuals to be self-developing and proactive shapers of themselves and their environments (Jenkins et al., 2018). Participants reported instances of their interactions with the engines that were suggestive of them modeling the environment and observing how it works, then enacting behaviors based on that knowledge that controlled or manipulated it. Modeling, observing, and vicarious learning are key individual qualities and concepts that help further support that social cognitive processes are unfolding in this technology context, and they are also vital to enacting agency as what individuals see, observe, and learn can determine future cognition, behaviors, and agentic expressions (Bandura, 2009; Pajares et al., 2009).

Suggestive of modeling and observation, participants discussed observing how the engines performed, e.g., where particular information suggestions were placed and the types of suggestions, and subsequently taking actions on the platforms based on those observations. By observing the actions of others, people can generate guidelines to future conduct and behavior (Pajares et al., 2009). Overall, their reports suggested they utilized observations and knowledge to inform future behaviors on the platform and reactions to the tools, such as attempting to sculpt

the recommendations offered by the engines based on how they understood the technology worked from observation.

Though not utilizing all concepts from social cognitive theory, the SCMAD model incorporates many of its core components. Pajares et al. (2009) discussed the challenges of even explicating the theory given its “breadth” and “interconnectedness” (p. 4). Given this complexity and in light of the goals of this study, if the theory could serve as a viable explanatory framework to evaluate behavior and agency, this research focused on a select range of study relevant concepts, as well as foundational processes, such as emergent interactive agency, triadic reciprocal causation, and observation (Pajares et al. 2009). These and other selected concepts also conform with Bandura’s own selectivity when discussing the core elements of his agentic framework (Bandura, 2018).

Other scholars employing social cognitive theory in technology contexts have also winnowed the concepts, likely due to study needs and to restrict focus to prevent the research from becoming unwieldy and laborious (Nabi & Clark, 2008; Velasquez & Quenette, 2018; Velasque & LaRose, 2015). Some key concepts are also given more weight than others and some are utterly absent (Hosseini, 2018; Lin & Hsu, 2015; Milakovic, 2020; Shetu, 2021). Researchers seeking to test the SCMAD model could examine other components of social cognitive theory not contained in this study, which may lead to the development of a more robust framework.

Fluid Agency Processes and Interrelations

Participant accounts demonstrated an extraordinary array of agentic expression and variability manifesting in these environments, some of which were highly distinct from the agency conceptions offered by Bandura (2009) in his social cognitive theory of mass communication and in other theoretical and empirical work (Bandura, 2001, 2018) This is not

surprising, given that the bulk of his empirical research and more recent theoretical articles discussing the promise of applying the theory to media contexts occurred before the advent of social media algorithms and personalization technologies. A reflection he published about his life and academic work also provides insight on perhaps the inspiration of his framework and even particular agency concepts, such as intentionality, forethought, and self-regulation. Growing up in a farming community with limited resources, he described engaging in self-directed learning at an early age, one trait that enabled him to leave the community where educational resources were sparse to eventually become a professor at Stanford University (Bandura, 2006, 2018).

That said, Bandura (2001) forecasted the need to study “electronic” environments, particularly as it became increasingly clear the dominant role media technology would play in human development and society: “Any theory of human adaptation and change in the electronic era must, therefore, consider the dynamic interplay of technological developments and a variety of psychosocial and structural determinants” (p. 2). The fluid agency dimensions reflect that statement and the coinciding need for theoretical refinement, particularly how the interplay of technological development, in this case personalization technologies, appeared to produce new psycho-environmental phenomenon in the form of unique agency expressions. Among some participants, far less intensive structured cognitions, behaviors, and agency appeared to be activated in response to the tools, indicating how the intersection of novel technology environments and people can lead to surprising outcomes — flows, hybrids, triggers, and the like, in addition to the related social cognitive processes that appear to underlie them.

Consistent with the deductive findings and lending further support to the SCMAD model, the emergent data also demonstrates the bi-directional influence of personalization environments,

individuals, and behaviors, as triadic reciprocal causation posits (Bandura, 2009; Pajares et al., 2009), with the fluid agency expressions appearing to emerge from that interplay. The model arises from these interconnections, i.e., the mapping of participant experiences with the *a priori* theory and emergent findings, ultimately providing a parsimonious framework that explains how agency can manifest in personalized social media environments and the interrelated cognitive and behavioral processes that appear to be activated and that give rise to agency in this “electronic” space. Put another way, now we can better sense how agency is at stake in these conditions and perhaps most importantly, why, in contrast to accounts that describe or theorize the human-machine dance. An empirically supported theoretical model provides the pathway to that understanding. This dissertation makes that contribution, the SCMAD model.

How Critical Realism Informed the Project

A critical realist approach helped form the model. Ontologically, the paradigm posits that an objective world consisting of mechanisms and properties exists and researchers can acquire a greater understanding of it by following research best practices and techniques (Vincent & O’Mahoney, 2016, 2018). Researchers can acquire heightened clarity about the world — or the phenomenon they are studying, such as personalization algorithms — by fitting theory with data or the converse, with the overarching aim to identify mechanisms animating phenomenon to “explain why things happen” (Vincent & O’Mahoney, 2016, p. 9). However, critical realists acknowledge that knowledge is contingent and interpretative, shaped by researchers’ worldviews, theories, and interests (Fletcher, 2020). Furthermore, mechanisms may not be observable, and may need to be inferred through empirical investigation and theory development (McEvoy & Richards, 2006). In terms of this study, the researcher obviously cannot observe internal cognitive processes like self-regulation and forethought in participants. But the

researcher can observe and analyze statements conferred by them about their experiences with the tools and utilize that empirical data and theory to make connections to the latent structures and mechanisms that may be generating, or associated with, events like rabbit holes, e.g., the psycho-environmental mechanisms, and for this study, identification of, that may lead to people plunging themselves into endless streams of content (McEvoy & Richards, 2006).

As critical realism is theoretically and methodologically ecumenical, what is being investigated drives these choices (Martin, 2020). Martin (2020) likened the process to detective work where the researcher turns to their toolkit to solve the crime or explain the event, an investigation that may also involve reconciling the failings of theory and the need to search for alternative explanations. In that vein, a critical realist scholar acknowledges that there can be multiple and sometimes opposing explanations, and that the explanation they arrive at — in this case, the SCMAD model — is an approximation and subject to falsification (Fletcher, 2020). The framework, theory, or model derived from a critical realist inquiry is the explanation that the researcher judges nearest to the reality or context they are studying, with theory, data, and rational explanation informing that judgment (Fletcher, 2020). As McEvoy and Richards (2006) affirmed, the “best explanations are those that are identified as having the greatest explanatory power” (p. 71). Yet explanations remain open to revision and alternative frameworks may be posited, particularly those that correspond more closely to reality or the context under study (McEvoy & Richards, 2006; Fletcher, 2020).

Guided by this framework, this study sought to understand how agency unfolded in personalization environments and to identify individual-level mechanisms related to agency, overall seeking a cognitive and behavioral explanation of people’s interactions with these pervasively used tools. For a critical realist inquiry, this demanded an investigation to better

understand these mechanisms by working backwards from the outcomes, reflections, and experiences participants reported with the tools in the qualitative sessions (Fletcher, 2017; Martin, 2020). Many of their experiences reflected the mechanisms and agency dynamics posited by social cognitive theory, apart from the emergent findings that indicated the theory contained some inadequacies. As a theory that centerpieces agency and human development in interaction with environments, social cognitive theory contained the *a priori* promise to help explain the swerves of agency participants reported. Other frameworks and theories were also considered and evaluated against the data, including actor-network theory, which ascribes agency to all things, people, technology, material objects, and so on (Latour, 1996; Law, 2007; Mol, 2010).

Social cognitive theory emerged as the most parsimonious, extant, and direct explanation of how agency, and related individual-level cognitive and behavioral processes, can unfold in these environments, ultimately providing a psycho-environmental or cognitive explanation as to how and why people react, including variably, to these tools (Bandura, 1989, 1999). Data fit with the cognitive, behavioral, and agentic concepts posited by the theory (Bandura, 1989, 1999, 2009), except for the emergent data resulting in an augmentation of the theory and ultimately the SCMAD model. A search of the mass communication, psychological, and general social science literature uncovered no theory or framework that fit with this study context and goals as closely as social cognitive theory. Accounts from participants further supported that choice, with the SCMAD model providing visibility to inconspicuous processes, as a critical realist inquiry calls for (Fletcher, 2020; Martin, 2020). The model's concepts — drawn from social cognitive theory, such as self-regulation and triadic reciprocal causation, and the inductive findings, such as flows and triggers — are the mechanisms this study identified as potentially animating outcomes

participants reported in their reactions to the tools. Theory, data, rational explanation, and inference led to these identifications and the model.

Other studies have examined the intersection of algorithms and users from an agency perspective (Rubel et al., 2018; Sundar, 2020; Tufekci, 2015), with some findings cohering with what this study established. Similar to this research, Velkova and Kaun (2021) offered a nuanced portrayal of users' interactions with the technology, in contrast to mainstream and academic accounts that painted a “dystopian” and “instrumentalist understanding of the technology” (p. 524). Noting the “scarce scholarship” attending to agency, they explored how users can evoke agency by resisting, tricking, and manipulating the algorithms to achieve their aims, maneuvers that demonstrate users can knowingly control the interaction (p. 525). Also aligning with the broader findings of this study, though not focusing on the personalization dimensions of social media, Turel (2021) found users can increase their sense of agency over their social media use if they reflect and internalize their use after an abstention period. Turel (2021) also noted the limited research examining agency in social media environments, acknowledging the “need to understand perceived agency over use in the context of social media and ways to amend it” (p. 4). The SCMAD model can contribute to that discussion.

Also cohering with the experiences of some participants who reported intentionally sculpting their feeds, Hockin-Boyers et al. (2020) demonstrated how female weightlifters recovering from eating disorders enacted agency by pruning their social media accounts and feeds to help encourage their recuperation and wellbeing. Like some participants, they shaped their feeds, such as their Instagram feed, by unfollowing people and avoiding content that did not support their aims. With wellbeing and outlook at stake and the platforms either stimulating or harming those aims, they utilized their agency to foster desired positive outcomes on the

platforms. Like other scholars, Hockin-Boyers et al. (2020) advocated for more research examining user agency through theoretically and methodologically integrated approaches and that also considers the “dynamic architecture of social media platforms” (p. 17). They also cautioned against evaluating these technologies through a good-bad binary — instead, assessing it via the intersections of user needs, values and experiences, and technology use and adaptation. The SCMAD model springs from these premises.

Indeed, these studies demonstrate that users can play a prominent role in their interactions with social media and the personalization technologies that comprise it. In contrast to unidirectional, techno-deterministic accounts, the scholarship and this research also suggest the transactional nature of our rendezvous with media, wherein theorists operating in this paradigm “assume reciprocal causal relationships between characteristics of the media users, their selective media use, factors in their environment, and outcomes of media” (Valkenburg et al., 2016, p. 327). However, Valkenburg et al. (2016) noted transactional media effects research has received scant attention, with social cognitive theory highlighted in their discussion.

The SCMAD model builds on this work, offering a dynamic, multifaceted perspective of how individual agency can unfold in social media personalization environments via a user-centric approach that seeks to evaluate the balance of several factors. The model also addresses limitations of research focusing on the intersection of people, algorithms, and social media, particularly from an agency perspective (Hockin-Boyers et al., 2020; Nagel, 2018; Turel, 2021). The literature mainly offers basic conceptions of agency and pared down analysis of it. To that end, the research fails to address the roots of where agency springs from, cognition and a myriad of specific, related processes (Bandura, 2009). Like this study, prior research demonstrates that agency is activated or at stake (Hockin-Boyers et al., 2020; Nagel, 2018; Turel, 2021). Yet the

scholarship falls short of offering a depth explanation of how and why it is activated and at stake, providing descriptive analysis and theorizing in some cases, instead of an explanatory framework, particularly one rooted in a cognitive, psycho-environmental understanding. No study was found offering this perspective. The SCMAD model addresses these gaps, providing an assessment of agency rooted in human cognitive and behavioral dynamics and augmented to consider the unique environmental dynamics of algorithmized, personalization environments.

Further, the model also counters findings from this band of literature that demonstrates users professed agency, cohering instead with the theorizing and findings from other work that questions users ability to be “in control” or have a semblance of overriding influence (Beer, 2017; Gillespie, 2013; Just & Latzer, 2017; Kitchin, 2017; Lustig & Lee, 2016; Orłowski-Yang, 2020; Tufekci, 2015; Wells et al., 2019; Zuboff, 2019). The fluid agency portion of the model offers agentic expressions where the environment appears to dictate the movements and behaviors of users more greatly, with participants' agentic and behavioral expressions indicating far less intentionality and deliberateness. Users who also professed control also reported several instances of wavering, e.g., being very structured in their interactions then unexpectedly falling into a rabbit hole. These findings remind us of a caution aired by Israeli scholar Yuval Noah Harari (2017): "What will happen to society, politics and daily life when non-conscious but highly intelligent algorithms know us better than we know ourselves?" The SCMAD model attempts to provide an answer to these and similar grand questions through an approach that acknowledges human and technological capacities and the intersections between them, a model that can assess and attest to the warnings and consider the ability of humanity to chart their own course no matter the prevailing wind.

Limitations

This project is not without its limitations. Qualitative research is inherently interpretative with participants in this study offering their perceptions and interpretations of their interactions with the tools and the researcher also interpreting their accounts (Creswell & Creswell, 2018). While providing guidance to enhance study rigor, critical realism also acknowledges the interpretative aspects of research and that explanations are approximations and subject to falsification (Fletcher, 2020; Martin, 2020). Further given the sample size and sampling approach, the findings cannot be generalized (Babbie, 2014) — though the study establishes the potential for generalization through future research that further tests the SCMAD model. Future research should also sample other demographics and generations.

The study also cannot statistically correlate the relationships or establish causation among the variables and dimensions of the model. While it offers a qualitatively derived explanation of the individual-level mechanisms that appear to be activated during users' interactions with the tools, other cognitive and behavioral mechanisms may also be activated — mechanisms which may further advance understanding of how agency unfolds in this and similar algorithmically-powered technology milieus. To this end, this study viewed these interactions through a social cognitive lens, with dimensions associated with that theory appearing to be activated and thus, offering an explanation of the unique swerves of agency participants reported. However, other psychological and mass communication theories and frameworks may also be of use and could potentially further augment the SCMAD model.

Being a qualitative design, uncontrolled variables and conditions may have also influenced the results and participants' reflections (Babbie, 2014). Data was collected during the COVID-19 pandemic. Participants may have been spending more time online and may have been

more susceptible to the choice recommendation engines. Qualitative research cannot control variables and isolate conditions like an experimental design, creating the potential for factors outside the study to influence the results and participants' perceived experiences with the tools.

Lastly, the study focused on participants' reflections and experiences with the algorithmically powered attributes of the environment, e.g., their Facebook or Twitter feed, and the social and information recommendations it offered. Among those recommendations, participants noted particular messages and other content that the engines displayed and that they felt influenced their behaviors on the platform. However, the study did not examine particular messages or directly assess their impact on individuals' agency and related processes. The study treated the messages as a dimension of the choice recommendation engines. Future research could utilize message reception models from the mass communication field and to that end, more directly assess the role content plays in agency expression and related processes, such as examining particular types of posts and their degree of influence on these dynamics (Baran & Davis, 2021; McQuail & Deuze, 2020).

Future Directions

The SCMAD model provides a foundation for future research into the interrelations of human cognition, behavior, agency, and algorithmic and machine-learning environments. Understanding these intersections is key to evaluating their consequences on people, beneficial or adverse, particularly given technological advancements that are anticipated. Building off this study's qualitative findings, future research could benefit from other methodologies, such as experimental designs which can better control conditions and isolate dimensions of the model for testing and evaluation. Other quantitative designs, such as surveys, could further test and evaluate the model. Generalizable samples may also increase the relevance of the model, as it

was developed from a purposive sample of 45 participants. Quantitative research designs and representative, random sampling will assist efforts to support, refute, or refine the model, particularly variable analysis and evaluation of possible correlations among variables via large samples, in addition to assessing variable strength.

Additional qualitative study is also encouraged, particularly research that would replicate the study design and evaluate the model with another sample. In this vein, research that focuses on user perspectives of algorithms, like this study and Bucher (2016), is likely to unveil more dimensions of the human experience in its bond with these complex technologies, in addition to potentially uncovering other agentic expressions. Beyond the sample here, the potential for other cognitive, behavioral, and agentic experiences to emerge in interviews and focus groups is a possibility, experiences that may also support and refine the model. Quantitative, qualitative, and mixed-methods approaches should also consider restricting focus to one platform and the personalization dimensions that comprise it. Restricting focus to a select set of personalization features may provide beneficial findings, including enabling evaluation of how specific features may impact self-regulation, flow, and other dimensions of the model. Among some participants, the Instagram Explore feature, for example, appeared to substantially diminish the enactment of classical agency dimensions, while other features appeared to have far less impact or were not mentioned in the qualitative sessions despite their presence on the platforms. Experimental designs could isolate and evaluate impacts of particular features and platforms, and these designs may also involve observing people's interactions with the tools, either direct or electronic, and speaking to them about their experiences.

Researchers may also want to consider evaluating other elements of the platform environment, such as more direct analysis of the messages and suggestions offered by the

engines, and the role they play on individual-level psychological processes. Other attributes of social media environments, such as like, share, comment, and other interactional elements, layout, and the device being used, may also be relevant factors to consider in an agency analysis.

Other psychological and mass communication theories should also be considered (Baran & Davis, 2021; McQuail & Deuze, 2020). This study ultimately evaluated how individual agency progressed in social media personalization environments through an augmented social cognitive lens. However, the psychological, mass communication, and broader social science literature offers a myriad of frameworks and concepts that may help refine and nuance the model, potentially expanding it beyond its largely social cognitive theory driven perspective. For example, Baughan et al. (2022) utilized a dissociation framework to assess why users slipped into “mindlessly scrolling on social media” (p. 1). Like this study, that framework also includes “flow states.” Other research and theoretical work could support the model and help broaden it to include potentially unaddressed and critical psychological processes. Actor-network theory and the unique lens it affords may also help better assess the “environment” under study, including whether the tools and features contain agentic capacities (Latour, 1996; Law, 2007; Mol, 2010). However, actor-network theory poses methodological complexities in terms of evaluating the agency of objects, as well as reconciling its ontology with critical realism and social cognitive theory (Baloch & Cusack, 2011; Elder-Vass, 2008; Karakayali, 2015).

In the main, evaluating the SCMAD model against prevailing research and theorizing could spark new questions and interesting avenues to explore, all of which may provide, in the spirit of critical realist scholarship and the open-ended nature of social science inquiry, an explanatory framework that is nearer to the “reality” of the human-machine dynamic studied here than the model posited by this research.

Implications:

Theoretical

Despite the pervasiveness of these technologies, widespread use, and apparent behavioral and agentic impacts as this and other studies have revealed, scholarship remains negligible relative to other foci in the mass communication literature. As noted, research focusing on human-machine agency dynamics is scant, with theorizing and non-empirical accounts appearing to represent the bulk of the literature. This study contributes a model that can help kindle this research and also encourage essential interdisciplinary ties between mass communication, psychology, social psychology, communication, and related fields. Building on Bandura's extension of his theory to mass communication contexts, the SCMAD model also bridges these literatures, which are essential, this researcher argues, to assessing the dance of individuals and these sophisticated technologies. The model offers a contribution to these domains, e.g., addressing gaps in the social cognitive and mass communication scholarship through extending that enduring theory to a new context and offering an empirically supported, theory-driven model.

Overall, the model provides a springboard to future studies exploring these dynamics and can help further concretize the legitimacy of the mass communication field in the public sphere through study of these consequential technologies that continue, unfortunately, to receive marginal attention. Furthermore, scholars should be an unflagging voice in the public conversations about the technology given its impacts and individual and societal consequences. Their research should be driving these conversations or at least adding to them, as this study achieves through providing a nuanced perspective.

The model and the findings provide a foundation for that work and researching these challenging contexts. This study also demonstrates how qualitative research designs and critical realist frameworks can help investigate these complex technologies, which can pose methodological complications given its fluidity and multi-factor composition.

Practical

The SCMAD model is not limited to advancing academic and theoretical understanding. People who utilize social media and interact with its choice recommendation engines can also benefit from this research. Drawn from social cognitive theory, the model consists of concepts that can help people achieve outcomes they desire and better manage the processes, or steps, to attain them on the platforms, as well as offline. Scholars have shown how social media can be addictive or result in excessive use (Brevers & Turel, 2019; Turel, 2021), with some participants also describing how they undesirably entered “rabbit holes” where they lost track of themselves, time, and responsibilities.

The model clarifies how that outcome and other outcomes can occur, thus offering people insight on the inconspicuous cognitive and behavioral processes that animate wanted and unwanted acts. It also foregrounds personal factors that may be favorable or make them susceptible to wanted or regrettable choices. In essence, the model makes our inner workings transparent — the dynamics that animate us and allow us to move through life and execute the acts we desire to carry out. With this knowledge, we are better equipped to engage with mediums and technologies that are designed to nudge and redirect us. With this knowledge, people may acquire greater control over their thoughts, behaviors, and actions in this novel environment, in addition to their off-line meanderings potentially — foiling outcomes they may otherwise regret. This may lead to more positive outcomes as opposed to adverse consequences. And instead of

disconnecting from social media because they cannot control themselves, people may become smarter, more effective patrons of it, managing the experience and benefiting from the positives it can offer, while balancing the acts there with other actions they desire in the “real-world.”

Conclusion

Agency is key to our development and flourishing, allowing us to overcome challenges, reflect on situations that have caused us to stumble, and spark our will to open doors we never thought possible. The rise of algorithm, AI, and machine-learning technologies that seek to govern and nudge through sophisticated choice recommendation architectures raise questions about how our agency may be at stake when we immerse ourselves in these digital worlds. What are the positive and negative impacts of that human-machine interface, particularly in terms of agency and the cognitive and behavioral processes that drive it? Put another way, what becomes of that human development and flourishing and the choices we make that incept it when we make contact, or “dance,” with these smart technologies that are designed to redirect us? Or as Harari (2017) asks, what becomes of us “when non-conscious but highly intelligent algorithms know us better than we know ourselves?”

These questions inspired this inquiry which sought to explain how individual agency progresses in response to the algorithmically powered personalized dimensions of social media. Motivating this enterprise, this study sought to unearth the roots of the outcomes represented in media accounts, including *The Social Dilemma*, and to shore up deficiencies in academic work. How and why did users appear to be undergoing notable swerves of agency in reaction to the tools, tumbling inexplicably into rabbit holes and sometimes against their wishes and will?

Offering clarity to these questions, this study posits an empirically supported, theory driven model, SCMAD, that draws together concepts from an enduring psychological theory,

social cognitive theory, with emergent findings. The findings support use of social cognitive theory, in modified form, for this context, ultimately providing a contribution to the growing, yet still nascent, academic literature that seeks to understand how individual agency is expressed in these milieus. This study is the first known attempt to extend social cognitive theory to this context, providing scholars with an opportunity to test the model and further explore individual interactions with these tools from an agency perspective.

The findings and model also demonstrate the wide array of agentic expressions that appear to manifest in these environments from self-regulatory behaviors to rabbit holes. The findings and model further suggest underlying cognitive and behavioral processes that seem to be activated when users interact with the tools — processes that appear to give rise to an array of agency expression from intensive, deliberative engagement to more fluid responses. The model makes these invisible processes visible and with that visibility allows them to be subjected to further testing to advance inquiry of these consequential technologies and their intersection with people.

Overall, the findings indicate that people react differently to the technologies depending on a range of personal factors and what they desire from the environment, a stance that calls for a nuanced view. Environmental conditions are also a factor. Greater understanding of the strength of influence of those factors and why some users are swayed to stay online longer because of the engines — in some cases to alarming levels — while others can maintain control is key to unraveling the full extent of the implications of these technologies. Scrutiny of cognitive characteristics and personal factors are likely to provide a wealth of answers, particularly to shed light on the worrying outcomes of Sam and others who found themselves unexpectedly and undesirably glued to the suggestions for long periods of time. Also deserving of attention, these

tools may be conditioning long-term behaviors and novel agentic expressions, including forms not captured by this study. Researchers should also heed to how future developments of the technologies intersect with these concerns, from algorithm evolutions to the design and look of new features on public-facing software.

Near the end of his life, Bandura reflected on the increasing role of technology in human life and society. Alluding to digital technologies, he cautioned that portraying them as “operating unidirectionally ... instills a sense of inevitability about the form and direction societal changes will take” (p. 18). Put succinctly, determinism hides other critical factors that influence media technology use and can hinder assessment of subtler positive and negative impacts. Given the abundance of deterministic commentary about the technology under study here, Bandura’s view is radically contrary to these accounts. But his perspective of human development, adaptation, and flourishing in the face of external realities was informed by his theory, which affords individuals with the capacity and power to affect change in their lives and the lives of others — and that capacity carries to the technologies that serve them.

Building on his work, the SCMAD model indicates that it is both the individual and the technology that can make a difference and what comes of their collision depends on a variety of factors. But the initial power is in the hands of the individual, so long as they exercise it. The model affords researchers and social media users a comprehensive toolkit to better understand these relationships, and perhaps a means to protect ourselves — more adept use of the technology and the engines so our flourishing remains unimpeded.

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APPENDICES

Appendix A — Recruitment Messages and Debriefing Script

Recruitment Message A

*Emailed to Recruits and Posted on SONA/Qualtrics' Recruitment Platform

Hello,

My name is Stephen McConnell, and I am a researcher at Colorado State University with the Department of Journalism and Media Communication.

We invite you to take part in a study that is exploring how people navigate and experience social media. We are hopeful you might consider participating in this research.

To participate, you must meet the following criteria:

1. Be 18 to 25 years old
2. Have used social media for at least two hours in a single day

If you meet these requirements, please click on this link (note: will insert link) to complete a short survey and to provide your contact information to set up one required interview or focus group session with the researcher. **You will also receive \$20 for participating in this study.** (note: may substitute this line for extra credit if desired by instructors).

We look forward to your assistance with our research.

Thank you!

Stephen.

Stephen McConnell, Ph.D. Candidate
Colorado State University, Fort Collins, Colorado, U.S.
Department of Journalism and Media Communication
University Profile: <https://www.libarts.colostate.edu/people/sjmcco/>
stephen.mcconnell@colostate.edu / 1(570) 561-6523

Recruitment Message B

*Ad Posted on Social Media, with graphic.

We want to know how you interact with social media for a social science research project. You will receive \$20 for participating! It just takes completing a short survey and participating in one interview or focus group session.

There are only two requirements you need to meet to participate: you are 18 to 25 years old, and you have used social media for at least two hours in a single day.

If you meet that criteria, please click on the following link to get started:

http://colostate.az1.qualtrics.com/jfe/form/SV_bqt90chY8mG95Gd

This research is being developed by Stephen McConnell, a Ph.D. Candidate at Colorado State University in Fort Collins, Colorado, U.S.

His official university profile can be viewed here:

<https://www.libarts.colostate.edu/people/sjmcco/>



Recruitment Email Blast

Hello,

My name is Stephen McConnell, and I am a researcher at Colorado State University with the Department of Journalism and Media Communication.

We invite you to take part in a study that is exploring how people navigate and experience social media. We are hopeful you might consider participating in this research.

To participate, you must meet the following criteria:

1. Be 18 to 25 years old
2. Have used social media for at least two hours in a single day

If you meet these requirements, please click on this link, http://colostate.az1.qualtrics.com/jfe/form/SV_bqt90chY8mG95Gd, to complete a short survey and to provide your contact information to set up one required interview or focus group session with the researcher.

You will also receive \$20 for participating in this study. We look forward to your assistance with our research.

Thank you!

Stephen.

Stephen McConnell, Ph.D. Candidate
Colorado State University, Fort Collins, Colorado, U.S.
Department of Journalism and Media Communication
University Profile: <https://www.libarts.colostate.edu/people/sjmcco/>
stephen.mcconnell@colostate.edu / 1(570) 561-6523

Debriefing Script

Thank you for your participation in this study. Our goal is to understand how people perceive and interact with social media personalization environments. We are also examining whether people feel these environments are influencing their thoughts and behaviors — such as the actions they take in response to these technologies, and how they may reflect on their interactions with these tools.

What you provided will help us better understand these processes — a very understudied topic in which our findings may be beneficial to researchers and the public. Talking directly to people that use these technologies, like you, greatly aids our insight.

If you have any questions about this study, you can reply to this email or contact me at stephen.mcconnell@colostate.edu. I can also be reached by phone at 1(570) 561-6523. To protect the integrity of this research, we urge you not to discuss this study with anyone who may be participating or might participate.

I also want to provide two resources regarding social media addiction: the Substance Abuse and Mental Health Services Administration hotline, and a private firm that offers services, Net Addiction.

Thank you again for participating and helping us with our research!

Stephen.

Stephen McConnell, Ph.D. Candidate
Department of Journalism and Media Communication
Colorado State University

Appendix B — Instruments

Descriptive Survey

*Hosted on Qualtrics

Q1 Informed Consent Text: I consent. (1) ; I do not consent, I do not wish to participate. (2)

Q2 Preferred email address to contact you.

Q3 Preferred phone number to contact you. (please provide area code).

Q4 What is your age?

Q5 What is your education level at present?

- Less than High School (1)
- Some high school (2)
- High School graduate (3)
- Some college (4)
- 2 year degree (5)
- 4 year degree (6)
- Master's degree (7)
- Professional degree (8)
- Doctorate (9)

Q6 State your current place of residence (locality/state, and country).

Q7 I identify my gender as (you can also report that you prefer not to say).

Q8 I identify my ethnicity as (you can also report that you prefer not to say).

Q9 Which social media platforms do you typically use? Select all that apply.

- Facebook (1)
- Twitter (2)
- YouTube (3)

- Snapchat (4)
- Instagram (5)
- TikTok (6)
- Other/Specify: (7) _____

Q10 In typical day, estimate how much time do you usually spend on the platforms you selected?

Q11 How much time weekly do you estimate you spend on the social media platforms you identified?

- 1-30 minutes (1)
- 31 minutes - 1 hour (2)
- 1 - 2 hours (3)
- 2 - 3 hours (4)
- 3 - 4 hours (5)
- 4 - 5 hours (6)
- 5 - 6 hours (7)
- 6 - 7 hours (8)
- 7 - 8 hours (9)
- 8 - 10 hours (10)
- 10+ hours (11)

Q12 What do you typically use social media for? Select all that apply.

- To be entertained (1)
- To gather information (2)
- To learn about current events/news (3)

- To maintain relationships (4)
- To find new relationships (5)
- For humor (6)
- To watch videos (7)
- To read posts (8)
- To engage with content (e.g., liking posts, posting comments/replies) (9)
- To share content (10)
- Other/Specify: (11) _____

Q13 Describe in 2 sentences what a typical social media session for you involves.

Q14 Thank you for participating. Stephen McConnell, the project researcher, will be in contact with you soon. If you have any questions, please email him at - stephen.mcconnell@colostate.edu

Interview Protocol

Q: Can you walk me through what you use social media for?

Q: How do you feel about the experience?

Q: On the platforms, there's these long scrolls of information, feeds of information and little boxes, and it automatically populates information and social recommendations. How do you use this, or how do you engage with it?

Q: Tell me your thoughts about these technologies, or this experience? Some call this personalization or the algorithm. This is the technology that makes content instantly appear, like posts from friends, articles, videos, memes, friend and content recommendations, content that is tailored to your likes/interests.

Q: What happens when you start interacting with it, these little recommendation features and feeds. We can talk about one or more platforms, but let's try to be specific.

Q: When you are here, what are you thinking about when you are interacting, using it?

Q: How/what are you thinking?

Q: How are you acting or behaving?

Q: While using these feeds and interacting with them, can you tell me what happens to your life in the physical/real world?

Prompt: What happens to goals you might have had or planned?

Prompt: How might it divert you or distract you?

Prompt: Tell me if/how you might get stuck there unexpectedly?

Prompt: How might schoolwork be affected?

Prompt: How might other thoughts/actions be affected?

Prompt: How might it, or not, take you away from goals you had? (online/offline). How long?

Q: What are your thoughts on the information, slash recommendations it displays?

Q: How do you think it works: how it decides to display what it displays?

Q: How do you feel about that process, or the technology?

Q: What would you do on these platforms if this technology didn't exist?

Q: If it didn't exist, how might that affect how you think or act there, and offline?

Prompt: How might that affect, or influence, goals you had offline or online?

Q: What effect do you think it has on you?

Q: How might you deliberately control what it displays?

Prompt: To what degree? Consciously?

Prompt: Why? Why not?

Q: When interacting with this experience/environment, how might you reflect about those interactions? If no, how come you don't reflect about it?

Prompt: Like what it is displaying?

Prompt: Like about particular features? What's trending, friend recommendations?

Prompt: Like what you are doing there?

Prompt: Like how it is behaving, or how you are behaving in response to it?

Q: With what it recommends you, the information and social recommendations, how might you resist or counter those recommendations/information?

Prompt: If you don't resist or counter it, what do you do in your interactions with it?

Prompt: How might you reflect, or think, about resistance? How might you reflect, or think, about just going with it, just going with the flow?

Q: What are you thinking in these interactions with the technology/feed/personalization?

Q: In what ways does reflection arise in these encounters?

Prompt: Tell me if you reflect about what it shows you and if so, how? If not, how come?

Q: In what ways do your intentions arise/come to a head in these encounters?

Prompt: Like you being intentional, goal-directed, or deliberate about this experience?

Q: Could you describe to me how the experience captivates you or not? How does it pull you in or repulse you?

Probe: Would you say it diverts you from things you were thinking about and if so, what happens to your thoughts/actions?

Probe: How are things in "life" affected or not?

Q: Have you ever gone onto a platform with a goal, or maybe a single intention, like an idea of something specific you wanted to do on it? In that case, what happens usually?

Probe: Walk me through how the feed/recommendations change or not change that intention? (Be specific).

Q: How does the specific platform features, or the general environment, capture your attention?

Probe: Like what do you observe?

Probe: How might it change your thoughts, like what you were thinking about before using it? Or while using it? Or after using it?

Probe: How might it change your actions, like things you are doing there? Or in life? Or afterwards?

Q: In what ways do you regulate, or self-discipline, what you are clicking on?

Prompt: Tell me what you think about that idea, regulating your interactions with that technology?

Prompt: Would you track clicks, time, or look at a clock?

Q: How might the feed be reacting to you? Or observing you?

Prompt: How does it work?

Prompt: What does that mean to you...& for you?

Q: Tell me about what you think it shows you.

Prompt: Be specific.

Prompt: Evaluate it (however you desire).

Q: This might sound philosophical. Would you consider it acting on you (creating difference in your life, thoughts, behaviors), and if so, how? If not, explain.

Probe: How it makes you think in certain ways? Examples.

Probe: How it makes you act in certain ways? Examples.

Q: This might sound philosophical too. Would you consider you acting on it (creating difference in its life, thoughts, behaviors) and if so, how? If not, explain.

Probe: How you can make it think certain things? Examples.

Probe: How you can make it act in certain ways? Examples.

Focus Group Protocol

Begin with background about personalization technology. Encourage them to continue the points and talk amongst each other, conversing and fleshing out the topics.

Q: Can you briefly walk me through what you use social media for?

Q: Let's talk about its personalization technology, that when you use these platforms, it endlessly, auto-populates with news, entertainment, information, and social recommendations.

How do you feel about this technology?

Q: How do you feel about this experience?

Q: How might it affect you?

Q: Describe how it functions, works?

Prompt: How do you observe and respond to it?

Q: Share with us how you think this technology may, or may not, make you behave in certain ways?

Prompt: How do you react to it?

Prompt: How have we reflected about it?

Prompt: How have we regulated our behavior while using it?

Q: Share with us how you feel this technology may, or may not, make you think in certain ways?

Prompt: How did it make you think differently? Tell us generally, specifically.

Prompt: Would anyone describe it as addictive? How, in what ways?

Q: How do you reflect about your interactions with these technologies?

Q: Share with us a story, or even general experiences, about when you went on a platform to check out a particular thing, a post, or on a friend, but you ended up somewhere else on it unexpectedly? (Specify the goal, platform, content, or even general experiences you had).

Probe: What features or technologies channeled you in a different direction?

Follow-Up: What did you see? What popped up? What happened?

Follow-Up/Prompt: Describe if you have gotten lost or diverted from a goal you might have had on the platform, or a real-world goal, like a course assignment, because of it.

Prompt: When that happened, tell us if and how you reflected about that occurring?

Q: Could you step us through how you might counter or resist the recommendations (the general content/information displayed)?

Q: Share how you might go with the flow of recommended information and why?

Q: What are your reflections with these technologies, like your reflections of your interactions with them?

Prompt: What gave rise to those reflections?

Prompt: When do you reflect? What's the purpose? How come? When don't you? How come?

Q: Could you tell us about a time you might have regulated, or controlled, your behaviors, or actions, with these technologies...your interactions, time spent with them? Share with us in what ways you regulated, or controlled, your behavior, or if you did not?

Prompt: How? Why?

Prompt: Walk us through how you did this briefly.

Q: How might reflection about your interactions with these technologies be appropriate or inappropriate? How might reflection matter or not?

Prompt: How come?

Prompt: (Raise hand), Who has thought about their interactions with these technologies in this way, in terms of reflecting about them, prior to this focus group?

Q: How might regulation, or control, of your actions/responses to these technologies be appropriate or inappropriate? How might regulation matter or not?

Prompt: How come?

Prompt: Who has thought about their actions/responses to these technologies in this way, in terms of regulation, prior to this focus group?

Q: Beyond what I opened this focus group with, discuss — as specifically as possible and concisely — how personalization, these information and content recommendations, work.

Q: How many were aware of that level of detail about how it works (Raise hand)?

Prompt: Knowing this, tell us how you feel about this technology?

Prompt: For society?

Prompt: For yourself?

Q: Tell us if you feel it affects your thoughts and how?

Probe: In what ways?

Probe: Share, and describe, if you feel it makes you think certain things?

Q: Tell us if you feel it affects your behaviors and how?

Probes: In what ways?

Q: Tell us if you feel it makes you act in certain ways?

Probe: In what ways?

Q: Discuss how you feel it might, or might not, be acting on you?

Q: How do you feel it has created difference in your life or has it?

Probe: Like what you know? Think? Actions?

Q: How have you created difference in it or not?

Probe: Through deliberate manipulation? Intentionally act on it because of reflection?

Probe: Get it to think about you in certain ways? Get it to behave in certain ways? Show certain things?

Q: Tell us how you feel it has agency or not? (Define agency)

Probe: In what ways? Explain/examples.

Q: Tell us how you feel you have agency over it or not?

Probe: In what ways? Explain/examples.

Q: Now that we are almost done, tell us your thoughts now on social media companies using these personalization technologies.

Media Log

Take 5-10 minutes to answer the following prompts.

A. List the social media platforms you use, in rank-order from most frequent (#1) to less frequent (#7). If you use only a couple, or few, that's OK.

B. Describe in short sentences, or phrases, what types of content you typically engage with on these platforms. Try not to write just "videos," "posts," or "humor." Aim to more specifically describe that content, while being concise. Also, for this content, write the social media platform(s) associated with it.

If social media content you note refers you to a website, blog, platform, or app, feel free to mention that as well. Overall, give a clear sense of the content you typically look at on these platforms.

Appendix C — IRB Materials

IRB-Approved Informed Consent Text

Dear Participant,

My name is Stephen McConnell, and I am a researcher at Colorado State University with the Department of Journalism and Media Communication.

We are studying how people navigate and experience social media to better understand what we think of these environments and how we act in them. The study's principal investigator is Dr. Kris Kodrich. I am the co-principal investigator.

Your participation in this research is completely voluntary. If you decide to participate, you may withdraw your consent, and stop, at any time without penalty. To participate, which will include one interview or focus group session, we would like you to first complete a short online survey. The survey should take about 3-5 minutes. Afterwards, I will contact you to schedule a time for the interview or focus group session. The interview or focus group session, in which you will only be required to take part in just one session type, will take approximately one hour and 15 minutes.

The session will take place remotely over secure video conference software. With your permission, we will record only the audio from the session. Only the researchers will have access to the audiotape, and it will be destroyed once it has been transcribed.

For this study, we will not collect your name or any other direct identifiers, except for your email address and phone number. That information will only be used to contact you to schedule the session. It will not be maintained in the data set used for analysis. When we report and share data with others, there will be no identifying information included. We will also combine data from all participants and use pseudonyms to further ensure your identity is not disclosed -- and remains strictly confidential.

There are no known risks for participating beyond what one might encounter in everyday living, such as using social media platforms and discussing pertinent topics about them. It is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential (but unknown) risks. While there are no direct benefits to you for participating beyond the incentive, you will provide us with insights to share with other researchers and the public about these technologies.

To indicate your consent to participate and to continue to the survey, please click "I consent" below.

If you have any questions or would like a digital copy of this consent agreement, please contact Stephen McConnell at stephen.mcconnell@colostate.edu, or Dr. Kris Kodrich at

kris.kodrich@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact the Colorado State University IRB at: RICRO_IRB@mail.colostate.edu; (970) 491-1553.

Appendix D — Codebook

Concept	Code	Definition
Agency	Agent	Agency is our capacity to act and to exercise control over our actions, often to achieve a goal or pursue an interest in an environment. *
Emergent Interactive Agency	EIA	Agency emerges from the interaction of personal/cognitive, behavioral, and environmental determinants — a process conceptualized by Bandura as emergent interactive agency. *
Personal Determinants	PD	Personal determinants comprise cognitive, affective, and biological states and events. *
Behavioral Determinants	BD	Behavioral determinants represent people's patterns of behavior. *
Environmental Determinants	ED	Environmental determinants are environmental events, essentially moments occurring outside oneself, social, structural, or mediated, that may be observed and navigated. *
Triadic Reciprocal Causation	EIA	Personal, behavioral, and environmental factors underlie emergent interactive agency (EIA) and triadic reciprocal causation (TRC), with a person's agency emerging from the factors and the interaction of them. *

Modeling/Observation/Vicarious Learning	Model	A key element of social cognitive theory is our ability to observe, learn, and model behaviors in the environment, then utilize this acquired knowledge to enact similar or divergent behaviors. Observation, modeling, and vicarious learning assist people in accumulating an understanding of the world and themselves. Individuals' ability to vicariously learn and observe is what helps them navigate environments, as well as make decisions and choices within them. That includes our agency as we decide to model behavior we have witnessed and enact it — or reject it outright. These processes also afford individuals critical information to achieve aims and to execute agency more adeptly. *
Intentionality	ClassicInt	Intentionality is intentional action, meaning a clear decision and commitment to act is made by an individual, as well as potentially creating a plan of action to execute it. *
Forethought	ClassicFore	Forethought comprises setting future goals, predicting consequences of desired actions, and selecting the best perceived course of action, in advance, to attain the desired outcome(s), ultimately a type of agency that is future oriented. Exercising forethought helps better ensure “things happen” through carefully considered forecasts of the acts required to achieve a goal. This forecasting also provides motivation, guidance, direction, and clarity to pursuits. Its future orientation may also lend to restraining present behavior. *

<p>Self-Reactiveness / Self-Regulation</p>	<p>ClassicReact</p>	<p>Self-reactiveness involves execution of the intended or forecasted course of action and reacting accordingly. Here, thought transforms into action: a self-directedness that may involve interpretation of the environment and its conditions in conversation with evaluation of personal goals, all of which may determine reactions or actions taken. Self-reactiveness may also involve assessing and regulating behaviors, as well as determining if behaviors are in line with environmental affordances and personal goals. Goals and the environment can influence how a person acts, and to what degree, with both serving as factors that can influence agency expression and behavior. *</p>
<p>Self-Reflectiveness</p>	<p>ClassicReflect</p>	<p>Self-reflectiveness is self-examination of actions and thoughts. In this vital, metacognitive dimension of human agency, individuals self-evaluate their motivations, values, goals, and pursuits. They also reflect on actions taken and predictions made, including outcomes that may or may not have occurred. *</p>

Pivots	Pivot/HMAP	<p>Participants reported turning to social media and the tools to seek goals and to carry out specific intentions, a sequence delineated by social cognitive theory, yet the recommendations swiftly brushed away those plans resulting in unanticipated behaviors and other outcomes. This dimension of fluid agency was termed pivots, in which participants intentioned, desired actions — forms of which constitute social cognitive theory’s agentic framework — are seemingly altered by the engines, i.e., nudging them to pivot in a new, undetermined direction like a fork magically, and suddenly, placed on a forest path. This dimension, and others below, highlight how the environment can modify — and in some cases, subvert — even the most well-intentioned goals and aims. **</p>
Flows	Flow	<p>For participants, there were occasions when intensive, critical thinking did not appear to be deployed, nor were carefully plotted action plans forecasted or developed. In this dimension of fluid agency, meta cognitive and other reflective states do not appear to be in play; instead, the participant seemingly enters a less analytic and behaviorally intentional state, responding and reacting to the suggestions provided by the engines, yet not, from the appearance and interpretation of their reports, critically analyzing their interactions or themselves in the moment, e.g., how their choices may lead to certain outcomes on the platforms. **</p>

Triggers	Trigger	<p>Critical to understanding this dimension of fluid agency and the distinction that sets it apart, isolated features of the engines trigger different behavioral patterns. Further, participants' agency appeared to morph from the more structured, classical type as social cognitive theory delineates to the more fluid variety, posited uniquely in this dissertation, in which decisions were made yet through far more flexible approaches. Additionally, this dimension also highlights how the environment — the machine-powered, algorithmically-driven features — can influence and reshape the agency of users. **</p>
Rabbit Holes	Rabbit	<p>Several participants reported an unanticipated outcome they attributed to the engines where their agency appeared to be constrained, time seemed to disappear, and a pattern of novel behaviors emerged where they appeared to have less control. This dimension of fluid agency was classified as rabbit holes, a term used by some participants to describe this peculiar outcome of their interactions with the tools. Participants unambiguously described entering “rabbit holes,” whereas the image implies, they reported losing sense of place, self, and time because of the allure of the suggestions the engines provided. For this outcome, participants were swept into the world of the recommendations, and they appeared from their reports of their experiences to be engaging in highly unstructured decision making — little to no intentionality, forethought, self-reactiveness, or self-regulation. In the midst of the rabbit hole, the technology appeared to have more sway over their actions and behaviors,</p>

		<p>instead of them dictating control and defining goals as classical agency would have it. **</p>
<p>Hybrid</p>	<p>Hybrid</p>	<p>Participants described social media sessions where multiple agentic expressions appeared to be mobilized in response to the tools. In these sessions, participants seemed to toggle between structured forms of agency and the more fluid responses delineated above. Participants reported making choices that can be interpreted as intentional in the environment, agentic expressions more in line with social cognitive theory, then describing moments where they seemed to flip to a more fluid and less deliberative agency. In essence, participants appeared to fluctuate between these modes, an outcome representative of this</p>

		dimension, hybrid agency. This toggling appeared to correspond to several factors, including their objectives, the offerings of the information environment, the platform, and the engines. **
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* Bandura's concepts and conceptualizations.

** Author's concepts and conceptualizations.