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‘Generation Facebook’ – A Cognitive Calculus Model of Teenage User Behavior on Social Network Sites

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ABSTRACT

With the growing popularity of Facebook, the number of teenage users has significantly increased. Parents and teachers observe this development critically as they fear that teenagers are prone to over-engage in pleasant activities and neglect the risks connected with information revelation. This paper adopts an explorative approach in order to investigate what motivates and hinders teenagers to use SNS and how using this medium affects their identities. By applying *Grounded Theory* to analyze data obtained in interviews, we formulate a conceptual model of teenage behavior on Facebook. We find that teenagers behave rationally on SNS, consciously weighing the benefits against the costs and acting in accordance with their preferences. Shared information and the diversified network structure allow teenagers to obtain support in school-related matters, broaden their horizon and intensify relationships with their peers. At the same time, peer and parental pressure play a significant role in this process.

Keywords

Social network sites, Privacy Calculus, Teenagers, Grounded Theory

“I’m not a big fan of young kids having Facebook. So, you know, it’s not something they need.”

--- Michelle Obama on The Today Show

INTRODUCTION

The social network site (SNS) Facebook has over 500 million users worldwide with teenagers being one of the growing segments, accounting for over 10% of users in the USA (Facebook, 2011). Parents and teachers often do not approve of these new developments as: (i) intensive use of the Internet may lead to social isolation and depression (Putnam, 1995); and (ii) teenagers tend to be less aware of risks connected with information disclosure and more prone to be influenced by their peer group when being on SNS (Boyd, 2007). Although a part of this tension can be attributed to the digital divide between generations, risks are still apparent. In order to address these concerns, Facebook imposes an age restriction of 13 years and recommends that teenage users “ask their parents for permission before sending any information over the Internet” (Facebook, 2011).

Although research on teenagers’ use of SNS is emerging, it is still unclear what distinguishes their behavior from that of other user groups. On the one hand, teenagers can benefit from effectively forming their networks from an early age and the unique possibility to obtain peer support (Greenhow and Robelia, 2009). On the other hand, SNS use may be detrimental to teenagers, as they are more prone to get addicted (O’Murchu et al., 2004) and unintentionally disclose vast amounts of personal information (Boyd, 2007). Against this background, we aim to investigate how teenagers use Facebook, which trade-offs they face and what impact does this medium have on their identity development.

The absence of systematic research on the topic urges us to adopt an explorative approach. We conduct interviews with a sample of teenagers, and by applying *Grounded Theory*, we formulate a conceptual model of teenage Facebook usage that describes the process of attitude formation towards the medium. After introducing literature and methodology, we proceed to describe the elements of the conceptual framework and derive practical implications in the end.

LITERATURE REVIEW

Existing studies provide insight into benefits that teenagers can gain on SNS. Greenhow and Robelia (2009) find that SNS allow teenagers to maintain existing relationships, develop a sense of connectedness and learn more about their friends. The effectively maintained relationships may generate the benefits of social capital (Subrahmanyam et al., 2008). Authors usually distinguish between two types of social capital benefits empirically proven to result from

Facebook use for student populations: (i) emotional support from close friends (bonding); and (ii) enhanced access to external resources of the weaker ties (bridging) (Ellison et al., 2007). For the teenage context, similar social capital benefits have been found: peer support when they have problems in school (bonding) and the enhanced ability to solve school-related tasks through information exchange and feedback (bridging) (Greenhow & Robelia, 2009).

Furthermore, SNS provide teenagers a unique possibility for selective self-presentation, which they rarely possess in real life (Greenhow and Robelia, 2009). In order to make themselves look popular and important, teenagers try to make as many friends as possible on SNS (O’Murchu et al., 2004) or engage in over-portrayal of desired aspects of themselves (Boyd, 2007). At the same time, teenagers are more prone to social pressure from their peer group than, for example, older users. When teenagers perceive certain behavior to be normative among friends on SNS, they tend to ‘follow the crowd’, which is true for joining (Boyd, 2007), using (Baker and White, 2010) or adding friends (Krasnova et al., 2010a).

The desire to self-present often leads teenagers to disclose vast amount of personal information increasing the probability of privacy-related threats, such as stalking or identity theft (De Souza and Dick, 2009). Even when being aware of the risk, teenagers have been found not to act accordingly (De Souza and Dick, 2009). This may be due to the fact that establishing a coherent identity is an important task during adolescence (Lenhart and Madden, 2007). Therefore, many teenagers choose to present themselves in the way contrary to the expectations of their parents (Boyd, 2007).

As opposed to these scattered findings, we present a holistic model of teenage user behavior on SNS. Two theories underlie our behavioral framework. First, the *Theory of Planned Behavior* (Ajzen, 1991) corroborates the impact of attitude on behavior, verified for the adolescent context by Backer et al. (2010). Second, the *Privacy Calculus Model* of Dinev and Hart (2006) postulates that users will disclose information only when they perceive the benefits to outweigh the possible privacy risk. For example, enjoyment and convenience in maintaining relationships can induce SNS users to reveal personal information (Krasnova et al., 2010b). We assume that teenagers’ attitude towards SNS will be based on the cognitive calculus process of weighing benefits and costs of their participation, resulting in corresponding behavior.

METHODOLOGY

In order to gain an in-depth understanding of teenagers’ Facebook usage, we apply *Grounded Theory*. The absence of systematic research on this topic causes the usage of this qualitative research methodology, which enables structured analysis of qualitative data to uncover underlying relationships and to build a theory based on them (Strauss and Corbin, 1998). We follow the "Straussian" line of *Grounded Theory*, which requires absence of an a-priori theory and emphasizes the usage of a paradigm for axial coding.

We conducted 9 semi-structured interviews of 30 minutes with German teenagers between 13 and 19 years of age (see table below). To counteract a possible bias, we chose interviewees attending different grades in different high schools. Our sample is not quite balanced w.r.t sex, which is due to the fact that in adolescence girls are more prone to engage in extra activities such as interviews than guys. During the interviews, we asked the teenagers what drives them to login, what do they usually do, what can they gain and what concerns they have when on SNS. The interviews were recorded, transcribed, and subsequently analyzed with the software *atlas.ti*.

Interviewee	Age	Gender	Exchange Year	Number of Facebook friends	Usage Frequency	Usage Duration
1	13	female	Yes	~ 450	Every day	Running in background
2	13	male	No	~ 150	2-3 times a week	1 hour
3	15	female	No	~ 150	Several times a day	30 - 60 minutes
4	17	female	No	~ 250	Several times a day	30 minutes
5	17	female	Yes	~ 150	Several times a day	1 - 60 minutes
6	17	female	Yes	~ 100	5 times a week	Running in background
7	17	male	Yes	~ 250	Every day	Running in background
8	19	female	Yes	Unknown	Every day	10 - 120 minutes
9	19	female	No	~ 70	Every day	30 - 60 minutes

Table 1. The interviewees

Following the "Straussian" approach, data analysis was done in three steps: open, axial and selective coding. In the process of open coding initial categories and their corresponding properties and dimensions are identified in a search process for patterns in the data. During axial coding we consolidate and structure the categories guided by the coding paradigm by Strauss and Corbin (1998). In the last step - selective coding - we focus on the most relevant categories.

RESULTS: CONCEPTUAL MODEL

The qualitative analysis resulted in a conceptual model, which describes the process of attitude formation of teenagers towards SNS (see figure 1). The causal relationships indicate the general flow of the model: in a cognitive calculus process of weighing the benefits and costs a specific attitude is formed, which, in line with the theory of Planned Behavior (Ajzen, 1991) determines behavior of teenagers on SNS. The strategies and actions teenagers perform as a

result, can, in turn, cause various effects. This is a circular model, where each cycle allows teenagers to gain experience and to update their expectations of benefits and costs, as well as adjust the strategies of participation. Intervening conditions can either amplify or constrain the impact of the various elements in the model. The relative importance of each category in the overall model can be assessed by the number of times respondents mentioned them. The first number in square brackets next to each category in figure 1 reflects the number of teenagers mentioning this category (max. 9), whereas the second one reflects the number of times this category was mentioned in all interviews. These numbers can provide the reader with guidance on the relative importance of each category in the overall model.

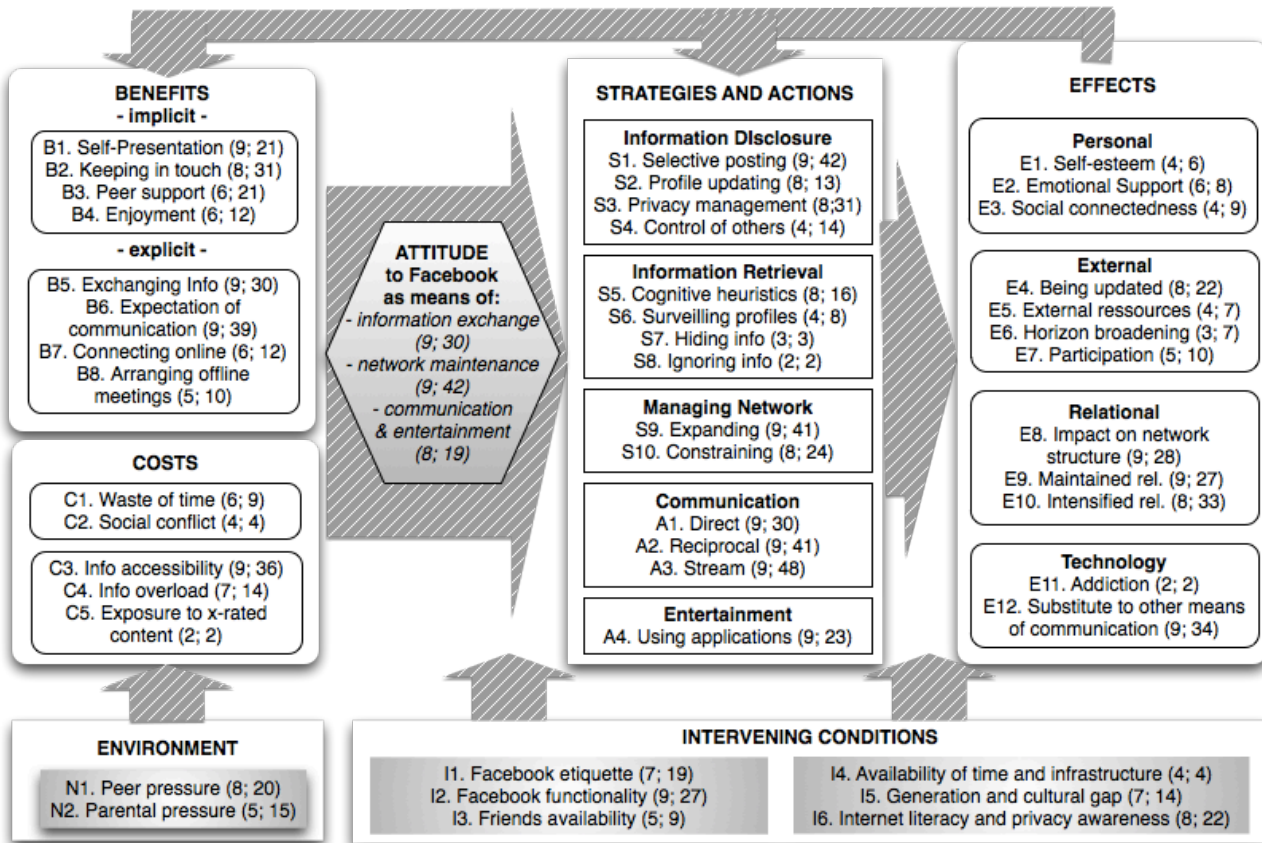


Figure 1 Conceptual Model of Teenage Facebook Usage

Benefits

Motivations of teenagers to use Facebook can be subdivided into implicit and explicit ones. The implicit motivations include self-presentation (B1) and keeping in touch with friends (B2) which underlie the main purpose of SNS as platforms that ‘allow users to construct a public profile and articulate a list of friends’ (Boyd and Ellison, 2008). Above these, teenagers can have utilitarian motivations - to obtain peer support (B3) or hedonic ones – to have fun (B4). These, however, are hard to discern from the statements of the interviewees. The explicit motivations, in contrast, are stated directly: teenagers login to Facebook because they expect communication (B6), want to exchange personal or school-related information (B5), desire to initiate a connection online (B7), or arrange offline meetings (B9).

This interplay between explicit and implicit motivations can, however, be corroborated by examples. First, presumably motivated by the desire to self-present (B1), teenagers use SNS to share their accomplishments or ideas (B5), whereby expecting feedback in return (B6): “These things identify me, show what I feel right now. If I like something, I post it on Facebook, because maybe my friends will also like it and comment” (Q). Second, keeping in touch (B2) occurs through increased online (B7) and offline communication (B8): “The people I know outside of school... we can meet more often in person, because we contact each other faster online” (Q), emphasizing the findings of Ellison et al. (2011). Third, a more tangible benefit - peer support (B3) requires information exchange (B5) and a broad network structure: “If I have a question, I ask some of my friends from the 12th grade who I know well, and they help me” (Q), supporting the findings of Grennhov and Robelia (2009).

Intervening conditions play an important role already at this stage in the model. Contacting someone online does not require much effort (I2) and is accelerated by the less formal network etiquette (I1): *“Should I really call her? You don’t know how she will react ... And then you write on Facebook: “How are you? That’s much easier” (Q).*

Peer pressure (N1) turns out to be a strong determinant of SNS usage for adolescents: *“Suddenly everyone was on Facebook and I had to change to Facebook as well” (Q).* In fact, peer pressure guides almost any aspect of teenage user behavior, such as playing games or adding someone to their friend list.

Costs

Teenagers are aware of the costs that can occur on SNS. In the process of information retrieval, teenagers are concerned with information overload (C4), referring to an increased amount and decreased quality of information on their Newsfeeds (Koroleva et al., 2010): *“I receive too many news, so I don’t read them, especially if they are stupid like: ‘I am going to the bathroom’” (Q).* Additionally, teenagers are worried about being exposed to x-rated content (C5): *“... they post stuff that is.. well... not for me, so I avoid them” (Q).* In the process of information disclosure, teenagers are concerned about social conflicts (C2): *“...but when I know that the post will affect another person, and it will be uncomfortable for her, then I wouldn’t post it” (Q).* These threats are, however, bidirectional as teenagers are also worried about being compromised themselves, if others disclose undesired information about them.

One of the most common privacy-related concerns of teenagers is information accessibility (C3). Teenagers are aware that their information can be accessible to a wide variety of persons, such as parents, teachers or even organizations and adjust their behavior accordingly: *“It’s maybe strange, if my parents would see everything, ...and then every time I would have to think about what I write...so I wouldn’t add them” (Q).* Most concerns of teenagers did not account for the probability of risk (C3) connected with abuse or secondary use of information. The problem was especially acute when using applications, as teenagers were informed that their information will be used, but were not informed how. If teenagers were aware of the risk, the appreciation usually came from their parents (N2): *“When I am on vacation, I don’t post that, because my father says that there are burglars who can break in...” (Q).*

Phenomenon – The Attitude Formation Process

The phenomenon in our study is the attitude of teenagers towards SNS, which is formed as a result of a cognitive calculus process of weighting the anticipated benefits against the costs of participating on SNS. For example, although using applications is seen as a fun-inducing activity (B4), it costs time (C1), causes information overload (C4) and fears of information accessibility (C3) resulting in a negative attitude: *“Although applications may be fun, they cost too much time... and all these notifications they send to others, I find it annoying. I have rejected applications, because I wondered: ‘What data will they access?’” (Q).*

We can distinguish between the cognitive and affective dimensions of attitude in the statements of the interviewees. Cognitive attitudes describe the evaluations of Facebook as communication medium and are identified by expressions such as: ‘useful-useless’ or ‘interesting – boring’, for example: *“I find it very interesting when people are posting music videos” (Q).* Affective attitude can be recognized by expressions of admiration or frustration, e.g. ‘like-dislike’, ‘annoyed – happy’: *“These games irritate me. I am sending you something to drink, to eat, and you post that on your profile” (Q).*

Strategies and Actions

Information Retrieval

Being confronted with information overload (C4), teenagers are forced to select information they want to consume, based on friend-based, distance-based, interest-based, or explicit cues (Koroleva et al., 2010). Adolescents usually apply friend- or interest-based heuristics (S5): *“There are people, at whose profiles I look more intensively. But at others profiles I only look, if they posted something interesting” (Q).* At the same time adolescents rarely report hiding people or information that does not interest them: *“I simply try to ignore them... But I believe, if somebody posted way too much... then I would block him...” (Q).* Thus, they deal with information overload by largely ignoring the unnecessary or uninteresting information (S8). Surveillance of profiles (S6) is another frequently pursued information retrieval strategy that allows to satisfy the need for curiosity and learn more about friends (Lampe et al., 2006).

Information Disclosure

When selecting the information to disclose (S1), teenagers can be guided by the benefits, for example, self-presentation (B1): *“I would like other people to see this, because it’s important for me” (Q).* At the same time, teenagers are concerned with risk of information accessibility (C3): *“Sometimes I want to post something, but then I think that it’s too private or it will tell too much about me” (Q).* Some teenagers admit that they usually consider the impact that the revealed information might have on others (N1): *“If it’s with people I’m not close with, then I don’t post things that I am not sure of, so that they don’t say: hey, what’s that you are writing?” (Q).*

Many information disclosure strategies are based on privacy considerations (S3). Most teenagers reported to have restricted the access to their information solely to their Facebook friends, often at the advice of the parents (N2): *“For*

most options I put the most private setting myself, and then my dad said – better do it for all the options” (Q). Several interviewees, however, were not aware which privacy settings their profile had or could not simply remember them, hinting at the low Internet literacy (I6).

Managing Network

Facebook offers the unique possibility to build and maintain a network of relationships with others that can either be expanded (S9) or constrained (S10) by the respective actions (see table 2).

	Reactive	Proactive
Expanding the network	Accepting FR	Searching for friends Sending FR Adding suggested friends
Constraining the network	Ignoring FR Rejecting FR	Deleting Friends

Table 2. Network Matrix

Seven out of nine interviewees stated that they would only accept friendship requests from users they knew personally, because they distrust unfamiliar profiles: “That could be always someone else than the person seems to be” (Q). Krasnova et al. (2010a) find that no additional motivation is needed to add people known well, but serious reasons are required for adding hardly familiar contacts, such as the desire to enhance the value of the contact list or social norms.

Interviewees often stated that they would like to delete friends that they do not communicate with regularly or to constrain their network in order to be able to keep track of their current friends and reduce information overload. However, peer pressure (N1) usually inhibits the application of this strategy: “I wanted to delete the people who are not really my friends. But then I wonder, if they would say: ‘I added her, why did she delete me?’” (Q).

Communication

Facebook offers a variety of communication possibilities, summarized in table 3. Referring to the targeted recipient, communication can be private, group or public. What concerns type, communication can be synchronous, when users have to be online simultaneously, or asynchronous referring to a time-delayed information exchange. Facebook itself distinguishes between reciprocal, direct and stream types of communication (Sandberg, 2009).

	Synchronous	Asynchronous		
	Reciprocal (A2)	Direct (A1)	Reciprocal (A2)	Stream (A3)
Private communication (accessible for one)	Chatting	Writing messages to someone	Back and forth messaging	
Group communication (accessible for a group)	Forming chat groups	Writing messages to a group; posting in a Facebook group	Back and forth messaging	Stream communication in a Facebook group: commenting, liking posts
Public communication (accessible for all)	Selecting Facebook chat status	Posting on one’s own wall, posting on someone’s wall,	Wall-to-wall exchanges	Stream communication to all: commenting, liking posts

Table 3. Communication matrix

Direct communication (A1) occurs when information is transmitted to only one or several recipients with or without expectation of reply (Sandberg, 2009). Reciprocal communication (A2) can be either synchronous like *chatting* or asynchronous like *back and forth messaging* or *wall-to-wall exchange*. The difference between direct and reciprocal communication usually lies in the content and purpose of the message, as well as depends on the other members of the network (N1) and the network etiquette (I1): “If I write something on the Wall: hey, what is the homework? Of course I expect an answer. But if I post a photo or something, then it does not have to be. But of course it is common to do it” (Q).

For both communication methods, users can decide to do it either publicly or privately. Private communication is usually preferred when the information is more sensitive: “I often write messages, because I do not want that all are informed about it” (Q), or when an answer is required right away: “If I have to ask someone something quickly, chat is very effective” (Q).

Stream communication (A3) – referring to interactions through commenting and liking of posts in a stream – allows to engage two to four times more people into the active network compared to traditional forms (Sandberg, 2009): “And then you post a status, people comment on it and it turns into a conversation” (Q).

Entertainment

The use of applications (A4) can, for example, promote online contact (A3): “Fortune Cookie’ is fun, especially when other friends comment on the results and thus new conversations develop” (Q). However, there are high costs of using applications, e.g. the waste of time (C1), information overload (C4), or the risk of access to their information (C3).

EFFECTS

Participation on SNS can lead to a set of positive or negative, direct or indirect effects, presented in table 4. These may be intrinsic or extrinsic and relate either to relationships, technology or personality of teenagers.

	Impact	Quotation	Findings
Personal	Self-Esteem (E1)	"...as there were more pictures, opinions and the like, I was very happy and proud to have created such a group"	Ellisson et al. 2007, 2011
	Emotional Support (E2)	"... and then someone wrote to me: don't worry, I have the same problem"	Ellisson et al., 2007, 2011
	Social Connectedness (E3)	"...someone says "today in class was really bad" and then everyone comments and thus feels a bit closer to each other"	Köbler et al. , 2010
External	Being updated (E4)	"...what will be on the test... or to compare homework... Not that others know better, but maybe they understood something that I did not"	Greenhow and Robelia, 2009
	External Resources (E5)	"I have a lot of older friends from school, who I know very well, and who I can turn to for help"	Greenhow and Robelia 2009
	Horizon Broadening (E6)	"I often check music or videos, and thus I lean new stuff and get new ideas"	Williams, 2006
	Participation (E7)	"... I do the things that I have not thought of before"	-
Relationships	Impact on network structure (E8)	"... I have older people in my network, and, although it is stupid to say – also career contacts"	Subrahamanyam et al. 2008
	Maintained relationships (E9)	"... you don't lose the friendships from the past and you always have the possibility to get in touch with them."	Lampe et al., 2007; Lenhart and Madden, 2007
	Intensified relationships (E10)	"... it has made our friendship even closer, because we can stay in contact with each other also after school"	Lenhart and Madden, 2007
Techno	Addiction (E11)	"... you start to play, then you stick to it, because it starts to be fun"	O'Murchu et al., 2004
	Substitute to other means (E12)	"I migrated all my contacts to Facebook and only check every couple months on SchülerVZ if there is something new"	-

Table 4. Classification of effects of SNS participation

Many of the consequences are closely interrelated and can impact each other. For example, the maintenance of a broad network structure (E8), exacerbated by the informal network etiquette (I1) can lead to increased participation (E7) and intensified relationships (E10): "And then three people that I don't usually go out with commented on my status that they are also coming and thus new groups of people are created that I didn't think of before " (Q). Consequences usually serve as the basis for updating the expected benefits, thus confirming circularity of the proposed conceptual model.

Moreover, teenagers tend to substitute other SNS or single channel communication means (e.g. e-mail) with Facebook (E12) mainly due to the intervening conditions in our model: (i) an increased availability of friends on Facebook (I3); (ii) its broad and effective functionality (I2); and (iii) the reduced communication barriers: "On FB you can chat with several people at the same time, and it's really different than talking with them on the phone every afternoon"(Q).

PRACTICAL IMPLICATIONS

Teenagers seem especially concerned when revealing information through the use of applications and have reported not to use them if they are not informed how their information will be used (C3). Therefore, applications providers should specify what kind of information they are accessing and for which purpose (I6).

Furthermore, Facebook could consider offering special accounts for users aged 13-18. In order to avoid disclosure of undesirable information (S1), such accounts could require the user to obtain the permission of the people appearing in pictures and videos to be posted on Facebook, as other services such as *Youtube* already do (Childnet, 2008). Additionally, these accounts could better filter the incoming information (S5), in order to reduce the exposure of teenagers to x-rated content (C5) and have most secure privacy settings (S3) as default.

In order to increase privacy awareness of teenagers (I6), teachers and parents should inform teenagers about risks connected with participation and information revelation on SNS. Teachers can also use SNS for teaching purposes as suggested by (Childnet, 2008), for example in order to build up debating or teamwork skills and encourage the discovery of SNS by young people (E6).

CONCLUSION

The paper investigates the attitude formation process of teenage Facebook users, confirming the hypothesized cognitive calculus framework of weighing the expected benefits and costs of participation on SNS. We find that teenagers behave more rationally on SNS than expected. For example, when facing cumulative risks, such as information accessibility and waste of time, they prefer to refrain from using applications, even though they may be luring benefits to them. Of course they are bounded by usual distortions, such as bounded rationality, self-control or optimism biases and can reveal something more than they wanted. However, as the circularity of our proposed conceptual model suggests, they quickly gain experience with the medium and update their expectations and behavior accordingly. At the same time, we reveal a strong impact of social pressure on the actions of teenagers on SNS. This can be expected, as teenagers are in a stage of forming their identities and sometimes have no other choice other than to rely on their immediate surroundings.

LIMITATIONS

In the field of qualitative analysis, results can be biased, due to the choice of questions, their formulation, the interpretation of the interviewee's answer by the researcher, or the small sample size. Although we analyzed the interviews carefully, and formulated the interview questions as open and as possible, we assume that we could not eliminate this bias completely.

This qualitative study is only the first step in investigating teenage user behavior on SNS. Further research endeavors should include the validation of the causal part of the proposed conceptual model, as well as require additional interviews in order to evaluate the full impact SNS has on teenage identities.

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