

Development of Theory of Mind on Online Social Networks: Evidence from Facebook, Twitter, Instagram, and Snapchat

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Abstract:

Teenagers are fond of online social networks (OSNs) but may be unable to decipher the marketing messages aimed at them or protect themselves from harmful advertisements, raising ethical concerns. The findings of this study may help alleviate such ethical concerns. Teenagers’ use of OSNs contributes to the development of a social skill—theory of mind (ToM)—which helps them interpret advertisements and detect deceptive contents. With regard to ethics-oriented outcomes, the findings confirm that ToM discourages youth materialism, which may be encouraged by inappropriate advertising, thereby demonstrating the utility of ToM in mitigating the adverse consequences of unethical marketing. Moreover, OSNs have reshaped how teenagers acquire ToM, such that they replace offline interactions (i.e., offline friendship quantity/quality) to play a central role in ToM development. Although OSNs expose teenagers to the harms of online marketing, they also empower teens to enhance their social skills, which potentially protect them from deceptive advertising.

Keywords: young consumers | ethics | online social networks | theory of mind | materialism | friendship quantity/quality

Article:

1. Introduction

In light of the deep penetration of social media among teenagers, the marketing literature features an increasing amount of studies that explore engagement by and outcomes of teenager-targeted advertising (Thakor & Goneau-Lessard, 2009). The ethics of marketing to young consumers has long been recognized as an issue (Gentina et al., 2018, Gentina et al., 2018, Gentina et al., 2018, Preston, 2005), but it deserves far more attention in the social media era, when teenagers spend more time interacting through online social networks (OSNs) than with any traditional media. For some teenagers, OSNs act as a sole source of information about consumption opportunities (Ho, Shin, & Lwin, 2019). Relative to traditional media, OSNs also introduce a new breed of challenges, both technical (e.g., behavioral profiling, custom advertising, advergaming) and otherwise (e.g., lack of industry self-regulation and government oversight due to rapid changes), which make it difficult to enforce existing ethical marketing practices (Slutsky, 2011). Moreover, unethical practices have been frequently documented on

major OSNs, exposing teens to products, services, or contents that are inappropriate or misleading (Jackler and Ramamurthi, 2019, Mandybur, 2017).

These observations spark heated debates over the role of OSNs: They offer utilities to teens (e.g., social support) but also expose teens to potential harm, such as unethical marketing practices. Such issues represent pressing concerns for parents, practitioners, and policy makers, suggesting the need for a more holistic understanding of the key phenomena, assessments of the situation and its impacts, and the development of strategies that can shield teenagers from unethical advertising (Lapierre, Rozendall, & Mc Alister, 2017). Considering the ubiquity of communication technology and the pervasiveness of targeted marketing, restricting OSN advertising would be difficult. Instead, we need options to mitigate the adverse consequences. Therefore, this research explores the possibility of encouraging OSN-empowered resilience against the harm of unethical advertisements, by leveraging the capabilities of OSNs to enhance online users' knowledge and competency (Chen, 2013, Ku et al., 2013).

In particular, according to cognitive science and developmental psychology, Theory of Mind (ToM) has a significant role to play in combating false, deceptive advertising (Craig et al., 2012, Lapierre, 2013, Lapierre, 2015, McAlister and Cornwell, 2009, McAlister and Cornwell, 2010, Moses and Baldwin, 2005). It refers to an individual's ability to impute mental states, such as beliefs, desires, intentions, imaginations, and emotions, to oneself and others (Premack & Woodruff, 1978). Because it may be a potential safeguard against unethical marketing on OSNs, we examine the development of ToM on OSNs.

In particular, friendship is a major source of ToM development (Cutting & Dunn, 2006), and an OSN is inherently a social platform that permits the growth of interpersonal relationships. It remains uncertain how much OSNs contribute to ToM development among teenagers though, relative to the ToM they might acquire through offline, face-to-face interactions with friends. Prior to the advent of OSNs, teenagers learned to understand others offline; the number of friends (quantity) and intimacy of the relationships (quality) they developed were key factors. We seek to determine the relative strength of OSNs use on ToM development in the presence of offline friendships; does OSNs use compliment or substitute its offline counterpart in cultivating teenagers' ToM growth? That is, we address the research question, "How does OSNs use interact with offline friendship management to produce greater ToM among teenagers?"¹

Moreover, we verify the effects of ToM on protecting teenagers against the threats of unethical OSN marketing, using youth materialism as a relevant threat.² Promoting materialism among teenagers is a confirmed outcome of unethical marketing on OSNs (Ho et al., 2019). Because teenagers have limited capability to process information and make judgments, they are especially vulnerable (McNeal, 1992). Yet as Flurry and Swimberghe (2016) comment, today's youth spend in record numbers, and they have been characterized as the most materialistic generation

¹ We study OSNs for friendship *management*, rather than offline friendship and online friendship, because of the likely overlap between shared friends in the two channels. When a friend is approached both offline and online, it is improper to categorize this friendship into one channel or the other or to divide it along offline (e.g., 40%) and online (e.g., 60%) dimensions.

² We are grateful to the Guest Editor for recommending that we include materialism, as an example ethical issue, in the conceptual model.

in history. With advertisements showing teen models wearing luxury clothes and costly cosmetic products, companies encourage unnecessary consumption and spending (Staff. , 2017), as well as fostering the growth of materialistic values that are antithetical to their optimal health and happiness. Young consumers who cannot afford pricy products still might develop an urge to pursue luxury items, so we also address the research question, “How does a teenager’s ToM affect his or her materialism?”

This study focuses on teenagers, aged between 13 and 18 years, because adolescence is a crucial stage for ToM development (Chaplin & Norton, 2015) and because teenagers are frequent users of OSNs. These “digital natives” have grown up in a digital, technology-saturated world and are the most engaged social networkers (Dingli & Seychell, 2015). We use France as our study context; French teens are very active on social media. According to recent international surveys (Statista. , 2019), French teenagers 11–18 years of age are heavy users of popular OSNs, such that 35% of French teenagers use Snapchat, 27% use Instagram, and 32% use Facebook. In comparison, 47% of U.S. teenagers use Snapchat, 24% use Instagram, and 9% use Facebook. Overall, Snapchat, Instagram, and Facebook are the top three most used OSNs by teens 11–18 years of age, in both France and the United States (Statista, 2018). Among French Snapchatters, 55% report engaging with the platform once a month, compared with less than one-quarter of the young consumers surveyed in Asia-Pacific regions (GWI, 2017). Furthermore, French youth face a significant threat of materialism, so this national context is appropriate for studying the likely effect of ToM in deterring materialism. For example, Lundstrom and White (1999) commented that, in both the U.S. and France, the youth are the most materialistic and they are most likely to acquire goods as a desired end state.

Accordingly, our study contributes to extant literature in three main ways. First, this research sheds new light on marketing ethics in the social media era (Lapierre, Rozendall, & Mc Alister, 2017). We empirically validate the effect of teenagers’ ToM on deterring their levels of materialism. Through a youth materialism lens, our findings underscore the utility of ToM for protecting teens from the consequences of unethical marketing campaigns (Craig et al., 2012, Lapierre, 2013, Lapierre, 2015, McAlister and Cornwell, 2009, McAlister and Cornwell, 2010, Moses and Baldwin, 2005). Materialism itself has been criticized as a major cause of consumer ethics problems (Muncy & Eastman, 1998). Second, this study contributes to ToM literature by uncovering new sources of ToM. Specifically, we establish that teenagers’ ToM development is driven by their OSNs use, which itself is shaped by teenagers’ offline friendship quality and quantity. Prevailing literature on ToM underscores the important role of friendship for building ToM but has not identified the potential role of online platforms. To fill this gap, we present novel insights on both online friendship management and its offline counterpart in teenagers’ ToM development. We highlight the dominant role of OSNs use; it directly contributes to ToM and simultaneously channels the effects of offline friendship on ToM. Third, we identify factors that explain individual differences in the use of OSNs to increase ToM. Specifically, we distinguish the effects of offline friendship quality and friendship quantity on OSNs use and underscore the effect of OSN concerns in regulating various relationships.

2. Theoretical background

2.1. Teenager-targeted advertising through OSNs: Ethical issues

Teenagers are growing up in a digital, technology-saturated world (Dingli & Seychell, 2015), in which OSNs allow them to engage in various activities that are not available offline, such as connecting with friends and family in a virtual world, making new friends from other communities, sharing pictures, and exchanging ideas. In France, the focal country of this study, 80% of 13–18-year-olds use OSNs, and 81% of them possess a smartphone, spending an average of more than three hours per day on the devices (Gentina & Delécluse, 2018). Engaging with OSNs can have both positive and negative outcomes for teenagers. On the positive side, OSNs benefit teenagers by enhancing their communication, social connection, and technical skills (Ito, Horst, & Bittani, 2010). Through OSNs such as Facebook and Instagram, teenagers gain multiple ways to stay connected with friends, classmates, and others with common interests. On the negative side, OSNs may open teenagers to risks of cyberbullying, inappropriate content, privacy concerns, and influences by third-party advertisers (O'Keeffe & Clarke-Pearson, 2011), as well as Internet addiction and sleep deprivation (Christakis & Moreno, 2009).

We focus mainly on ethical considerations pertaining to how OSNs may affect teenagers' consumption-related attitudes and behavior. According to Vanwesenbeeck, Walrave, and Ponnet (2016), OSN advertising takes various forms, such as displays in virtual settings or theme rooms assigned to a particular brand, designed to evoke teenagers' desire for the advertised brand or product. Furthermore, OSNs feature advertisements of various types, including banner, behavior-based (which target people according to their cyber-browsing behavior), and demographic (which target consumers according to demographic characteristics, such as age, gender, education, and marital status) ads. These marketing communications can affect teenagers' purchasing tendencies and their views of what is normal (O'Keeffe & Clarke-Pearson, 2011). Due to the effectiveness of OSNs for advertising to teenagers, companies have been increasing their marketing budgets in these channels (Yang, Floyd, & Tanner, 2019). Overall, OSNs are a top choice for reaching teenagers (Mas-Tur et al., 2016, Rozendaal et al., 2013, Vanwesenbeeck et al., 2016). But such approaches raise significant ethical concerns, because teenagers often lack the capability to identify the intentions of subtle marketing (Cornish, 2014), and this concern is especially salient on OSNs, on which there often are no clear boundaries between content and advertising, so it can be more difficult to identify advertising than it would be in traditional media (Owen, Lewis, Auty, & Buijzen, 2013).

Unethical advertising practices also have been frequently documented on major OSNs, including exposing teens to products, services, or contents that are misleading, inappropriate, illegal, or unsafe for consumers at their age (Jackler and Ramamurthi, 2019, Mandybur, 2017). Companies also exploit teenagers' personal traits to tailor their OSN advertising strategies to cater to their interests and demands (Mas-Tur et al., 2016). As soon as children begin to go online and post, marketers gather their personal information and target them according to their profiles. For example, advertisers on Facebook target emotionally vulnerable teens (as young as 14 years of age) by using data mining algorithms to collect and analyze their posts, pictures, and reactions (Mandybur, 2017). A 2019 analysis critically cited vaping companies for targeting teens through Instagram (Jackler & Ramamurthi, 2019).

2.2. ToM to combat unethical OSN advertising

In search for skillsets that can mitigate the negative effects of unethical advertising on teenagers' consumption patterns, scholars in cognitive science and development domains emphasize ToM as an instrumental skill. Using experimental studies, McAlister and Cornwell (2009) show that ToM development is essential to persuasive knowledge: Before developing ToM, a person cannot recognize persuasion in advertising. Moreover, McAlister and Cornwell (2010) confirm that ToM predicts performance in developing a correct mental representation of advertising contents. Using fMRI, Craig et al. (2012) study brain functioning among people as they process ads and show that ToM reasoning protects consumers by helping them determine the truth behind claims and screen out deceptive advertisements. Moses and Baldwin (2005) also note the implications of ToM for individual appreciation of advertising, suggesting that it helps people (1) distinguish advertising from program content, (2) infer the intentions underlying advertising, and (3) recognize biases. In addition, ToM affects how people understand advertisements and control their reactions to emotionally exciting stimuli (Lapierre, 2013); in particular, ToM development is directly linked to understanding of selling intent, beyond influences of age and linguistic competence (Lapierre, 2015).

Because ToM describes the way people make attributions about the intentional states of others (Adams, 2001), it constitutes a critical skill for human survival and thriving (Cherry, 2019). With the help of ToM, a person is able to understand the unobservable psychological states and thought processes of others and to predict their behavior accordingly. Therefore, ToM is tied to social competency and is crucial for supporting optimal social development. Those with well-developed ToM are able to build models of others' minds and infer others' mental states. Accordingly, ToM often results in prosocial behavior (Cavojova, Belovicova, & Sirota, 2011), whereas deficits in ToM lead to a lack of sensitivity to others' feelings, as well as inability to detect the interests of other people, anticipate others' behaviors, or understand deception and deceit (Baron-Cohen, 2001).

Acquisition of ToM starts in early childhood and continues to develop throughout life (Moran, 2013). It is acquired particularly during adolescence (Chaplin & Norton, 2015), a period characterized by major changes in cognitive, socio-emotional, and relational abilities (Eccles, Templeton, Barber, & Stone, 2003). In the relational domain, teenagers tend to progressively distance themselves from their parents and increasingly rely on peers (Gentina, Butori, & Heath, 2014); their peer groups become more important, supplementing the emotional support initially provided by parents.

2.3. Friendship quantity and quality

As an indicator of social competence, ToM by nature is related to friendship. Prior studies (e.g., Peterson & Siegal, 2002) document that, after controlling for the effects of language ability and group sociometric status (e.g., being popular or unpopular), there is a significant correlation between friendship and ToM. Through interactions with friends, people gradually realize that their friends' perspectives may differ from their own. Therefore, friendship is a significant contributor to the development of ToM (Fink, Begeer, Peterson, Slaughter, & de Rosnay, 2015).

Prior to the advent of OSNs, teenagers acquired friends primarily through offline channels such as school (Gentina & Bonsu, 2013). Teenagers spend seven hours per day, five days a week, with their classmates at school, making it the major context through which they enhance their ToM skills. However, in the OSN era, this traditional ToM development route is changing. Teenagers may be attracted to OSNs because they offer such a large supply of contacts and support a wide variety of social interactions (e.g., commenting, posting photos, “liking”) that are instrumental to the growth of ToM.

According to Statista (2018), 2.46 billion online users visited social networking sites in 2017; this number is expected to rise to 3.02 billion by 2021. Growing up in the Internet era, teenagers view OSNs use as an inherent part of their lives; OSNs have become the default solution for improving their social lives (Shapiro & Margolin, 2014). Although it is reasonable to expect a shift from offline to online ToM development among digital natives, existing literature has rarely investigated that prediction, other than to advocate the potential value of OSNs use for friendship (McKenna, Green, & Gleason, 2002) or suggest a connection between offline friendship and OSNs use (Reich, Subrahmanyam, & Espinoza, 2012).

Most research on how offline friendship may affect individual OSNs use also has ignored the distinction between two dimensions of offline friendship, namely, friendship quantity and friendship quality. The quantity dimension refers to the number of friends one has, whereas the quality dimension refers to the degree to which relationships with offline friends are meaningful, regardless of the number of friends (Nangle, Erdley, Nerwman, Mason, & Carpenter, 2003). Among studies that simultaneously examine the effects of friendship quantity and quality (none of which include OSNs), mixed findings arise with respect to whether their effects are similar or distinctive. That is, some studies indicate that the effects of friendship quantity and quality are not differentiable (Lodder, Scholte, Goossens, & Verhagen, 2017). For example, Nangle et al. (2003) reveal cumulative positive effects of both friendship quantity and friendship quality (as perceived by the teenager’s friends) on teenagers’ social adjustment. Similarly, Lodder et al. (2017) show that poor social adjustment (e.g., loneliness) is negatively related to both friendship quantity and quality. Yet other scholars report differences across these two dimensions. Qualter et al. (2013), for instance, find that only friendship quality, not friendship quantity, is related to poor social adjustment (loneliness).

In a ToM context, it remains unknown whether offline friendship quantity and quality affect ToM development in a similar way. Also, it is unclear whether offline and online channels are complimentary or competitive in teenagers’ friendship management. In subsequent sections, we discuss how OSNs use for friendship management contributes to the development of ToM and how offline friendship quantity and quality differentially affect teenagers’ engagement in OSNs.

2.4. Youth materialism

Materialism is prominent in everyday life (Burroughs & Rindfleisch, 2011), particularly for teenagers (Chaplin and John, 2007, Chaplin and John, 2010). Goldberg, Gorn, Peracchio, and Bamossy (2003, p. 280) define youth materialism as a value that “includes the desire to buy and own things, the enjoyment of these objects, the desire for money to enable these purchases, and even the desire for jobs that can secure the money necessary for purchases.” Teenagers high in

materialism are oriented toward material possessions, desire to obtain money to buy things, believe that enjoyment comes from ownership of things, and think that status is linked to material things (Dittmar, Bond, Hurst, & Kasser, 2014). Teenagers prioritizing materialism tend to use possession acquisition as a way to build and maintain their self-identity (Chaplin & John, 2007) and as a substitute of interpersonal relationships to fill the void of social connections (Rindfleisch, Burroughs, & Wong, 2009). Accordingly, youth materialism is a prominent ethics-oriented factor related to teenagers, because materialism can increase their social isolation, loneliness (Pieters, 2013), and debt (Richins, 2011). In accumulating possessions, materialistic teenagers are more willing to compromise ethical rules (Flurry & Swimberghe, 2016). Several studies affirm that the relationship between youth materialism and consumer ethical beliefs is very robust (Gentina et al., 2018, Gentina et al., 2018).

Social media is among the leading causes of materialistic mindsets among teenagers (Debrenci & Hofmeister-Tóth, 2018), in the sense that it supports the consumption-related socialization of teenagers. They come to anticipate that reality should mimic what they see in social media (Yang et al., 2019, Yang et al., 2015). Furthermore, social media can help users choose and respond to particular information (Yang et al., 2015). Word-of-mouth discussions through online forums and blogs fertilize teenagers' learning of consumption techniques and drive imitation. The need to maintain online relationships and attract recognition from online forums and virtual communities (e.g., online reputation) also can directly reinforce consumption behavior. Because social media offers an important source of learning that may shape teenagers' materialistic values, teenagers more frequently exposed to shared stories about the consumption of luxury items tend to overestimate the popularity of such consumption and underestimate its financial risk (Yang et al., 2019).

These concerns highlight the importance of finding ways to curb youth materialism and reduce its harmful effects. According to Chaplin, John, Rindfleisch, and Froh (2018, p. 1), "there is a need to explore alternative means of addressing this important issue by finding alternative ways to reduce youth materialism." We address this need by identifying a promising strategy for reducing materialism among teenagers that also seems easy to implement: ToM. Specifically, we propose that youth materialism may be suppressed by ToM.

3. Theoretical model and hypotheses

Our proposed research model (see Fig. 1) specifies that offline friendship quality is negatively related, and offline friendship quantity is positively related, to the frequency of OSN activities; in turn, the frequency of OSN activities positively affects ToM, which affects youth materialism in a negative way. This model allows us to examine two mediation effects (offline friendship quality → frequency of OSNs activities → ToM, and offline friendship quantity → frequency of OSNs activities → ToM). We test the model in the contexts of online OSNs for teenagers, including Facebook, Twitter, Instagram, and Snapchat. We further posit that OSN concerns moderate these relationships, such that the magnitudes of the relationships among offline friendship quantity, offline friendship quality, OSN activities, and ToM vary across teenagers high versus low in OSN concern.

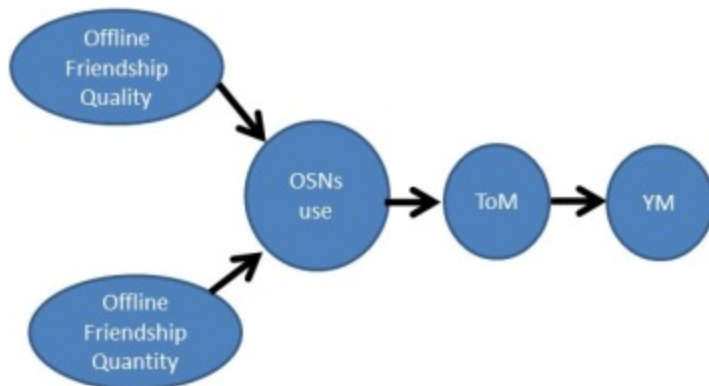


Fig. 1. Conceptual Model.

3.1. Offline friendship quantity and quality and OSNs

Friendships are important to teenagers. Adolescence is marked by transformational intrapersonal changes in identity and the increased need to belong to peer groups (Baumeister & Leary, 1995). As indicated previously, offline friendship is a bilateral construct composed of two dimensions: friendship quantity and friendship quality. In the digital era, teenagers have flocked to social networks such as Facebook, Twitter, Instagram, and Snapchat to continue their social interactions with people who are already a part of their extended social network (Ellison, Steinfield, & Lampe, 2007). However, it is not clear how the two friendship dimensions—quantity and quality—affect the frequency with which teenagers use OSNs.

We expect that when teenagers have more offline friends, they tend to go online more often, because many of their offline friends also are active on the highly popular OSNs.

As previously explained (Statista, 2019), 35% of French teenagers use Snapchat, 27% use Instagram, and 32% use Facebook. To stay “in the loop,” teenagers likely engage in OSNs. Having more offline friends therefore is likely to be associated with having more online friends, which leads to more OSN visits. Moreover, OSNs have built-in features that recommend potential friends to users. Through features such as “People You May Know,” for example, users of Facebook receive suggestions of potential contacts. Therefore, the more friends teenagers have online (originating from offline friends), the more new friends they may find in cyberspace, resulting in even more OSN visits. This theorizing suggests a positive relationship between offline friendship quantity and frequency of OSN activities. Thus, we hypothesize:

H1: Offline friendship quantity relates positively to the frequency of OSN activities.

During adolescence, the desire for closeness and intimacy with peers increases; friendship quality promotes positive personal development by enhancing personal well-being (Ojanen, Sijtsema, Hawley, & Little, 2010). Face-to-face interactions, including gestures, facial expressions, body language, and eye contact—none of which is transmitted by “screen-speak”—are superior for producing quality relationships and enabling personalized communications (Nogales, 2010). Therefore, we suggest that teenagers who have high-quality relationships with offline friends may be less motivated to make new friends by engaging in OSNs. Moreover, maintaining the quality of a friendship takes time; it reduces the amount of time that teenagers

can spend on OSNs. In contrast, teenagers who have low-quality relationships with offline friends are more motivated to find new friends to compensate for the deficiency of friendships in face-to-face environments. We expect:

H2: Offline friendship quality relates negatively to the frequency of OSN activities.

3.2. OSNs and ToM

Extant literature has been silent on the potential impact of OSNs on ToM development. Although there has been some theorizing that television (e.g., Moses and Baldwin, 2005, Nathanson et al., 2013) and social media (Mar, Tackett, & Moore, 2010) exposure can influence the development of ToM, there is little empirical research regarding whether OSNs may affect ToM. We anticipate OSNs are positively related to ToM. Adolescence is accompanied by important social and emotional changes; most teenagers distance themselves from their parents to create new relationships with their peers (Chaplin & John, 2007). However, many of them are threatened by real-life social contexts, finding it hard to interact with peers face-to-face (mostly at school), especially if their peers display higher social status or dominance (Gentina, Shrum, et al., 2018). In this context, OSNs offer opportunities for them to engage with others at their own pace, anonymously, and with less anxiety (McKenna & Bargh, 2000). Furthermore, OSN activities involve sharing, exchanging, and negotiating content such as pictures, photos, comments, and praise of others' generated content (Ellison, 2007), which provide "experimental" grounds for teenagers to gauge the minds of others (Chan, 2014). Finally, OSNs connect online users from around the globe, building platforms for teenagers to learn from others who use different thinking processes and have different frames of reference. Such exposure to the mindsets of others fosters ToM (Ellison et al., 2007, Yang and Brown, 2013). Accordingly, we expect that OSNs—in our case, Facebook, Twitter, Instagram, and Snapchat activities—facilitate the development of teenagers' ToM.

H3: The frequency of OSN activities relates positively to the development of teenagers' ToM.

3.3. ToM and youth materialism

To date, little is known about the relationship between ToM and youth materialism. Psychology literature contends that people equipped with good ToM skills are able to stand in others' shoes, build models of others' minds, and infer others' mental states, including their thoughts, messages, and intentions. In contrast, those whose ToM skills are underdeveloped (i.e., "mind blindness"; Baron-Cohen, 2001) tend to struggle to make sense of their social soundings and lack proper frameworks for interpretation (Epley & Waytz, 2010). In line with these notions, teenagers with greater ToM should be able to decipher the commercial nature of OSN advertising more readily, leaving them more vigilant toward and skeptical of marketing messages that promote materialistic values.

Furthermore, ToM drives altruistic behavior (Warneken & Tomasello, 2009), whereas materialism implies an individualistic, selfish behavior (Belk, 1985). Empirical research in psychology indicates that ToM relates positively to pro-social behaviors such as helping,

cooperating (Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016), and sharing (Liu et al., 2016). In contrast, materialism relates to selfishness (Belk, 1985) and is negatively correlated with willingness to share money with family, friends, or charitable organizations, among both adults (Belk, 1985, Richins and Dawson, 1992) and teenagers (Kasser, 2005). Thus, ToM arguably could act as an antidote to materialism. In a similar vein, research in consumer behavior indicates that teenagers with mature, well-developed ToM are able to appreciate the benefits of experiences rather than the fact of possessing objects (Chaplin, Lowrey, Ruvio, Shrum, & Vohs, 2018). Therefore, we postulate:

H4: ToM is negatively associated with youth materialism.

3.4. OSN concerns as a moderator

The notion of OSN concerns refers to the pressure to conform to the expectations of others on OSNs. As Chaudhuri (2012) notes, “Social networking is the new peer pressure.” Social pressure may emerge when people attempt to identify with reference groups to enhance their images in the eyes of important others (i.e., “value expressiveness influence”) (Bearden & Etzel, 1982). It also may occur when people attempt to comply with others’ expectations to gain rewards or avoid punishments (i.e., “utilitarian influence”) (Bearden & Etzel, 1982). Because OSNs connect users on a 24/7 basis, OSN concerns have become a major issue; reports show that many teenagers are under significant social pressure when engaging in OSNs (e.g., to wait for people to comment, to always be liked, to fit in with others posting on social media) (Chaudhuri, 2012). Teenagers are often so emotionally invested in OSNs that “a fifth of secondary school pupils will wake up at night and log on, just to make sure they don’t miss out” (Udorie, 2015). Teenagers’ OSN concerns may stem from a fear of missing out or of being excluded; such fears may lead to self-hatred or bullying. For example, concerned teenagers may become worried about not being accepted or valued by their peers if they do not receive comments on their OSN posts or tweets or else receive negative comments. In contrast, teenagers who are less concerned tend to downplay the significance of others’ opinions. Therefore, OSN concerns indicate the extent to which teenagers are susceptible to peer influence.

We propose that individual differences in the level of OSN concerns represent a boundary condition for the relationships among offline friendship, OSN usage, and ToM, because OSN concerns imply a tendency to seek and accept the influence of important others on OSNs. Previous research indicates that susceptibility to interpersonal influence is a key factor in shaping attitudes, norms, values, and aspirations in contexts such as smoking and drinking (Yang, Schaninger, & Laroche, 2013), music piracy (Yang et al., 2015), and privacy in social networks (Koohikamali, Gerhart, & Mousavizadeh, 2015). However, its role as a moderator in general and of OSN concerns in particular has not been investigated.

We expect that teenagers with differing levels of OSN concerns display differing levels of responsiveness to friendship quantity, such that the positive effect of friendship quantity on OSN activities is stronger for teenagers who have high (vs. low) levels of OSN concerns. Relative to those with low levels of OSN concerns, teenagers with high levels tend to make their decisions according to the desire to be accepted by others (Bonabeau, 2004) and to gain reputational benefits (Kuran, 1997) or positive self-image (Yang et al., 2015). Teenagers with high levels of

OSN concerns are more motivated to engage in OSNs to keep in touch with their offline friends who are also active on OSNs. They view OSNs as an opportunity to project ideal self-images, stay connected, and remain accepted by their social ties, which leads to more OSN activities. In contrast, we expect a weak connection between the number of offline friends and OSNs use when teenagers have lower levels of OSN concerns; these teens may be less motivated to use OSNs even when their peers create profiles and stay active on OSNs. We hypothesize:

H5: The positive relationship between offline friendship quantity and frequency on OSN activity is stronger for teenagers who have higher levels of OSN concerns.

We further expect that OSN concerns reduce the negative impact of offline friendship quality on OSN usage. Those with high levels of OSN concerns are more likely than those with low levels to distinguish between in-groups and out-groups and show greater preference for in-group members (cf. Yang & Laroche, 2011). To them, in-group members (e.g., close friends) are much more important than out-group members (e.g., distant friends); therefore, maintaining relationships with close others becomes paramount.

Previous studies in domains other than social media provide evidence that supports our argument; for example, research on altruism shows that those who draw clear distinctions between in-group and out-group members are willing to donate more to in-group victims than out-group victims. Those who do not draw fine lines between in-group and out-group members are less likely to discriminate between the two groups (Duclos & Barasch, 2014). Similarly, for those who perceive clear differences between in-groups and out-groups, activating personal traditions and values can enhance intergroup aggression, especially when the in-groups and out-groups are in conflict (Struch and Schwarz, 1989).

Given the deep penetration of OSNs among teenagers, large numbers of their in-group friends are on OSNs. Moreover, because valuing in-group members is likely to drive teens to use OSNs to nurture their friend relationships, we expect teens will use OSNs more, thereby reducing the negative impact of offline friendship quality on OSN usage. In contrast, we expect that teenagers with low levels of OSN concerns will be less likely to treat in-group friends with special care, because they are satisfied with their offline social relationships and lack the motivation to take extra steps online (e.g., engaging in OSNs).

H6: The negative relationship between offline friendship quality and frequency of OSN activities is stronger for teenagers who have lower levels of OSN concerns.

Furthermore, we anticipate that OSN concerns can enhance the impact of OSN usage on ToM. Those with high levels of OSN concerns may regard online posting of personal inner feelings or beliefs as immature or selfish (and care more about others' reactions to their online posts); as a result, they are encouraged to sacrifice personal goals for good relationships with others (Yang & Laroche, 2011). Having high levels of OSN concerns also may encourage people to respect the differing mind-sets and ideologies of others, that is, to keep an open mind in learning about varying perspectives, which would contribute to the development of ToM. In contrast, teenagers with low levels of OSN concerns have more autonomy to ignore social-influence constraints (Mourali & Yang, 2013) and post according to their own internal attitudes and thoughts (Yang et

al., 2015). However, by pursuing autonomy, people can miss opportunities to recognize differences between mind-sets and perspectives, thereby sabotaging ToM development. Accordingly, we expect levels of OSN concerns to strengthen the effect of OSN activities on ToM development.

H7: The positive relationship between frequency of OSN activities and ToM is stronger for teenagers who have higher levels of OSN concerns.

4. Method

4.1. Procedure

Noting the significant role that OSNs play in French teenagers' lives, we gathered data from France to test our model. Adolescent populations are vulnerable in research contexts (Levine et al., 2004), so precise standards exist for the ethical conduct that researchers must follow when they work with teenagers (Crane & Broome, 2017). In particular, there is an inherent power differential, created by age differences and the varying social standings between participants and the researcher (Crane & Broome, 2017). Therefore, we administered paper-and-pencil surveys in classrooms during regular class hours, in the presence of a teacher (to maintain classroom order) and one of the authors. The teachers were physically present in the classroom to ensure the protection of the teens' interests. The physical presence of the researcher limits the bias linked to information dissemination, by ensuring that teen informants reply individually to the questionnaire, and also ensures a source is available to provide answers to their questions, as needed. In addition, the teen informants were clearly informed of the purpose of the research, had time (one hour) without pressure to answer the questionnaire, were free to express themselves, and had the choice not to participate at any time without any adverse consequences. Moreover, they were told that the information gathered would be kept confidential and only the researcher would see their answers. Both verbal and written statements affirmed that the completed questionnaires would "never be shown to parents, teachers, or anyone else, except for the researcher." We also did not gather any identity information (e.g., name, student ID). During the data collection, the researcher remained neutral and adopted an egalitarian friendship pose toward the teenage informants, following an approach recommended by previous researchers (Tisdall, Davis, & Gallagher, 2009).

Two private schools and two public schools in the city of Lille, in Northern France, were selected to participate the study. In cooperation with each school, participants were recruited from 15 approved classes. Participants completed a questionnaire as a part of an omnibus survey on consumer-related topics. Each session was approximately one hour in length. Prior to its administration, parents received letters inviting their children to participate. Study participation required signed parental consent and individual participants' assent. We explained that the participants could refuse to answer some questions. We also received agreement from the teachers.

To enhance the generalizability of our findings, we tested our research model in four OSN contexts: Facebook, Twitter, Instagram, and Snapchat. These four OSNs are internationally popular, including in France. Although Facebook remains a dominant social platform among

French members of Generation Z, it is losing relevance among younger users who spend more time on “cooler” platforms such as Instagram or Snapchat, which specialize in image and video sharing. If we focus on Generation Z, Snapchat usage reaches as high as 35% in France and jumps to nearly 50% in North America. Yet the four platforms also are similar in many ways: Twitter, Instagram, and Facebook all provide means to share and consume content with peers. Both Facebook and Twitter help users connect with existing friends or build new social contacts online (through the “Find Friends” and “Connect” features, respectively). Facebook and Twitter also allow users to post commentaries easily, by creating posts or tweets. Although all four OSNs allow users to share photos, Snapchat is characterized by greater privacy and tends to feature shared content in a more private context than Facebook (Hildebrand & Schlager, 2019).

4.2. Sample

A total of 409 French teenagers (ages 13–18 years; 223 girls), including 13–14-year-olds (65), 15–16-year-olds (200), and 17–18-year-olds (144), participated this study. They came from 15 classrooms of four public and private schools. Participants’ average age was 16.2 years, and the average class size was 30 students.

4.3. Measures

We translated all measurement scales (Table 1) into French and back-translated them into English to ensure semantic equivalence between the two versions. An additional effort also sought to ensure the translations of the established measurement items were free of linguistic confounds. We recruited two bilingual judges—faculty members who were unaware of the purpose of this research—to compare the original English and back-translated versions. The judges agreed that 95% of items in the two versions conveyed the same meaning. On the basis of suggestions from the two judges, minor modifications were made to the French version. Moreover, 15 French teenagers pre-tested the final version to ensure clarity, comprehension, and ease of completion.

Table 1. Construct Measurements.

		Mean	SD	Factor loading	Composite reliabilities
Youth materialism	1. I would be happier if I had more money to buy more things for myself	3.04	1.18	0.81	0.58
	2. When you grow up, the more money you have, the happier you are.	2.16	1.15	0.75	0.55
	3. I would love to be able to buy things that cost lots of money.	2.63	1.25	0.72	0.59
	4. The only kind of job I want when I grow up is one that gets me a lot of money.	3.57	1.18	0.78	0.71
	5. I’d rather spend time buying things, than doing almost anything else.	2.72	1.58	0.72	0.70
	6. The things I own really make me happy.	2.89	1.24	0.66	0.64
	7. I enjoy just thinking about all the things I own.	3.01	0.98	0.66	0.62
	8. I admire people who dress well	3.21	0.99	0.67	0.62
Offline Friendship Quantity	1. Thank you for nominating up to five of your closest friends in class.	4.90	12.9	0.68	0.66

		Mean	SD	Factor loading	Composite reliabilities
Offline Friendship Quality	1. If ... had to move away, I would miss him/her.	2.01	0.85	0.80	0.63
	2. When I do a good job at something, ... is happy for me.	1.79	1.09	0.85	0.75
	3. Sometimes ... does things for me or makes me feel special.	2.08	1.11	0.78	0.66
Theory of Mind	1. I can tell right away when people smile but are not being honest.	3.93	0.99	0.82	0.65
	2. It is easy for me to talk to other people.	3.67	0.95	0.82	0.64
	3. It is easy for me to understand people by just watching them.	3.81	0.78	0.78	0.66
	4. I often think about reasons why people do certain things	3.79	0.95	0.72	0.56
	5. I like to guess what other people are thinking.	3.80	0.98	0.70	0.65
Facebook Activity	How often do you:				
	1. Connect with friends on Facebook?	4.03	0.94	0.78	0.68
	2. Post comments on others' Facebook profiles?	2.06	0.49	0.72	0.67
	3. Post pictures of yourself on Facebook?	2.19	0.90	0.70	0.68
Twitter Activity	How often do you:				
	1. Connect with friends on Twitter?	2.99	0.81	0.76	0.71
	2. Tweet?	2.56	0.52	0.72	0.70
	3. Post pictures of yourself on Twitter?	2.81	0.61	0.70	0.68
Instagram Activity	How often do you:				
	1. Connect with friends on Instagram?	2.85	0.89	0.78	0.70
	2. Post pictures on others' Instagram profiles?	2.71	0.78	0.71	0.66
	3. Post pictures of yourself on Instagram?	2.80	0.78	0.73	0.69
Snapchat Activity	How often do you:				
	1. Connect with friends on Snapchat?	2.86	0.78	0.68	0.64
	2. Post pictures on others' Snapchat profiles?	2.84	0.75	0.78	0.68
	3. Post pictures of yourself on Snapchat?	2.83	0.64	0.69	0.63
OSN Concerns	1. I feel bad about myself when nobody makes comments on my posts/tweets.	3.07	0.75	0.70	0.84
	2. I worry about people posting negative posts/messages and tagging me in them.	2.91	0.79	0.68	0.82

In accordance with previous research (Kratzer & Lettl, 2009), we assessed offline friendship quantity by measuring teenagers' connections within their classroom social networks. To mitigate potential confounds caused by social desirability bias and impression management, we used a peer-reported, rather than self-reported, measure (Lee, Cotte, & Noseworthy, 2010). Social networks show how teens are connected to their peers and indicate their degree centrality. According to Johnson (2014, p. 41), degree centrality refers to "the number of peers with whom a student has face-to-face interactions, and so is a marker of the size of that student's microsystem(s)."

We asked participants' classmates to name up to five of their closest friends in their classes. The purpose of this exercise was to determine friendship networks and measure the degree centrality of our participants, as reported by their peers. We limited the number of names to five to mitigate the chances of over-reporting affiliations with others (e.g., naming distant [less close] acquaintances, giving names at random) (Gentina et al., 2014). We calculated degree centrality using Ucinet 6.0. software (Borgatti, Everett, & Freeman, 2002).

To measure offline friendship quality, we asked the teens to write a list of 10 peer names (their closest friends) at school and to answer follow-up questions about their good friends, using Bukowski, Hoza, and Boivin (1994) friendship quality scale (1 = not true; 5 = really true).

We used Chaplin et al. (2018) 5-item ToM scale to assess teenagers' ToM.

To measure the frequency of OSN activities, we used three items to measure the frequency of teens' engagement on OSN activities (1 = never; 5 = always) for each of the four platforms.

To measure levels of OSN concerns, we used two items with 5-point scales (1 = strongly disagree; 5 = strongly agree) (Social Media, Social Life, 2012).

Finally, we used Goldberg et al. (2003) 10-item scale to assess youth materialism. Example items included "The only kind of job I want when I grow up is one that gets me a lot of money" and "I'd rather spend time buying things, than doing almost anything else" (1 = strongly disagree; 5 = strongly agree). The Youth Materialism Scale was specifically developed for an adolescent population, and prior research with children and teenagers has provided evidence of its validity (e.g., Chaplin and John, 2007, Chaplin and John, 2010).

5. Results

5.1. Factor analyses

As the results in Table 1 show, all items passed the test of univariate normality (Kline, 2005). Prior to testing our hypotheses, we conducted an exploratory factor analysis and evaluated the measures in terms of their dimensionality and convergent and discriminant validities, using confirmatory factor analysis (CFA). We removed two items from the youth materialism scale because of weak loadings ($\lambda < 0.5$) on their target factors.

Table 2 displays the descriptive statistics, including the correlation matrix, average variance extracted (AVE), and reliability scores. We assessed measurement reliability using composite reliability and Cronbach's α . As shown in Table 1, the internal consistencies of all variables are acceptable, because the composite reliability scores are all greater than 0.70.

The measurement models fit the data well: Facebook $\chi^2 = 192.27$, $df = 111$, $p < .001$, $\chi^2/df = 1.73$; root mean square error of approximation (RMSEA) = 0.05; confirmatory fit index (CFI) = 0.92; Twitter $\chi^2 = 195.97$, $df = 111$, $p < .001$, $\chi^2/df = 1.76$; RMSEA = 0.05; CFI = 0.91; Instagram $\chi^2 = 192.04$, $df = 111$, $p < .001$, $\chi^2/df = 1.73$; RMSEA = 0.05; CFI = 0.92; and

Snapchat $\chi^2 = 206.37$, $df = 111$, $p < .001$, $\chi^2/df = 1.85$; RMSEA = 0.03; CFI = 0.98 (Table 3, Model 2).

Table 2. Results of the Eight-Factor CFA Model (n = 409, Whole Sample).

Construct	* Correlations among trait factors.			Discriminant validity							
	Reliability (Jöreskog's Rhô)	Convergent Validity (Rhô VC)		ToM	SC	IN	TW	FA	QUANT	QUAL	YM
Youth Materialism (YM)	0.83	0.51									X
Offline Friendship Quality (QUAL)	0.79	0.56								X	-0.05*
Offline Friendship Quantity (QUANT)	–	–							X	-0.30	0.07
Facebook Activity (FA)	0.79	0.56						X	0.27	-0.26	0.10
Twitter Activity (TW)	0.75	0.50					X	0.65	0.24	-0.25	0.11
Instagram Activity (IN)	0.77	0.53				X	0.42	0.50	0.25	-0.33	0.10
Snapchat Activity (SC)	0.75	0.52			X	0.62	0.40	0.63	0.22	-0.46	0.11
Theory of Mind (ToM)	0.82	0.50		X	0.25	0.20	0.13	0.12	0.12	-0.11	-0.13

** Shared variance among trait factors.

*** Correlations among trait factors.

Table 3. Main results of measurement models, invariance, and common method variance for four OSN models (Facebook, Twitter, Instagram and Snapchat). Facebook.

Facebook											
	χ^2	df	p	χ^2/df	CFI	RMSEA	SRMR	Models	ΔCFI	$\Delta RMSEA$	
Measurement model on the whole sample (n = 409)											
1. M1: Reflective (20-item, 1-factor)	1643.01	119	0.00	13.80	0.23	0.23	0.21	1 vs 2	0.69	0.18	
2. M2: Reflective 20-item, 5-factor)	192.27	111	0.00	1.83	0.92	0.05	0.06				
Invariance (High vs. low OSN concerns groups)											
3. M3: Configural invariance (20-item, 5-factor)	323.21	222	0.00	1.45	0.90	0.04	0.06	3 vs 4	0.00	0.01	
4. M4: Metric invariance	330.04	223	0.00	1.48	0.90	0.05	0.07				
Common method variance (CMV)											
5. M5: Reflective (20-item, 5-factor)	192.27	111	0.00	1.72	0.92	0.05	0.06	5 vs 6	0.00	0.01	
6. M6: Reflective (20-item, 5-factor) + CMV	184.30	0.97	0.00	1.09	0.92	0.04	0.03				
Theoretical model											
7. M7: Facebook Theoretical model on the whole sample	221.65	114	0.00	1.94	0.90	0.06	0.07				
8. M8: Facebook Theoretical model across OSN	342.52	226	0.00	1.52	0.90	0.04	0.07				
Twitter											
	χ^2	df	p	χ^2/df	CFI	RMSEA	SRMR	Models	ΔCFI	$\Delta RMSEA$	
Measurement model on the whole sample (n = 409)											
1. M1: Reflective (20-item, 1-factor)	1605.41	119	0.00	13.49	0.39	0.22	0.21	1 vs 2	0.40	0.11	
2. Reflective (20-item, 5-factor)	195.97	111	0.00	1.76	0.91	0.05	0.07				
Invariance (High vs. low OSN concerns groups)											
3. M3: Configural invariance (20-item, 5factor)	327.30	222	0.00	1.47	0.90	0.04	0.07	3 vs 4	0.00	0.01	
4. M4: Metric invariance	332.36	233	0.00	1.49	0.90	0.05	0.08				
Common method variance (CMV)											
5. M5: Reflective (20-item, 5-factor)	195.97	111	0.00	1.76	0.91	0.05	0.07	5 vs 6	0.00	0.01	
6. M6: Reflective (20-item, 5-factor) + CMV	117.42	97	0.00	1.21	0.91	0.04	0.04				
Theoretical model											

7. M7: Twitter Theoretical model on the whole sample	220.22	114	0.00	1.94	0.90	0.06	0.07			
8. M8: Twitter Theoretical model across OSN	356.63	226	0.00	1.57	0.92	0.05	0.06			
Instagram										
	χ^2	<i>df</i>	<i>p</i>	χ^2/df	<i>CFI</i>	<i>RMSEA</i>	<i>SRMR</i>	<i>Models</i>	Δ <i>CFI</i>	Δ <i>RMSEA</i>
Measurement model on the whole sample (n = 409)										
1. M1: Reflective (20-item, 1-factor)	1 6043.10	119	0.00	13.80	0.25	0.23	0.20	1 vs 2	0.67	0.18
2. M2: Reflective (20-item, 5-factor)	192.04	111	0.00	1.73	0.92	0.05	0.06			
Invariance (High vs. low OSN concerns groups)										
3. M3: Configural invariance (20-item, 5-factor)	321.99	222	0.00	1.45	0.90	0.04	0.07	3 vs 4	0.00	0.01
4. M4: Metric invariance	342.51	233	0.00	1.47	0.90	0.05	0.04			
Common method variance (CMV)										
5. M5: Reflective (20-item, 5-factor)	192.04	111	0.00	1.73	0.92	0.05	0.06	5 vs 6	0.00	0.01
6. M6: Reflective (20-item, 5-factor) + CMV	112.42	97	0.00	1.15	0.92	0.04	0.04			
Theoretical model										
7. M7: Instagram Theoretical model on the whole sample	216.80	114	0.00	1.91	0.90	0.06	0.07			
8. M8: Instagram Theoretical model across OSN	333.62	226	0.00	1.47	0.90	0.04	0.07			
Snapchat										
	χ^2	<i>df</i>	<i>p</i>	χ^2/df	<i>CFI</i>	<i>RMSEA</i>	<i>SRMR</i>	<i>Models</i>	Δ <i>CFI</i>	Δ <i>RMSEA</i>
Measurement model on the whole sample (n = 409)										
1. M1: Reflective (20-item, 1-factor)	1 375.64	119	0.00	11.56	0.33	0.20	0.13	1 vs 2	0.65	0.17
2. M2: Reflective (20-item, 5-factor)	206.37	111	0.00	1.85	0.98	0.03	0.05			
Invariance (High vs. low OSN concerns groups)										
3. M3: Configural invariance (20-item, 5-factor)	340.93	222	0.00	1.53	0.90	0.05	0.07	3 vs 4	0.00	0.01
4. M4: Metric invariance	358.82	223	0.00	1.54	0.90	0.06	0.07			
Common method variance (CMV)										
5. M5: Reflective (20-item, 5-factor)	206.37	111	0.00	1.85	0.98	0.03	0.05	5 vs 6	0.00	0.01
6. M6: Reflective (20-item, 5-factor) + CMV	1126.55	97	0.00	1.30	0.97	0.03	0.03			
Theoretical model										
7. M7: Snapchat Theoretical model on the whole sample	234.84	114,226	.00	2.03	.90	.06	.07			
8. M7: Snapchat Theoretical model across OSN	360.82		.00	1.59	.90	.05	.08			

We then assessed the convergent and discriminant validity of the factors. According to Fornell and Larcker (1981), convergent validity exists if the AVE for each factor accounts for 0.50 or more of the total variance. The results confirm the convergent validity of the factors extracted from our data, in that the AVEs for the factors are above the 0.50 cut-off value. Furthermore, discriminant validity is established if the AVE is larger than the squared correlation coefficients between factors, and our results confirm this criterion across factors (Table 2)

5.2. Common method variance

Because we used self-reported questionnaires to collect data, common method variance may be a concern. We thus adopted Harman's single-factor test and examined the unrotated factor solution involving all 20 items of interests in an exploratory factor analysis. We identified eight factors with eigenvalues greater than 1. The amount of variance explained by Factor 1 is 34.62%, which

is significantly < 50%, followed by seven other factors that explain 25.02%, 12.30%, 12.21%, 8.69%, 8.01%, 7.92%, and 5.55% of the variance.

As a second technique, we introduced a new latent common variable factor, such that all observed items are related to it. Common method variance is not a problem if the addition of the new common latent factor does not significantly improve the fit of our model. We compared Models 5 and 6 for each of the four OSN platforms (Table 3), and the two models did not significantly differ ($\Delta CFI/\Delta RMSEA \leq 0.01$, Cheung & Rensvold, 2002), indicating that common method variance does not pose threat to the validity of our findings.

5.3. Measurement invariance across high- and low-OSN concern groups

We also checked for configural (factor structure) and metric (factor loading) invariance across the high- and low-OSN concerns samples, using multi-group CFA for each of the four OSNs (Facebook, Twitter, Instagram, and Snapchat); each of them achieved configural invariance. To test for metric invariances, we set all the factor loadings for each OSN to be the same across two groups of OSN concerns (low and high) in a constrained multi-group CFA (Table 3, Models 3 and 4). As evidence of metric invariance of all four platforms, the constrained and unconstrained models do not differ ($\Delta CFI/\Delta RMSEA < 0.01$).

5.4. Hypothesis testing

We specified the full latent model (see Fig. 2) to examine the relationships among offline friendship quantity, offline friendship quality, frequency of OSN activities, ToM, and youth materialism. The estimation of the structural model (Table 3, Models 7) on Facebook activities generated acceptable fit ($\chi^2 = 221.65$, $df = 114$, $\chi^2/df = 1.94$, $p < .001$, CFI = 0.90, RMSEA = 0.06). Similar results emerged from the structural models of Twitter ($\chi^2 = 220.22$, $df = 114$, $\chi^2/df = 1.94$, $p < .001$, CFI = 0.90, RMSEA = 0.06), Instagram ($\chi^2 = 216.80$, $df = 114$, $\chi^2/df = 1.91$, $p < .001$, CFI = 0.90, RMSEA = 0.06), and Snapchat ($\chi^2 = 234.84$, $df = 114$, $\chi^2/df = 2.03$, $p < .001$, CFI = 0.90, RMSEA = 0.06) activities.

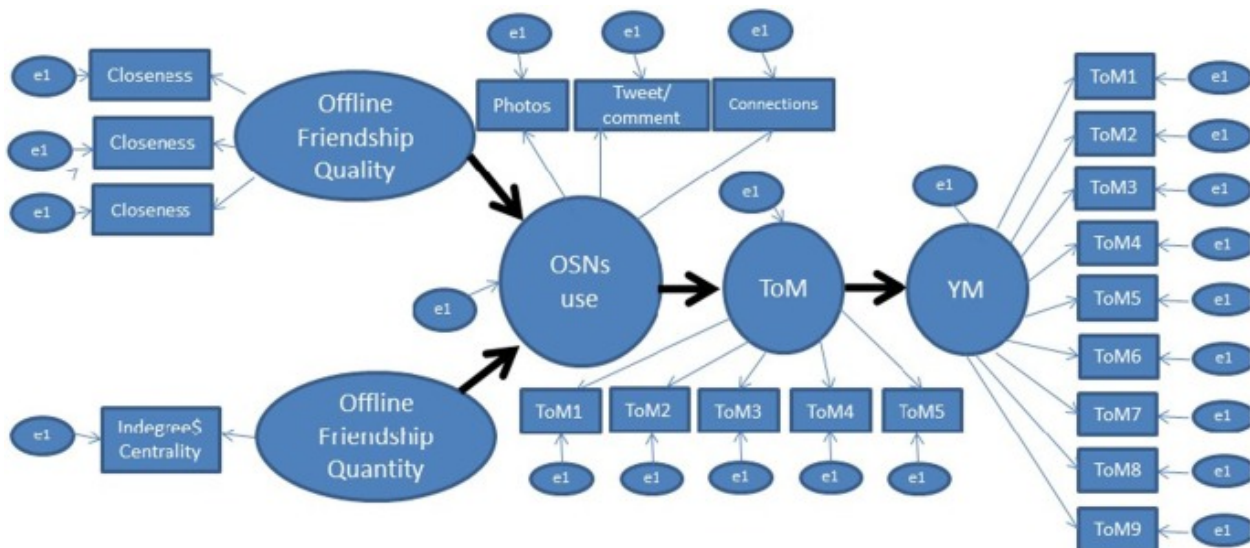


Fig. 2. Structural Model.

5.4.1. Hypotheses 1–4 (main effects).

As expected, offline friendship quantity relates positively to the frequency of OSNs activities ($\beta_{\text{Facebook}} = 0.31$; $\beta_{\text{Twitter}} = 0.19$; $\beta_{\text{Instagram}} = 0.21$; $\beta_{\text{Snapchat}} = 0.18$; all $ps < 0.05$), in support of H1. Moreover, offline friendship quality relates negatively to the frequency of OSNs activities ($\beta_{\text{Facebook}} = -0.29$; $\beta_{\text{Twitter}} = -0.26$; $\beta_{\text{Instagram}} = -0.18$; $\beta_{\text{Snapchat}} = -0.26$; all $ps < 0.05$), in support of H2. The frequency of OSNs activities ($\beta_{\text{Facebook}} = 0.21$; $\beta_{\text{Twitter}} = 0.21$; $\beta_{\text{Instagram}} = 0.21$; $\beta_{\text{Snapchat}} = 0.23$; all $ps < 0.05$) also relates positively to teenagers' ToM, in support of H3. Finally, ToM relates negatively to youth materialism ($\beta_{\text{Facebook}} = -0.17$; $\beta_{\text{Twitter}} = -0.17$; $\beta_{\text{Instagram}} = -0.16$; $\beta_{\text{Snapchat}} = -0.14$; all $ps < 0.05$). Table 4 contains these results.

Table 4. Hypotheses Tests, Whole Sample (n = 409).

a. Facebook Model				
	Standardized β	t-Value	p	Results
H1: Offline friendship quantity \rightarrow Facebook activity	0.31	3.44	<0.001	Supported
H2: Offline friendship quality \rightarrow Facebook activity	-0.29	-2.97	<0.05	Supported
H3: Facebook activity \rightarrow ToM	0.21	2.05	<0.05	Supported
H4: ToM \rightarrow Youth materialism	-0.17	-2.03	<0.05	Supported
b. Twitter Model				
	Standardized β	t-Value	p	Results
H1: Offline friendship quantity \rightarrow Twitter activity	0.19	2.33	<0.	Supported
H2: Offline friendship quality \rightarrow Twitter activity	-0.26	-2.72	<0.5	Supported
H3: Twitter activity \rightarrow ToM	0.21	2.10	<0.05	Supported
H4: ToM \rightarrow Youth materialism	-17	-2.06	<0.05	Supported
c. Instagram Model				
	Standardized β	t-Value	p	Results
H1: Offline friendship quantity \rightarrow Instagram activity	0.21	2.44	<0.05	Supported
H2: Offline friendship quality \rightarrow Instagram activity	-0.18	-2.02	<0.05	Supported
H3: Instagram activity \rightarrow ToM	0.21	2.15	<0.05	Supported
H4: ToM \rightarrow Youth materialism	-0.16	-2.01	<0.05	Supported
d. Snapchat Model				
	Standardized β	t-Value	p	Results
H1: Offline friendship quantity \rightarrow Snapchat activity	0.18	2.19	<0.05	Supported
H2: Offline friendship quality \rightarrow Snapchat activity	-0.26	-2.65	<0.05	Supported
H3: Snapchat activity \rightarrow ToM	0.23	2.22	<0.05	Supported
H4: ToM \rightarrow Youth materialism	-0.14	-1.99	<0.05	Supported

5.4.2. Hypotheses 5–7 (moderation effects).

To test for the moderating effects of OSN concerns specified in H6–H7, we used multi-group analyses. Following Kline (2005), we compared two models: a “constrained model” that forces the structural parameters to be equal across groups (χ^2_H) and a “non-constrained model” that removes this restriction, resulting in a chi-square value (χ^2_N) with an additional degree of freedom. The proposed moderation effect is supported if the difference in the two chi-square values ($\chi^2_N - \chi^2_H$) is statistically significant.

Consistent with H5, OSN concerns moderate the effect of offline friendship quantity on the frequency of Facebook ($\Delta\chi^2[1] = 8.16, p < .05$), Twitter ($\Delta\chi^2[1] = 6.32, p < .05$) Instagram ($\Delta\chi^2[1] = 6.34, p < .05$), and Snapchat ($\Delta\chi^2[1] = 5.98, p < .05$) activities. The positive relationship between offline friendship quantity and frequency of Facebook/Twitter/Instagram/Snapchat activities is significant for teenagers with higher levels of OSN concerns but not for those with lower levels of OSN concerns. Moreover, consistent with H6, OSN concerns moderate the effect of offline friendship quality on the frequency of Facebook activities ($\Delta\chi^2[1] = 6.99, p < .05$), Twitter activities ($\Delta\chi^2[1] = 6.40, p < .05$), Instagram activities ($\Delta\chi^2[1] = 5.89, p < .05$), and Snapchat activities ($\Delta\chi^2[1] = 5.01, p < .05$). The negative relationship between offline friendship quality and frequency of Facebook/Twitter/Instagram/Snapchat activities is significant for teenagers with lower levels of OSN concerns, not for those with higher levels. Finally, consistent with H7, OSN concerns moderate the relationship between frequency of Facebook activities and ToM ($\Delta\chi^2[1] = 6.78, p < .05$), frequency of Twitter activities and ToM ($\Delta\chi^2[1] = 9.30, p < .05$), frequency of Instagram activities and ToM ($\Delta\chi^2[1] = 7.02, p < .05$), and frequency of Snapchat activities and ToM ($\Delta\chi^2[1] = 4.78, p < .05$). These positive relationships are stronger for teenagers who have higher OSN concerns, as Table 5 shows.

Table 5. Hypotheses Tests across OSN Concerns.

a. Facebook Model								
	Low OSN concerns (n = 201)			High OSN concerns (n = 208)			$\Delta\chi^2$	Results
	Standardized parameter estimates	t-Value	p	Standardized parameter estimates	t-Value	p		
H5a: Offline friendship quantity → Facebook activity	0.18	1.72	= 0.08	0.43	2.60	<0.05	$\Delta\chi^2(1) = 8.16, p < .05$	Supported
H6a: Offline friendship quality → Facebook activity	-0.33	-2.59	<0.05	-0.17	-1.32	= 0.18	$\Delta\chi^2(1) = 6.99, p < .05$	Supported
H7a: Facebook activity → ToM	0.17	1.34	= 0.07	0.34	1.99	<0.05	$\Delta\chi^2(1) = 6.78, p < .05$	Supported
b. Twitter Model								
	Low OSN concerns (n = 201)			High OSN concerns (n = 208)			$\Delta\chi^2$	Results
	Standardized parameter estimates	t-Value	p	Standardized parameter estimates	t-Value	p		
H5b: Offline friendship quantity → Twitter activity	0.13	1.21	= 0.21	0.28	2.17	<0.05	$\Delta\chi^2(1) = 6.32, p < .05$	Supported
H6b: Offline friendship quality → Twitter activity	-0.31	-2.30	<0.05	-0.16	-1.29	= 0.19	$\Delta\chi^2(1) = 6.40, p < .05$	Supported
H7b: Twitter activity → ToM	0.11	0.90	= 0.26	0.36	2.10	<0.05	$\Delta\chi^2(1) = 9.30, p < .05$	Supported

c. Instagram Model								
	Low OSN concerns (n = 201)			High OSN concerns (n = 208)			$\Delta\chi^2$	Results
	Standardized parameter estimates	t-Value	p	Standardized parameter estimates	t-Value	p		
H5c: Offline friendship quantity → Instagram activity	0.09	1.48	= 0.20	0.17	2.01	<0.05	$\Delta\chi^2(1) = 6.34$, $p < .05$	Supported
H6c: Offline friendship quality → Instagram activity	-0.22	-2.13	<0.05	-0.07	-1.32	= 0.18	$\Delta\chi^2(1) = 5.89$, $p < .05$	Supported
H7c: Instagram activity → ToM	0.14	1.44	= 0.15	0.21	1.99	<0.05	$\Delta\chi^2(1) 7.02$, $p < .05$	Supported
d. Snapchat Model								
	Low OSN concerns (n = 201)			High OSN concerns (n = 208)			$\Delta\chi^2$	Results
	Standardized parameter estimates	t-Value	p	Standardized parameter estimates	t-Value	p		
H5d: Offline friendship quantity → Snapchat activity	0.08	0.86	= 0.39	0.16	1.99	<0.05	$\Delta\chi^2(1) = 5.98$, $p < .05$	Supported
H6d: Offline friendship quality → Snapchat activity	-0.28	-2.30	<0.05	-0.10	-0.93	= 0.35	$\Delta\chi^2(1) = 5.01$, $p < .05$	Supported
H7d: Snapchat activity → ToM	0.11	0.97	= 0.32	0.17	2.04	<0.05	$\Delta\chi^2(1) 4.78$, $p < .05$	Supported

6. Discussion

The prevalence of OSNs use among teenagers has raised considerable ethical concerns, especially because it significantly boosts youth materialism. Materialistic values among young consumers increase their desire for possessions and acquisition, as well as their tendency to view possessions as part of their extended self and critical for building and maintaining their self-identity (Chaplin & John, 2007) or satisfying their needs for connectedness (Rindfleisch et al., 2009). A driver of youth materialism is marketing campaigns on OSNs. Young users may be unable to comprehend the commercial intent of such targeted communications or even could be exposed to purposefully unethical marketing campaigns, as detailed in reports of incidents in which unethical companies prey on teens with products, services, or contents that are misleading, inappropriate, illegal, or unsafe for people at their age to consume (Jackler & Ramamurthi, 2019). Concerns about being perceived as unethical may discourage ethical marketers from engaging teens on OSNs, even for legitimate purposes (e.g., promoting educational materials). These concerns also become amplified by word of mouth, because OSNs make social comparisons much easier, through online posts, liking, tweets, and reviews. Then popular figures on OSNs may emerge to become the most influential socialization agents for youth, rather than their family and offline friends (Ho, Lee, & Liao, 2016), evoking powerful imitation incentives.

Because ToM can help people understand persuasive advertising and shield them from false, deceptive commercial contents (Craig et al., 2012, Lapierre, 2013, Lapierre, 2015, McAlister and Cornwell, 2009), we explore whether OSNs might enhance teenagers' ToM skills, in which case

the OSNs would provide a form of protection against the development of youth materialism and, more generally, unethical marketing practices. According to our survey of 409 French teenagers, OSNs use relates positively to teenagers' ToM, which decreases youth materialism. In addition, OSNs largely have replaced offline friendship as a crucial source of ToM development, such that they channel the effect of offline friendship on ToM. We also find that OSN concerns are an important boundary condition for the effects of offline friendship on ToM. These insights can alleviate some ethical concerns.

6.1. Theoretical contributions

The findings offer significant insights about OSNs use, ToM, and youth materialism. First, our study is the first empirical research designed to find ways to foster ToM and assess its effects on materialism among teenagers. Prior research mainly seeks to identify antecedents of youth materialism, such as materialistic parents and peers, television viewing (Chaplin and John, 2007, Chaplin and John, 2010, Rindfleisch et al., 1997), low self-esteem (Chaplin & John, 2010), or ungrateful positions (Chaplin et al., 2018). The question of how their ToM, as a critical social skill, might be fostered by OSNs and thereby youth materialism has been largely neglected, and our study helps fill this relevant research gap.

Second, we assess the effects of ToM on materialism together with the effect of OSNs use as a means to develop ToM during adolescence. Prior research on teenagers' use of OSNs (Fox & Moreland, 2015) emphasizes the dark side, including their potential adoption of unethical behaviors (Moreno & Whitehill, 2014). Our findings show instead that OSNs use can help teenagers develop critical social skills and define their personal and social identities (Batat & Tanner, 2019). In particular, our study uncovers the constructive value of OSNs in building ToM skills among youth, which reduces their materialism. Considering the utility of ToM for detecting biases, persuasion, and deception in advertising (Craig et al., 2012, Lapierre, 2013, Lapierre, 2015, McAlister and Cornwell, 2009), we find that the teens' involvement in OSNs empowers them with more abilities to decipher inappropriate commercials. Teenagers may encounter improper advertising materials on social media, but their engagement on OSNs empowers them and ultimately may enable them to mitigate the threats. In this sense, our findings can alleviate some ethical concerns, while also answering calls for more scholarly inquiries into the potential benefits of OSNs (Berezan, Krishen, Agarwal, & Kachroo, 2018). Prior OSN research tends to highlight negative aspects and detrimental outcomes, such as decreased self-esteem (Fiovaranti, Dettore, & Casale, 2012) and poor self-control (Wilcox & Stephen, 2013). We offer a novel view, to examine the positive impact of OSNs on teenagers' ToM development.

Third, our research can inform the heated debate about the ethical concerns created by OSNs use between a disclosive ethics perspective and the normative ethics perspective. The former investigates moral issues associated with OSN features (Light & McGrath, 2010), whereas the latter addresses the value of OSNs in nurturing friendships (Briggle, 2008). We consider how two important elements of offline friendship—friendship quantity and quality—affect teenagers' uses of OSNs. In so doing, we contrast competing channels for friendship management (offline and OSNs) and examine their relative effects—substitutive or complementary—on ToM development. According to our findings, when it comes to ToM, OSNs have largely replaced

offline formats; they contribute directly to ToM development and also serve as a key mechanism through which offline friendship affects ToM. These findings reflect a societal shift, from solely relying on offline channels to resorting to online channels for personal development, reflecting how these online channels have “revolutionized socialization by opening a new world of communication possibilities across a wide array of technologies” (James, Lowrey, Wallance, & Warkentin, 2017, p. 561).

Fourth, our research contributes methodologically, by proposing better ways to measure offline friendship quantity. Previous research (Gentina et al., 2014, Lee et al., 2010) has mainly used self-reported measures to assess offline friendship quantity; these measures may suffer from social desirability bias and/or impression management attempts. Our research overcomes these issues by measuring offline friendship quantity using social network data derived from peer-reported friendship. Consumer behavior researchers can identify adolescent social positions within peer groups by analyzing friendship network data. This social network approach also can complement other social position identification methods, such as observation or social integration questionnaires, that directly ask teenagers with whom they interact in their peer networks (Kratzer & Lettl, 2009).

6.2. Marketing and public policy implications

Beyond its theoretical contributions, our research has significant implications for social workers and public policy makers. In particular, ToM is an effective source to curtail youth materialism. Most existing strategies for doing so rely on public policy makers placing more stringent restrictions on Internet marketing or on parents educating their children about consumption values. Such strategies face significant implementation challenges. According to Chaplin et al. (2018, p. 6), “parents, social scientists, and child advocates know there is a problem, but workable solutions have been frustratingly slow to emerge.” Our findings suggest a relatively effective solution: According to our inquiry, with more than 400 teenagers, cultivating ToM can mitigate materialism and its negative social consequences. Interventions designed to foster ToM among teenagers can decrease materialistic tendencies, and there are many methods for developing ToM, so parents, teachers, and care givers have various options (Froh & Bono, 2014). We show how OSNs use can encourage the development of teenagers’ ToM, which in turn implies that parents should be more informed about the positive potential role of OSNs (O’Keeffe & Clarke-Pearson, 2011). Instructional conferences might help parents understand these benefits and participate with their teenagers as they use OSNs. For example, parents could visit high quality OSNs with their children, discuss OSN-related learning opportunities and challenges to mental and social health, and help children develop “social media savvy,” a skill that will benefit them in years to come.

Our findings also offer guidance to educators and schools. By setting up dedicated OSNs (e.g., Facebook pages for students, online interaction platforms for classes), schools can provide spaces for teenagers to share and discuss ideas, delegate tasks, and provide feedback on completed work. These dedicated OSNs can facilitate interactions among students and help them understand the usefulness of social media in nurturing relationships and developing ToM. Parents, educators, and policy makers thus can help teenagers think about OSNs use in moral and

ethical ways and better understand the positive consequences of participation in a socially networked world, for themselves and others.

Ethical business firms also should engage with teenagers on OSNs, to promote ideas, products, or services that promise to help them (e.g., health food, workout routines). According to Batat and Tanner (2019, p. 14), “co-creating educational campaigns with teenagers through empathetic collaboration, and incorporating teenagers’ cultural markers and views in educational discourses and policies can offer numerous advantages over more traditional paternalistic approaches to counter risky behaviors and vulnerable situations.” By engaging teenagers on social media, these companies also offer the young generation a valuable opportunity to grow ToM and prepare and protect against predators that distribute deceptive advertising contents on OSNs. Social media platforms already are working to address fake news reports; ethical marketers should develop online communities that address youth issues with experts who take a youth perspective and work to minimize the potential impact of dangerous sites (Batat & Tanner, 2019). For example, teenagers generally prefer communication-facilitating media, rather than sites that just provide information, and they are attracted to design features such as humor, emotion, music, and videos (Outbrain, 2019). To develop interactive marketing materials appealing to younger consumers, ethical companies might request feedback, rely on appropriate language styles, offer hedonic value, and include visual and audio appeals. In turn, the newly developed marketing programs could encourage interactions on OSNs to promote ToM. Such an outcome resulted from a recent campaign by AXE body spray, which encouraged teens to reject traditional gender roles (i.e., the stereotype that boys should not praise other boys). The challenge asked young male consumers to do or say something nice about another boy, then share the effort on social media, which increased participants’ uses of OSNs, as well as their ToM. On the other side, companies are responsible for minimizing harmful OSN uses, as exemplified by Proctor & Gamble’s reaction to the Tide Pod Challenge, for which it even hired the New England Patriot star Rob Gronkowski to support its efforts.

Our findings show a connection between OSNs use and friendship management; friendship may drive OSNs use. Armed with this information, OSNs could pursue better means to facilitate teenagers’ connections with offline friends. They might host study groups to share useful information, such as class trips or extracurricular activities. Notably, our findings also suggest that OSNs significantly affect teenagers’ social well-being, which implies that they have a moral responsibility to embrace their role in facilitating adolescents’ friendship management and enhancing their social benefits. For teenagers younger than a certain age, OSNs could create small groups and reinforce their one-on-one interactions with close friends through comments and messaging, instead of relying on public broadcasting. Stakeholders of the marketing industry (e.g., OSN vendors and merchants) should invest in building more meaningful OSN environments for teens, because such a system will allow teenagers to enhance their ToM skills, leaving them better protected against the adverse influences of marketing communications on OSNs.

6.3. Limitations and further research

Several limitations pave the way for additional research on social media use among teenagers. First, we asked participants to identify only their five closest friends; teenagers may have more

than five close friends outside their classrooms, so researchers should expand the number of names allowed in the name-generation process and examine wider networks, such as friendship ties at grade or school levels.

Second, we tested our research model using cross-sectional data. Although we determined causal directions according to theoretical reasoning, we did not verify them with empirics. Researchers might use longitudinal data to provide empirical evidence for the causality of our model constructs. They could also use a longitudinal design to test the causal direction between the effect of frequency of Facebook, Twitter, Instagram, and Snapchat activities on ToM.

Third, researchers should enhance the generalizability of our findings by extending the context to other popular social networks, such as Tik Tok, a popular iPhone video-sharing app launched in 2016 and downloaded more times in six months than Facebook, Instagram, Snapchat, or YouTube among young teenagers (Zhang, 2018).

Fourth, this research took place in France, an independent-oriented culture. More interdependent cultures might provide different, interesting insights. For example, in collectivistic Asian cultures, teenagers emphasize connectedness and the influence of their friends, such that they acknowledge adopting others' opinions and actions (Triandis, 1995). In this sense, ToM might not be universal, as summarized in questions such as, "Is theory of mind an innate, culturally universal construct that is merely triggered by environmental factors, or is it cultivated in a context of social interaction, displaying culturally specific developmental routes?" (Wang, Devine, Wong, & Hughes, 2016, p. 7). Researchers should investigate how friendship quality and quantity explain OSN activities, which might affect ToM in both individualistic and collectivist countries.

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