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AN EVOLUTIONARY  
PERSPECTIVE ON SOCIAL-  
MEDIA ADDICTION

Steven Arnocky, Shafik Sunderani AND  
Darren W. Campbell

**H**uman beings are an extraordinarily social species. The need to belong, or feel connected and accepted by others, is one of the fundamental motives underlying human behaviour (Baumeister and Leary, 1995). From an evolutionary perspective, this complex system of interconnectedness was necessary for maintaining social coalitions once crucial to basic survival. With the emergence and spread of online communication and social-media platforms available today, people are developing and monitoring social connections in a manner that is very different from our ancestral past. We propose that evolutionary motives may offer insight into

people's modern social-media behaviour, including addiction and overuse of social-media technology; this may help to better explain why some individuals are compelled to engage in acts like taking 200 selfies per day:

Danny Bowman, 19, spent ten hours a day taking up to 200 'selfies' of himself on his phone. "I was constantly in search of taking the perfect selfie and when I realized I couldn't I wanted to die, ... I lost my friends, my education, my health and almost my life... People don't realise when they post a picture of themselves on Facebook or Twitter it can so quickly spiral out of control. It becomes a mission to get approval and it can destroy anyone. It's a real problem like drugs, alcohol or gambling. I don't want anyone to go through what I've been through."

– Danny Bowman (quoted in Aldridge and Hardin, 2014, the *Daily Mirror*)

Indeed, there are many immediate reasons why people use social media: a) generating social connections; b) managing one's online identity; c) forming new relationships (online dating); d) staying aware; e) remaining socially connected (i.e., fear of missing out); f) intellectual stimulation (e.g., discussion groups); g) simple pleasures (e.g., humour); h) erotic pleasures; i) video gaming; j) stalking; and k) online aggression (See Alt, 2015; Meshi, Tamir, and Heekeren, 2015).

Considering the multiple reasons why people utilize social media on a regular basis, it is not surprising that it can also lead to overuse and addiction. People who use social media excessively can display aspects of addiction such as "neglect of personal life, mental preoccupation, escapism, mood modifying experiences, and concealing the addictive behaviour" (Kuss and Griffiths, 2011,

p. 3529). Social-media addiction is proposed to develop when people rely on social networking to relieve stress, loneliness, or depression (Xu and Tan, 2012). Social networking accounts for twenty-eight percent of all media time spent online. Users now spend over thirty percent of their online time (roughly two hours daily) using social-media platforms such as Facebook, Twitter, and Instagram (Global Web Index, 2017). Some researchers estimate that nearly ten percent of young adults engage in disordered online social networking (Hormes, Kearns, and Timko, 2014). Other researchers propose new addiction disorders, such as "smartphone addiction" and "internet addiction" based on clear functional impairments associated with their misuse (e.g., Lin et al., 2016; Pies, 2009).

Current knowledge about the causes of social-media use or addiction is very limited. Below we offer a sampling of evolutionary explanations for social-media use. Specifically, we propose that the appeal of social media, including its addictive properties, is at least partially rooted in the adaptive value of social connectedness and reward-based neurophysiological responses associated with social connectedness within our species.

#### THE EVOLUTION OF THE SOCIAL BRAIN

Evolutionary processes have favoured human social relations, including socially monogamous mating, bi-parental care of offspring, and alliances with extended family and non-kin community members. These interpersonal relations require sophisticated and dynamic social thinking, planning, and interaction. Neuroimaging research has identified several brain systems that play a central role in these interpersonal processes. Below we discuss these brain systems, point out their relevance to evolutionarily motivated social behaviours, and propose how these systems support the development of addictive versions of these social behaviours in person and online.

Three brain systems are central to social thinking, planning, and interacting. The mentalizing network is crucial for understanding the goals and intentions of others (Molenberghs, Johnson, Henry, and Mattingley, 2016). The limbic brain network is central to emotional responses associated with social encounters (Bressler, and Menon, 2010). A third, somewhat overlapping neural network is the brain's reward circuit, which is more directly linked to the experience of pleasure. Each of these brain systems likely underlies the social and emotional responses necessary to the pursuit of mating opportunities, competing for resources, or forming alliances.

With the current focus on social-media addiction, we will focus our discussion primarily on the brain's reward circuit. Mammals have evolved reward circuitry fundamentally tied to social interaction. This neural circuitry typically fires in response to events that provide external rewards, enhance survival, or support reproduction, such as increased social status, access to nutritious foods, and opportunities for sex. This pleasure response in the brain encourages people to engage in those actions which promoted such events again in the future.

However, this reward circuitry is also susceptible to addictive processes. Addiction is a condition that results when a person ingests a substance (e.g., drugs) or engages in an activity (e.g., gambling) which initially is pleasurable, but then becomes compulsive and interferes with ordinary aspects of life. Specific addictions also undermine people's enjoyment of naturally pleasurable events which emerged through natural and sexual selection. This undermining process is referred to as the "high-jacking of the reward circuit" because natural pleasures no longer activate people's reward circuit sufficiently.

People can become addicted to socially focused activities as well as consumption-related activities. During the addiction process, however, people will begin to engage in extreme levels or versions

of the social activities to generate stronger feelings of reward and greater responses in their reward circuit. The link between social interactions and the reward is evident in both animal and human studies. Mice, genetically engineered to produce more dopamine in the reward circuit, show a marked increase in social interaction, whereas mice with a decrease in dopamine production in this area show decreased social interactions (Gunaydin et al., 2014). In humans, a similar increase in reward-circuitry activity is associated with increases in social reputation perceptions (receiving positive social feedback) (Meshi, Morawetz, and Heekeren, 2013).

Today, people can monitor and maintain their social reputations through social-media outlets such as Facebook, Instagram, and Twitter. These sites allow one to cultivate a particular social image, and to compare themselves to others. Evidence shows that reward circuitry (in this case, the left nucleus accumbens) becomes activated when people's social reputation increases, but they show no such activation when they see other people's social reputation rise (Meshi et al., 2013). Furthermore, this neural activity predicts people's Facebook use (Meshi et al., 2013).

The reward system also is associated with social-media addiction. Turel and colleagues (2014) had participants complete a Facebook addiction questionnaire, consisting of behaviours surrounding withdrawal, salience, relapse, loss of control, and conflict. People who scored higher on Facebook addiction tendencies showed more activation in the amygdala-striatal region when exposed to Facebook images. Together, these early findings suggest that social-media use activates the brain's reward system. A reward system that evolved ancestrally to promote activities that increased survival and reproductive fitness (i.e., the likelihood of passing one's genes on to the next generation). This begs the question: What evolutionarily adaptive goals might contemporary social-media use satisfy?

## ADAPTIVE FACTORS POTENTIALLY UNDERLYING SOCIAL MEDIA USE

Below we highlight an initial list of adaptive challenges which may be relevant to contemporary social-media use. This list is not meant to be exhaustive or invariable, but rather to act as a starting point for further discussion on the potential evolutionary factors underlying the manner in which we use social media.

### 1. Signalling

*Altruism.* Altruism is any act that benefits another person at a cost to the altruist. Within some hunter-gatherer societies, successful hunters who altruistically share meat with others receive greater reproductive access to females. In contemporary Western society, individuals who engage in altruistic acts toward unrelated others report more mating success (see Arnocky et al., 2017 for review). Some researchers have suggested that altruism directed toward unrelated others functions as a signal of personal qualities that are otherwise difficult to observe, but that are desirable in an ally or mate. For example, donating money to a charity can signal to others that one is kind, cares for others, and has enough resources that they can afford to give some away without any expectation of reciprocity. To the extent that modern social-media altruism is widely observable to the other members of one's social network, engaging in online acts of kindness may bolster one's value as a friend or mate. Many social-media charitable campaigns have been highly successful. For example, the Facebook organ-donor initiative allows users to officially register as an organ donor as part of their online profile. This viral initiative resulted in nearly 40,000 new registrations over a two-week period. Charity campaigns such as the ice-bucket challenge, whereby participants dump a bucket of ice water over their heads in support of Amyotrophic Lateral Sclerosis (i.e., Lou Gehrig's

disease), was once widely popular, garnering over twenty-eight million participant videos that were viewed over ten billion times. Such acts performed over social media allow users to signal their altruistic proclivity. However, social media has simultaneously enabled individuals to feign altruism without actually donating time, effort, or resources, and yet still receive altruism-related social-status benefits. The ice-bucket challenge is an example of feigned altruism. According to some reports, the majority of the participants (nine out of ten) did not actually donate any money to the charitable cause of ALS (Maguire, 2014). This hyper-proliferation of "non-costly signals" (i.e., a low effort; high reward ratio) is much easier since the advent of social media in which a person can benefit from appearing altruistic even with minimal investment of their time, effort, and money.

*Sex differences in self-presentation.* Women and men also differ in their social-media self-presentation tendencies in ways that conform to evolved sex difference in fitness-promoting characteristics. For instance, Buss (1989) found that in each of thirty-seven cultures studied, men more than women desired partners who were youthful and physically attractive (i.e., women's mate-value relies more upon their physical attractiveness relative to men). This may explain why teenage girls are more likely than boys to post overtly seductive photos of themselves (Sorokowski et al., 2016). Buss (1989) also reported that characteristics considered "attractive" are remarkably consistent across cultures, ostensibly because these features signal underlying genetic quality, overt health, or fertility. Some researchers suggest that such very conventional beauty standards and aesthetics draw women to sites like Instagram (see Seligson, 2016). Given the technological advancements in personal photography, image manipulation is much easier today. From an evolutionary perspective, we predict that women are more likely to manipulate their personal images to conform more close-

ly to conventional beauty standards than men. However, future research is needed to test this hypothesis. Buss (1989) also reported that men's mate-value, in contrast to women's, relies more upon resources and status. Consistent with this finding, men were more likely than women to have posted a photo which implied that they were staying, eating, or visiting somewhere more expensive than their reality (as reported in Renzulli, 2017). In summary, these sex differences in online behaviour are consistent with efforts at demonstrating mate-value within the context of intersexual selection (dating and mating competition).

## 2. Monitoring of Intrasexual Rivals

*Social comparison.* Social-media use extends beyond intersexual selection behaviours. People are able to cultivate particular social images. They can highlight select social group memberships and showcase certain personal interests, values, or traits. However, people often evaluate themselves and their self-worth in how they compare to others. Social-media sites support these social comparisons. Research has demonstrated that when women evaluate images of other women on Facebook and Instagram as more physically attractive than themselves (i.e., an upward social comparison), they are more likely to report a negative mood and engage in dieting and exercise in an attempt to personally match these physical ideals (Fardouly, Pinkus, and Vartanian, 2017). Social comparison has been proposed by some evolutionary psychologists as a cognitive mechanism that evolved to allow for individuals to gain important information about where they stand on important mate-value characteristics (Arnocky et al., 2012). Frequent social comparisons can motivate specific goals and behaviours aimed at competing or "keeping up" with others. This perpetual process of self-refinement approximates some of the addiction tendencies described earlier.

## 3. Relational Maintenance

*Mating relationships.* Social media not only allows people to monitor and manipulate their own social persona, it also supports the monitoring of other people's social persona and affiliations. From a mating perspective, regular surveillance of a partner's online behaviours may serve to circumvent partner infidelity or a same-sex rival's attempts at poaching (i.e., stealing) one's partner. Ancestrally, losing a reproductive mate is very costly resulting in lost reproductive and survival related resources. Similarly, partner infidelity may result in cuckoldry and relationship termination. Thus, from a mating perspective, frequent monitoring of a partner's online actions (i.e., recent updates; newly added friends) may not simply reflect "pathological," "abnormal," and/or "dysfunctional" online behaviours. Instead, this online vigilance represents a tactic for ensuring and preserving the self from emotional harm and loss of reproductive resources.

Excessive online social-media vigilance may lead to psychological problems and relationship problems. Muise et al. (2009) surveyed undergraduate students asking them questions such as "How likely are you to become jealous after your partner has added an unknown member of the opposite sex?" and "How likely are you to monitor your partner's activities on Facebook?" Results indicated that social media may trigger "potentially jealousy-provoking information" (p. 443). A recent review reported that, in about thirty percent of marriages, one partner secretly read the e-mails or text messages of their partner (Utz and Beukeboom, 2011). Social signals, including social-media postings, are often ambiguous (e.g., friendly or flirty) in their meaning. In an attempt to determine whether their lover's online interpersonal communications with others are benign or threatening, the weary and distrusting partner within the romantic dyad may ramp up surveillance of their lover's

social-media connections and communications (Muise et al., 2009)—often for good reason. This oversensitivity to a romantic partner’s social-media behaviour as potentially threatening simulates the mental preoccupation and compulsive behaviours found in addiction.

*Non-mating alliances.* Use of social-networking sites can strengthen relationships with friends and acquaintances. For instance, previous research (as reviewed in Utz and Beukeboom, 2011) found that SNS are useful for generating *bridging capital* (i.e., maintaining weaker ties with acquaintances) and *bonding capital* (i.e., maintaining strong ties with close friends). In primates, including macaques, chimpanzees, and human hunter-gatherers, evidence suggests that social ties, including those of an indirect nature, can predict reproductive success (e.g., Page et al., 2017).

#### 4. Intrasexual Competition

Interpersonal aggression, as one form of intrasexual (i.e., same-sex) competition, may have evolved to help our ancestors solve problems related to status generation, resource access, and mate acquisition (e.g., Arnocky and Vaillancourt, 2017). Beyond the prototypical examples of overt aggression, such as a physical fight between two men, indirect (i.e., surreptitious) forms of aggression, such as gossip, rumor spreading, and social exclusion, are more common and can be effective at inflicting harm to one’s competitors while improving one’s own access to mates (Arnocky and Vaillancourt, 2012).

Aggression is commonplace on social-media sites. Today, seventeen percent of Canadians between the ages of fifteen to twenty-nine report having been victims of online aggression such as cyberstalking or cyberbullying (Hango, December 2016). In one survey of teens, more than half reported witnessing cyberbullying on social media; twenty-five percent of teens reported a later face-to-face confrontation with their cyberbully (Cox, 2014).

Cyber-aggression seems to conform to established sex differences in aggression. Females have evolved to employ less physically risky aggression tactics, in part, to remain alive for offspring survival (see Arnocky and Vaillancourt, 2017 for review). For example, females are more likely than males to post gossip on the Internet to hurt other people they might know. In contrast, males are more likely to attack others directly with violent threats and homophobic insults (Marcum et al., 2012).

Given that human reproduction does not provide males with paternity certainty, males have evolved to prefer mates who are sexually faithful. Women who are sexually unfaithful and/ or promiscuous are susceptible to increased criticism and derision (see Buss and Dedden, 1990). Perhaps, unsurprisingly in the context of the cyber-world, woman more than men report online aggression which is largely focused on their sexual activities too. Marcum et al., (2012) provided a relevant example: “A few guys posted a naked picture of a girl I know on Facebook for everybody to see and called her a slut.” Conversely, males are more likely to be victimized via attacks of their skills and talents.

Interestingly, social-media use alongside romantic motivations and social comparisons (described earlier) have been identified as important predictors of online aggression (Young, Len-Ross, and Young, 2017). Moreover, recent research has linked Internet addiction to a greater propensity for aggression (Ko et al., 2009). Future studies will be needed to determine whether Internet addiction has any causal influence upon either online or offline aggression.

#### Conclusion

Researchers have proposed that various online activities, including but not limited to social-media use, can be pathological. Yet little research has examined the underlying etiology of this proposed

clinical disorder. Among the limited research available, the focus has been on proximate social-cognitive and reward-based mechanisms rather than evolutionarily based mechanisms. Neurophysiology is implicated insofar as production of pleasure-related neurotransmitters (e.g., dopamine) coincides with resolving socially and sexually relevant adaptive challenges. However, an understanding of social-media addiction is incomplete without considering the evolutionary mechanisms underpinning our need for social affiliation rooted in our ancestry. By taking into account evolutionary processes, both researchers and clinicians alike could be better equipped to assess, diagnose, and provide treatment for people afflicted with social-media addiction.

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