

Too Many ‘Friends,’ Too Few ‘Likes’? Evolutionary Psychology and ‘Facebook Depression’

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Psychologists (and subsequently the media) have defined ‘Facebook depression’ as the affective result of spending too much time on the social networking site (Selfhout et al., 2009; Kross et al., 2013). Some social psychologists have denied that Facebook is causally implicated in any such negative affect (Jelenchick et al., 2013). This article argues that if we want to understand modern mass media and new social media, we need a better understanding of the (old) psychology bequeathed us by natural selection (Barkow et al., 2012). Disentangling the relationship between social media and depression using evolutionary social competition theories of depression, I argue that the mismatch between current social milieu and the environment of evolutionary adaption affords some predictions about the use of social media as a trigger for mild depression or dysphoria. I hypothesize that users of Facebook may be more susceptible to causal triggers for mild depression under the following (specific) circumstances: (a) the greater the number of ‘friends’ that the user has online; (b) the greater the time that the user spends reading updates from this wide pool of friends; (c) the user does so regularly; and (d) the content of the updates tends to a bragging nature. I hypothesize that the frequency and the number of displays of higher status cues observed by the user may incur the perception of low relative social value among users (automatically triggering this response). The article concludes with directions for future research on the behavioral and cognitive effects of social media sites such as Facebook.

Keywords: depression, evolutionary psychology, Facebook depression, social media, sociality

Depression is one of the leading causes of disability in the world today (World Health Organization, 2010). The social networking site Facebook now has 1.23 billion active users (Wakefield, 2014). This article takes for its focus current research into the causal link between usage of *social network sites* (‘SNS’) such as Facebook and the symptoms of depression. Research into ‘Facebook depression’ has yielded conflicting results. In social psychology (and beyond) the ‘ping-pong’ of debate has ensued without a winner with both sides disputing how to interpret conflicting findings. This article shows that absent an evolutionary perspective, researchers are failing to orient their research efficiently. Theory determines the questions that we ask and how we make sense of those results. The evolutionary framework is a foundational approach: it enables us to make predictions about behavioral responses given specific environmental triggers and naturally selected universal capacities. This article argues that the time should be past when social psychologists could ignore evolution. I propose ways in which the evolutionary paradigm can illuminate how people navigate social networking sites and elaborate on the conditions that are likely to render users vulnerable to depression.

Controversy still exists over the evolutionary function (if any) of depression and depressive states. In this article I examine some promising (and convergent) theoretical claims that mildly depres-

sive cognition and behavior was selected because it was (and arguably still is) an adaptive functional response to perceptions of low relative social value.¹ Insofar as we can rely on this functional hypothesis, it is eminently plausible that Facebook is a forum where feelings of low relative social value are habitually elicited. Therefore, to take this research beyond the realm of speculation we need to ask: What are the online proximal triggers of the ultimate, evolutionary functions of mild depression? Moreover, to determine the features of Facebook that might lead to feelings of dysphoria or mild depression we need to enquire what happens when an individual logs on. What kinds of status updates and comments by online ‘friends’ (and indeed, other public Facebook profiles) might elicit feelings of depression? Do the profiles of some ‘friends’ garner more attention than others? Are there predictable patterns in Facebook navigation? And, how do users manage their own profiles? This article begins to address these questions by building on the recent work of Barkow and colleagues on the evolutionary psychology of social media (Barkow, O’Gorman, & Rendell, 2012). It concludes by drawing some specific hypotheses about when (and how) Facebook might be depressing.

The article is organized as follows. In Section One, I briefly expound on the idiosyncratic features of SNS and take for my focus Facebook which has long eclipsed other SNS as the most widely used in the world. SNS are often referred to as ‘online communities.’ Members typically display content about themselves (including photos, personal updates on their lives), and they

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¹ Determining whether depression is still functional today takes us beyond the remit of this article.

can browse the personal content of other members, befriend other users, and interact with them. The hegemony of Facebook among SNS is evinced by the slogan ‘Facebook depression’ and the majority of recent studies examining the impact of SNS on well-being have concentrated solely on Facebook usage.

In Section Two I survey the problematic and conflicting results in the empirical literature on the causal link between the use of social networking sites and depression. I find that the current social psychological literature is often methodologically flawed and explanatorily impoverished. I contend that if we are to motivate clear hypotheses about the causal connection between the use of these sites and depression, we need to integrate social psychology with evolutionary cognitive science.

In Section Three I briefly discuss theories on the cognitive and behavioral functions of depression in the environment of evolutionary adaptation (EEA). I propose that social competition theories of depression provide one promising framework for explaining function of depression: on these accounts, the functional mismatch between the modern day social milieu and the EEA explains the apparent rise in (at least) mild depression (Price, Sloman, Gardner, et al., 1994/1999; see also Allen & Badcock, 2006). If mild depression is associated with loss of relative standing, prestige, and rank (if this was adaptive in the EEA) then arguably (in certain contexts) it may also be adaptive today. Given this specific ultimate evolutionary explanation (which is derived from social competition and relative social evaluation theories of depression), how might Facebook use be depressing? Facebook is a forum for impression management where comparative status is a matter of competition, and some of your ‘friends’ may be doing a better management job than you are. The argument of Section Four is that Facebook use triggers evolved mechanisms for such social evaluation. When users are exposed to ‘friends’—who are habitually presenting themselves in the best possible light—this may lead to negative self-appraisals. I conclude, in Section Five, by specifying the following conditions under which Facebook users may be more susceptible to causal triggers for mild depressive symptoms. I contend that individuals are more likely to suffer from depression when (a) they have more online ‘friends,’ (b) the more time they spend reading updates from this wide pool of ‘friends,’ (c) the more frequently the user reads these updates, (d) the content of the updates tends to be of a bragging nature, and (e) the user accesses such sites as a solitary pursuit. I argue that under these conditions the user may be much more likely to incur the perception of low relative social value but, in addition, I contend that some of these specifications (e.g., (b) the greater the time that the user spends reading updates) also need to be the subject of enquiry based on the evolved function of attraction biases. I propose that if social media triggers depressive feelings the amount of time spent online is not sufficient, on its own, to trigger this response: the user must also recurrently perceive persistent displays of high status from other users. I conclude by briefly advancing some directions for future research.

Facebook 101

If we want to investigate how Facebook may elicit depressive responses among its active members, we need to begin by saying something about how the medium works. Therefore, for both the

initiated and uninitiated alike it is worth drawing attention to several of the main features of Facebook.

As a social networking service, Facebook—which was founded in 2004—allows its registered members to create a personal profile, to browse and seek out other users and to exchange messages with others, as well as to provide instant personal updates. Each member of Facebook has a personal profile page where he or she can provide ‘status updates.’ The profile page is something of a personal blank canvas for users, and Facebook prompts members with the question ‘What’s on your mind?’ This space specifically allows individuals to insert their own comments, upload photos, insert ‘tags’ of places they have visited, and even itemize ‘life events’ (choosing from the subcategories of ‘Work and Education,’ ‘Family and Relationships,’ ‘Home and Living,’ ‘Health and Wellness,’ and ‘Travel and Experiences’). Other sections of their personal webpage enable users to provide lists of their personal preferences (‘Movies You’ve Watched,’ ‘TV shows You’ve Watched,’ and ‘Books You’ve Read’).

After creating their own profile, each member is entitled to befriend other members (whom he or she can seek out via the search engine). As a user, one befriends other members by sending invitations, or ‘friend requests’ via an e-mail facility for contacting others, and awaiting the outcome of whether invitees choose to ‘accept’ or ‘ignore’ you. Keeping abreast of the number of friends one has (and, notably, other members have) is another feature of Facebook: a ledger keeps each member up-to-date with the number of ‘accepted’ friend requests that they have accumulated. It is also possible to ‘unfriend’ people—and the only conspicuous means of finding that one has been ‘unfriended’ is by checking one’s list of friends (there are no e-mail updates for this feature).

Facebook friends can post messages and upload photos on each others’ ‘wall’ (the aforementioned ‘status’ section of each individual’s webpage), and friends can also tag each other in photographs (provide identifying labels of other members in photographs that they upload). There are some noteworthy features of the format with respect to communicating with other users. Every ‘status update’ (be it a photo, comment, or link) can be ‘liked’ (evinced by a thumbs up icon). Notably, however, no user can affirmatively *dislike* any status updates (there is no ‘thumbs down’ icon). To dislike—or, indeed to elaborate on one’s liking—or further comment on a particular status update, users must insert a comment below the update in question. The number of ‘likes’ and ‘comments’ that any given posting elicits is also quantified in a public tally so that users can observe the popularity or intensity of dialogue postings. Friends can also choose to ‘promote’ or ‘share’ any update by posting it on other friends’ pages.

All this activity (updates, likes, comments, uploaded photographs, and so forth) is automatically added to a ‘newsfeed’ which appears on every Facebook user’s log-in page. The ‘newsfeed’ is customized, then, to automatically collate the status updates and activity of each user’s friends. The resultant ‘Newsfeed’ thereby makes visible the ‘likes’ and comments of friends of friends of the user. Members are kept up-to-date about any responses to their comments and status updates via e-mail and conspicuous alerts on their personal Facebook page.

Another noteworthy feature of Facebook is the ‘chat’ facility. This allows ‘instant messaging’ among friends (the term is often abbreviated as ‘IM’). The chat or IM feature indicates who is online, and provides notification of the last time friends logged

onto Facebook and how long ago they logged off. Given the newsfeed facility, this provides useful information: even if a user's friends have not responded to his or her status updates, the user can ascertain who among these friends has recently logged onto Facebook: it is, in principal, possible to speculate whether friends have observed (thereby, ignored) one's updates or chosen not to 'like' or comment on them, if no response is forthcoming. At this juncture, it is worth pointing out that—although the default settings on Facebook allow public access to every aspect of one's profile—it is possible to adjust the privacy settings. For example, one can restrict who has access to your list of friends, and one can also 'hide' the status updates of particular friends on one's newsfeed. Evidence shows that the majority of Facebook users (around 80%) do not adjust their privacy settings (Lewis, Kaufman, & Christakis, 2008; Moreno et al., 2011); however, there have been observable trends in how users have modified their privacy and disclosure settings as a response to the growth and changes in Facebook. Today users are less privacy-seeking than they used to be (indeed, it takes some effort to maintain privacy for every posting on one's profile; Stutzman, Gross, & Acquisti, 2013).

Before turning to the research on the relationship between SNS (and especially Facebook) on users' wellbeing, it is necessary to comment on the nature of the content exhibited in 'status updates.' We can note that at a folk anthropological level much has been made of the content that typifies Facebook status updates. Many commentators have observed Facebook is a medium of overweening image management (Parker-Pope, 2012; Silver & Day, 2012). As a recent user, I have observed that Facebook status updates appear to cleave into a number of (not mutually exclusive) kinds, three of which are worthy of mention. First, status updates that reveal low negative affect on the part of the user; second, the (more common) self-promoting updates; and third, updates that are striking for their Pooterish banality.

The first kind of status update, as recent social psychological studies attest, is not uncommon: low negative affect and existential angst are occasionally reported among users ("Having a bad day. Sometimes I just wonder what it's all about"; Patchin & Hinduja, 2010). One study estimates that, of the 90% of college students who have Facebook profiles, 25% of users have—at one time or another—disclosed reference to depressed mood (Moreno et al., 2011). Such updates often elicit supportive comments from the friends of such users ("Hey we all get like that."; "What's up?"). Again, at a prescientific, observational level it appears that users who express negative affect use the medium more often, communicating more 'status updates.' Evidently, the causal direction is not established by this observation, and it may be that some users (who are depressed) use Facebook as a form of 'therapy' or diversion.

Activities that might typify the second cluster on our folk taxonomy are self-promoting updates which include the uploading of photographic evidence of recent holidays, graduations, weddings, or the plentiful evidence of the user socializing among off-line friends; indeed profile photographs often appear to display not just flattering self-images (perhaps dressed up for a formal event, or even professionally taken photographs) but ones that may also include interesting backdrops (such as an exotic location). Status updates in the self-promotion category might be illustrated by prideful comments such as, "John's school report came home—

I'm a very proud mum!" Or "Fifth article accepted for publication this year—Phew!"

Third, examples of more pedestrian updates include comments such as, "Just eating the biggest bowl of Haagen Dazs ice-cream [smiley emoticon] while watching Breaking Bad." Some users appear prone to using the format to record the minutiae of daily activities (as we will see, such updates may lead to attention bias [in this case, avoidance] in reading newsfeeds). But many status updates display something of a crude admixture of banality and self-promotion: "I've just eaten the biggest bowl of Haagen Dazs ice-cream and can't move [embarrassed face emoticon] but in my defense I did run my first half-marathon today [smiley face emoticon]".

Also of note are the 'conversations' between friends that appear in comments below posts. Perhaps owing to the public nature of the interaction (again, with a folk anthropological hat on) these comments may display more attempts at humor than face-to-face, small group interactions. And of special interest are the responses of friends of high status users. Those users who are high in status (in the author's own list, this included renowned friends who are professors) appeared to receive more comments and more 'likes' for their posts. Oftentimes streams of comments were elicited by one single posting by a high status user; the character of these comments tends to flattering, and occasional obsequiousness. High status users also appeared to be tagged by friends more often in photographs, and to attract more friend postings on their own wall.

Folk observations provide an important starting point in any social psychological investigation: they provide rough, revisable insights into what attracts users' attention and how users interface with Facebook. But such cursory observations are unreliable without further scientific investigation. In the next section I examine some social psychological research on the effects of using the Internet and Facebook.

Existing Research into 'Facebook Depression'

The relationship between Internet use and wellbeing has been the subject of study since the arrival of home computers and Internet connections in U.S. households: by 1998 40% of U.S. households had an Internet connection (Kraut et al., 1998); today, the latest U.S. census figures show that more than 70% of American households have a home computer and Internet access (US Census Bureau, 2013).

The first longitudinal study on the effects of the home Internet use on health (dubbed the 'HomeNet study') set out to investigate its impact on psychological wellbeing via questionnaires. The study was launched in 1996, and data were collected over a 24-month period. The authors of the study concluded that there was a statistically significant association between Internet use and depression but made the (unsupported) inference that, "[T]he Internet *causes* declines in social involvement and psychological well-being" (italics added, Kraut et al., 1998, p. 1029). The researchers hypothesized that the "causal mechanism" responsible for this rise in depression was the displacement of strong off-line social ties by "poorer quality social relationships" online (Kraut et al., 1998, p. 1029): they dubbed this the "Internet paradox" because, they contended, here was a social technology that reduced well-being (the assumption being that direct social interactions – *ceteris paribus* – enhance psychological well-being).

There are serious problems with this study. The purported association between Internet use and depression in the study does not warrant the authors' stronger assertion of a causal link; the inference to the conclusion that the Internet displaces strong social ties is underdetermined by the evidence. In fact, the researchers might equally have reached the opposite conclusion: in the study there was no control group (a similar demographic without home Internet access)—the authors might have argued that the social use of the Internet helps to foster well-being by promoting stronger, off-line social ties but intervening factors have acted to circumvent such positive effects (they might have speculated, e.g., that the concurrent rise in antidepressant advertising and prescriptions of antidepressants led more people to report depressive symptoms during the period of the study; Horwitz & Wakefield, 2007).

Second, the researchers also assumed that online relationships tend to be more superficial (and therefore less conducive to psychological well-being) than off-line relationships, but this cannot be taken as a given without further explanation (see also: La Rose, Eastin, and Gregg, 2001). Third, and related, there is a hidden working assumption that (even if) online relationships are superficial that this is inherently 'bad': again we might challenge this conclusion as underdetermined (perhaps, numerous superficial on-line relationships actually enhance well-being?)

Indeed, against the explanations proffered in the HomeNet study, contemporaneous research involving 4,000 Internet users in the United States found that more than 95% of individuals surveyed did not substitute Internet use for time spent with close friends and family (Nie & Erbring, 2000 cited in Bargh & McKenna, 2004). Yet other studies have reached conclusions that contradict the findings of the original HomeNet study (Shaw & Gant, 2002). Rather than attempt to elaborate on their initial research, the original HomeNet authors asserted in a subsequent study that the initial negative effects of Internet use had "dissipated" and users now "generally experienced positive effects of using the Internet on communication, social involvement, and well-being" (Kraut et al., 2002, p. 49).

At least one recent study has attempted to probe more deeply into the relationship between the amount of time spent online and depression (Morrison & Gore, 2010). The study, involving more than 1,300 individuals, found that those users who spent four hours online (compared with an average of two hours) were significantly more likely to be moderately to severely depressed. As the authors point out the study reveals nothing about the causal direction (if any) of these findings: it may be, for instance, that depressed individuals are more likely to use the Internet and that this explains the correlation between Internet use and depressive affect. But there are three major problems with this study and other current Internet-well-being research. The first shortcoming is the operational term 'Internet activity' (see Kraut, Patterson, Lundmark, et al., 1998; Kraut et al., 2002; Shaw & Gant, 2002). In the Morrison and Gore study (2010), for example, the authors differentiated between a variety of Internet activities (including 'browsing,' 'chat,' 'and 'community'; 2010, p. 125). These differentiations are not fine-grained enough to provide information about the nature of the interactions. Consider the first of these activities: 'browsing.' *What* websites are subjects browsing? What is the *content* of these websites? *What* factors might *influence* browsing patterns? *What* are the immediate emotional responses with respect to the content of the sites subjects are browsing? Indeed, *who* are these 'average'

Internet users and *what* is their prior state of psychological well-being before they go online? This is a problem that also extends to numerous studies of SNS use and well-being (see Selfhout et al., 2009; Pantic et al., 2012; Jelenchick, Eickhoff, & Moreno, 2013; Kross et al., 2013).

We know that Facebook use encompasses a diverse range of activities, including checking who is currently online, instant messaging, reading one's newsfeed, browsing photo galleries, commenting on friends' status updates, and so on. The failure by research to specify the nature of the online interactions and the content that might elicit negative affect presents a serious impediment in the determination of the relationship between psychological well-being (specifically, depression) and Facebook usage. It is perhaps unsurprising then that studies conducted so far have revealed conflicting results: some affirm the claim that Facebook is associated with depression (Pantic et al., 2012), others deny it (Jelenchick, Eickhoff, & Moreno, 2013).

The second major problem with current research pertains to measurements of psychological well-being. In assessing the relationship between Facebook use and 'depression' more needs to be said about what is understood by the term depression and how we measure well-being. Most studies use an established depression scale such as the Beck Depression Inventory (BDI) or the Children's Depression Inventory to compare depression scores with the amount of time spent online (Selfhout et al., 2009; Morrison & Gore, 2010; Pantic et al., 2012). Such scales may be helpful in establishing whether depression is correlated with SNS (without establishing causal direction) but we might also usefully ask: Are SNS such as Facebook associated with milder negative affect such as sadness? The BDI subclassifies depression into "minimal depression," "mild depression," "moderate depression" and "severe depression"—but it is at least a possibility that SNS are associated with subjective dissatisfaction or sadness—and it may be that this is only measurable at the high end of minimal depression on the BDI. Finer grained, qualitative measurements are methodologically important.

One study has come close to investigating the association between sadness and Facebook use (Kross et al., 2013). The study by Kross et al. (2013) examined shifts in subjective well-being (without employing a depression inventory scale) and attempted to improve on previous questionnaire studies by providing a real-time assessment of affect. Conducted over 14 days it involved text-messaging subjects five times per day to determine how much they had used Facebook since the researchers' last message, and asked subjects (somewhat leading) questions including: "How lonely do you feel right now?" "How worried are you right now?" "How much direct [face-to-face or telephone] contact have you had since we last asked?" Subjects' answers were recorded on a slider scale. The study concluded that Facebook use predicted a decline in subjective well-being but that direct (off-line) social contact had the opposite effect—it improved people's subjective well-being over time. There appears to be an explanatory assumption that lack of direct or face to face contact is deleterious to well-being (and this may well be the case). But it raises the question: Does Facebook compare unfavorably with any other solitary activity (such as sitting working on one's laptop)? To test whether there is something particularly depressing or emotionally deleterious about Facebook use (compared to other solitary activities) we would need to extend the study and provide an adequate control aimed at

testing the association between Facebook use—in *particular*—and lower subjective well-being.

This leads to the third problem with current research: the question of explanation. Prevailing explanations at the social psychological level demand greater scrutiny: consider the claim that Facebook may be predictive of lower subjective well-being because it leads to “harmful social comparisons” (Kross et al., 2013). What constitutes a harmful social comparison, why might there be a tendency for social comparison, and in what contexts can we expect this to arise? This not the only question left unanswered. Consider the following: Do some friends command more attention than others? Do some user-photographs or pictures attract more attention when users browse? Do some status updates command greater interest? Do users routinely observe numerical data such as the number of ‘friends’ that other users have, or the number of ‘likes’ or comments that their postings and the postings of other users’ attract?

When users log onto Facebook they may *intend* to use the medium in a variety of ways: messaging friends, reading their newsfeed, posting status updates, or browsing the pages of other users. Social psychological research that surveys Facebook users about their browsing patterns will always be vulnerable to reporting bias; for example, individuals may underestimate the time spent browsing other users’ sites (and more generally, how much time they regularly spend on Facebook). Determining how users *in fact* navigate the medium is another matter. Psychology can gain greater explanatory traction when it designs studies that are theoretically attentive to the underlying cognitive mechanisms activated during Facebook use. To answer the question ‘*Why* might Facebook lead to depression?’ we need to address *how* this might occur. This is where the evolutionary perspective affords us direction.

Evolutionary Psychology and Depression

Evolutionary psychology is concerned with ultimate causes’ of psychological processes; in the case of depression it asks: what recurrent problems in our ancestral environment (if any) were solved by the suite of responses associated with depressive cognition and behavior? This is distinct from questions about *proximate* triggers or local causes of depression which might occur outside of the environment of evolutionary adaptiveness (EEA) today (later in this section I will provide theories of ultimate explanations and proximate triggers for depression). For now, following Murphy (2005) and Varga (2012) we can identify three accounts of the pathology of depression embedded within this evolutionary psychological framework. First, so-called *persistence* accounts contend that there are enduring problems between the EEA and modern environments for which depression presents an adaptive solution (Murphy, 2005; Varga, 2012, p. 42). On this perspective, modern triggers of depression still elicit adaptive responses. Second, it may be that depression was adaptive in the EEA but the features of modern environments mean that it is no longer adaptive: on this view, we hypothesize a *mismatch* between the ancestral and modern environments. Third, it might be contended that depression is (and never was) an adaptive cluster of responses; on this view, depression is understood as some dysfunctional outlier, a dysregulation of an adaptive range of re-

sponses, or as the result of random—and nonadaptive—genetic noise (cf. Keller & Miller, 2006).

This last consideration is worth serious attention because it appears to undermine the premises of this article: Is depression an adaptive response (as evolutionary psychiatry has tended to assume) or is there no adaptive ‘story’ to tell? Indeed, we know that genetic variation is usually diminished by natural selection yet no clear, polygenic genetic markers have so far been located for depression (Keller & Miller, 2006; Flint & Kendler, 2014). Does this mean that depression was not selected for? To respond to the antiadaptation challenge two important issues should be emphasized. First, in pursuing an evolutionary perspective it is crucial to consider the utility of the distinction between depression and sadness. For example, depressive responses and sadness appear to occur on a functional continuum. Second, and related, if contextual factors are built into evolutionary accounts of depression (and note, contextual factors have been expunged from the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-5) in the diagnosis of major depressive disorder and mild depressive disorder), the function of more serious depressive symptoms (including suicidal ideation, e.g.) still needs to be assessed. Current epidemiology is beset with validity problems because contextual factors are overwhelmingly omitted from data collection. Certainly, if depression (or rather, a particular range of depressive behaviors) is understood as an adaptive response to environmental cues, we can begin to make predictions about the rise of depression among certain groups or subpopulations, given specific our understanding of specific (and perhaps persistent) environmental triggers (we will examine theories about such triggers, below). Therefore, to appraise whether depression *was* adaptive we need to be very clear on (a) what we mean by depression and (b) the ancestral environment and the recurrent problems that may have solved by depression. In short, it cannot be assumed that contemporary psychiatric classifications are straightforward adaptations: each condition deserves separate analysis. Nonetheless (as I will argue and Keller & Miller [2006] point out) it remains plausible that depression had some ancestral adaptive function but that modern environmental conditions render these adaptations disorders. In the remainder of this section, we will examine the purported adaptive, psychological functions of depression (both severe or major depression, and mild depressive states). We will now survey theories aimed at explaining the function of depression.

Persistence accounts (those which consider major depression to be adaptive today) include the social navigation hypothesis (Watson & Andrews, 2002); the bargaining hypothesis of postpartum depression (Hagen, 1999, 2002); and the analytical rumination hypothesis (Andrews & Thomson, 2009). All three accounts share some overlapping claims. The social navigation hypothesis proposes that depression promotes two functions: (a) it enables an individual who is presented with complex and difficult social situations time to ruminate and problem-solve; and (b) it signals a cry for help and induces others (including coalitional partners) to provide needed investment and resource allocation (Watson & Andrews, 2002). Hagen’s theory might be construed as a special case of the social navigation hypothesis: it amounts to the claim that postpartum depression is an adaptive bargaining strategy (1999, 2002). This is the view that depression amounts to ‘going on strike’: Hagen hypothesizes that mothers who detect lack of paternal or social support induce greater investment—as a sort of

plea-bargaining strategy—when their depression causes the withdrawal of their own maternal investment in their offspring. Finally, the analytical rumination hypothesis forwarded by [Andrews and Thomson \(2009\)](#) proposes the following:

[D]epression is a stress response mechanism: [1] that is triggered by analytically difficult problems that influence the importance of fitness-related goals; [2] that coordinates changes in body systems to promote and sustain analysis of the triggering problem, otherwise known as depressive rumination; [3] that helps people generate potential solutions to the triggering problem. (p. 623)

We might distil persistence accounts of depression into two hypotheses with related predictions: (a) cognition associated with depression affords functional rumination of complex social problems, which trigger this response; and/or (b) depressive behavior signals a ‘cry for help’ which elicits sympathy and/or coalitional investment. First, with regard to Andrews and Thomson’s claim that “depression is a stress response mechanism” and elicited by “analytically difficult [social] problems” ([Andrews & Thomson, 2009](#), p. 623), we need to ask: What makes these problems ‘analytically difficult’ and why does their solution in particular require a ruminative response? Furthermore, what is meant by ‘depression’ here—severe (clinical) depression or something milder such as dysphoria? Other evolutionary theorists have hypothesized that depressive rumination is characterized by problem-solving impairment and cognitive incapacitation ([Hagen, 2011](#), p. 721; [Price et al., 1994](#); [Varga, 2012](#), p. 46). Nonetheless, the claim that people with depression have more realistic perceptions of their own abilities, and control over the world than the those who are not depressed, is the subject of much debate in social psychology; the body of research on ‘depressive realism’ has yielded mixed findings. There is some evidence that people with mild depression or dysphoria² have more realistic expectations about the future than people who are clinically depressed and those who are not depressed (the former appear to experience more negative illusions, and the latter more positive ‘self’ illusions; [Alloy & Abramson, 1979](#); [Dunning & Story, 1991](#); [Haaga & Beck, 1995](#); [Carson, Hollon, & Shelton, 2010](#); but also see: [Kapçı & Cramer, 1998](#); [Albright & Henderson, 1995](#)). There is also limited evidence that people who are mildly depressed are better at evaluating how well they are perceived by others ([Weinstein, 1980](#); [Dobson, 1989](#)). So, it may be that the depressive rumination hypothesis is supported if its claims are weakened—if, for example, mild depressive cognition is adaptive in certain (as yet to be specified) contexts.

What about the second claim that arises in persistence accounts that major depressive behavior motivates care or social support in others? The evidence is inconclusive. There is some research to show that depression tends to elicit stigmatizing responses even among coalitional partners ([Bleas, 2012](#); [Varga, 2012](#), pp. 46–47); and in these early studies Hagen concedes that levels of postpartum depression are not predicted by perceived social and familial support ([Hagen, 2002](#), p. 323). Furthermore, the results of Hagen’s studies depended on spousal testimony—an unreliable method of collecting data ([Hagen, 2002](#), p. 333). On the back of these studies there is no conclusive evidence to determine whether increased spousal investment occurs as a result of postpartum depression. There may even be indirect evidence of the reverse effect: [Roberts et al. \(2008\)](#) found that women (in particular) who scored high on the neuroticism scale had significantly fewer kin in

their networks. To the extent that there is an overlap between neuroticism and depressive symptomatology it may be that people who are depressed ‘scare away’ their family and friends.³ Interestingly, however, Hagen’s latest work on postpartum depression with the Shuar, a hunter-horticulturalist society in the Ecuadorian Amazon, moves away from a plea-bargaining theory of postpartum depression ([Hagen & Barrett, 2007](#)). In this latest research Hagen and Barrett argue that postpartum depression is linked to parental investment (social support, maternal health, resources, and infant health problems) which acts to dial down investment in the newborn baby if resources are diminished and costs incurred are high.

Turning now to so-called ‘mismatch’ models of depression, these theories propose that (in ancestral environments) depressive cognition and behavior served as a functional response to social ranking but that modern social contexts render these responses dysfunctional ([Nesse & Williams, 1995](#); [Price et al., 1994](#)). One prominent mismatch theory is the ‘social competition theory of depression’ ([Price et al., 1994](#)). This is the view that the function of depression is, “an unconscious, involuntary losing strategy, enabling the individual to accept defeat in ritual agonistic encounters” ([Price et al., 1994](#), p. 241). On this account, the incapacitating features of depression (commonly: social withdrawal, subordinate body posture, psychomotor retardation, feelings of low self-worth) are explicable because, it is argued, this suite of behavior enables individuals to retreat from agonistic social encounters, and to signal inaction to dominant others without incurring physical damage. [Price et al.](#) argue that this “de-escalating” strategy stands in opposition to the mood elevation that occurs when an individual perceives his superior fighting capacity against his rivals ([Price et al., 1994](#), p. 242). For [Price et al.](#) the suite of behavioral responses that are automatically triggered in such encounters acts as a gauge of what has been dubbed “resource holding potential.”

How does the social competition theory amount to a mismatch between the EEA and modern environments, thereby giving rise to depression? [Price et al.](#) also note that prestige has largely replaced dominance as an indicator of social ranking and that self-esteem has evolved from mechanisms that were originally adapted to solve agnostic conflicts ([Price et al., 1994](#), p. 246; see also: [Leary, 2005](#)). An interesting hypothesis that emerges from this viewpoint is the prediction that the persistent perception of being outnumbered by high status individuals will elicit an involuntary response of depressive cognition and behavior. In short, according to the social competition theory, it is the overstimulation of such high status cues in modern environments that can cause depressive responses. In conjunction with insights from ‘depressive realism’ research we might ask: Do perceptions of low relative self-worth undergird the ‘complex social situations’ that [Andrews and Thomson \(2009\)](#) propose trigger depression? Combining the insights of both theories, it may be that ‘depressive rumination’ is triggered by the perceived intensification of social competition and the feeling of being out-competed, thereby causing lower status individuals to retreat.

² In this article I will not elaborate further on the distinction between ‘dysphoria’ and ‘mild depression’ though note that this requires further clarification. For now, I will note that most evolutionary accounts of depression appear to assume that there exists a functional continuum between sadness, dysphoria, and mild depression.

³ My thanks to an anonymous reviewer for making this point.

It should also be noted that the social competition theory has been criticized on the grounds that depressive episodes often involve involuntary social withdrawal for months at a time: Hagen argues that, for depression to be an adaptive response to agonistic encounters, the individual should yield quickly but not be incapacitated for such prolonged periods of time yet depression is typified by such lengthy periods of incapacitation (Hagen, 2011, p. 718). In response, we might argue that this criticism is off the mark: it needs to be shown that depressive symptoms do not abate when social triggers are removed from the depressed individual's environment.

An additional mismatch theory—one that is compatible with the social competition theory—is the 'social risk hypothesis' of depression (Allen & Badcock, 2003, 2006). This theory proposes that mild depression is an adaptive response that evolved to aid risk-averse behavior in social contexts: for example, in threat situations, the suite of depressive functions includes hypersensitivity to the social status of others, reducing one's expectations of success and sending signals of low relative self value to others. This theory proposes that major depression is a dysregulation of an adaptive range of responses. Insofar as it explains mild depressive cognition and behavior as a response to negative evaluative comparisons, it might be said to share the same theoretical purview as the social competition theory. Gender disparities in depression also appear to support this combined theory. The gender ratio for depression is 2:1 with the disparity emerging in adolescence, with girls more susceptible to depression than boys. Pubertal status is a better predictor of depression vulnerability than pubertal timing (Hyde, Mezulis, & Abramson, 2008) and it has also been noted that peer sexual harassment as a result of secondary sexual characteristics (rather than primary estrogen levels per se) predicts depression (Petersen & Shibley Hyde, 2009). Greater vulnerability to negative life events (girls are twice as likely to be sexually abused as boys; Costello, Erkanli, Fairbank, & Angold, 2002) as well as the pressure to conform to gender roles, and wage inequality also support social risk and social competition theories of depression. Furthermore, there is strong evidence that vulnerability to depression increases during childhood (and adulthood) if one is victim to, or witnesses, domestic violence and abuse (Sternberg et al., 1993; Mezulis, Hyde, & Abramson, 2006); this also adds weight to the combined hypothesis.

Clearly, there is controversy in the evolutionary literature over the function of depression, but we can still locate some common ground. Most accounts acknowledge that sadness and mild depressive states perform psychological functions but that depressive illness occurs when this function is dysregulated resulting in 'major depression' (Hagen, 2011, p. 717). Increased sensitivity to comparative social standing—perhaps as a result of personal loss, or being out-competed—also emerges as a common theme. In the next section I therefore assume that some version of the (mismatch) social competition theory combined with the social rumination hypothesis may present the best framework (presently available) for understanding the evolution of depression.

How Facebook Can Be Depressing

If mild depression is an adaptive functional response to perceptions of comparative low social value, Facebook may be a forum which abounds in triggering cues. To take this research further, we need to ask specific questions about how the features of Facebook

and individuals' navigation of it may result in depressive responses. With respect to this, Barkow et al. argue that social attention attractors are important in understanding how we use mass media and new media (Barkow et al., 2012, pp. 123–127). Drawing on their analysis, I will highlight two such adaptive cognitive functions that are relevant to Facebook use: biases for cues of (a) high status individuals; and (b) attractive individuals. I will say why future research needs to focus on these kinds of psychological biases, before turning to the matter of impression management and why users of Facebook appear such masters of self-spin (in this regard, of course, they may not be different from nonusers).

First, why might users of Facebook preferentially attend to cues of high status when navigating the site? In order to answer this question and to avoid circularity in our definition of 'high status,' we need to say something about what constitutes high status cues or behavior. The evolutionary literature has differentiated between two kinds of social learning biases since early work by the primatologist Michael Chance (1967; Chance & Jolly, 1970). In their observations of social hierarchies and attention within chimpanzees and baboon-macaques, Chance and Jolly distinguished between "hedonic" and "agonistic" attention modes. The former they characterized as relaxed communication and receptive learning involving affection (such as mutual grooming, and hugs). The latter they defined as constricted and disruptive learning, typified by fear and aggression. Barkow's work on prestige and status has built on Chance's early ethnography (Barkow, 1989, p. 179; Barkow et al., 2012; Barkow, 2014) and more clearly defines Chance's hedonic mode as involving attention to prestigious individuals where learning is characterized by attending to those who rank highly in some ability. More recently, Henrich and Gil-White have also distinguished between "prestige" and "dominance" as evolved biases for learning (Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013; Henrich & Gil-White, 2001). These two modes of attention (which I will refer to as prestige and dominance biases) describe cognitive processes and suites of behavior associated with attending to individuals (or rather, behavioral cues) which indicate either *prestige* (that is to say, high quality skills) or *dominance* (that is to say, agonistic or aggressive behavior). In order to investigate Facebook use, both kinds of displays will be pertinent.

First of all, however, we need to enquire: what clusters of behavior are associated with prestige and its detection? Barkow has proposed that natural selection has favored an ability to evaluate the rank or status of individuals in terms of their skills and knowledge, and favored a suite of behaviors which are triggered when individuals are perceived to be highly skilled in a particular domain (Barkow, 1989, pp. 174ff). In short, evolution has bequeathed a tendency to respond to prestigious individuals in ways that enable us to learn from them—to copy their skills efficiently by paying preferential attention to them (Barkow, 1989; Henrich & Gil-White, 2001; Barkow et al., 2012). The evolution of this learning capacity predicts that we respond to cues of prestige (which may include so-called trappings of success such as increased access to desired resources) with displays of deference, prolonged gazing, directing our posture to the esteemed individual, and effectively "kiss-up" to them (with displays of gratitude, gift-giving, and so on; Henrich & Gil-White, 2001, p. 168ff); and Henrich and Gil-White contend that social learners have "evolved

dispositions to sycophantically ingratiate themselves with their chosen models, so as to gain close proximity to, and prolonged interaction with these models” (Henrich & Gil-White, 2001, p. 165). This cluster of behaviors ‘buys’ proximity to the highly ranked individual (and indeed, rewards may be bequeathed to the prestigious individual). The psychology of prestige, then, is a suite of adaptations for detecting prestigious or high status individuals and efficiently copying their skills. Importantly, there is also good evidence that we give attention to individuals based on the observation that others are so doing: for example, the eye-gaze of others can induce preferential attention in the gazed individual (Henrich & Gil-White, 2001; Foulsham, Cheng, Tracy, Henrich, & Kingstone, 2010). As noted, we do not merely evaluate social rank according to evidence of skill but according to cues of social status. Indeed, social psychology has persistently shown that cues that indicate wealth or affluence (indicated by clothing, e.g.) can be powerful indicators of deference and attentional influence (Lefkowitz, Blake, & Mouton, 1955; Bickman, 1974). In addition (as Barkow et al. and Henrich and Gil-White have noted), when an individual is perceived to command a high degree of deference or popularity this too can elicit preferential attention. With respect to this, one striking peculiarity that appears explicable on this evolutionary framework is the ‘famous for being famous’ phenomenon: attention begets attention in a kind of ‘rich get richer’ trend: Barkow et al. contend that the tendency for popularity to be conflated with ‘prestigious high status’ is particularly evident in certain new media usage such as Twitter whereby the greater the number of followers the greater the account holder’s status (Barkow et al., 2012, p. 216). It may be that Facebook navigation follows a similar trend of ‘befriending’ popular profiles.

How do the evolutionary functions of prestige help to better organize research into Facebook navigation? Given that high status tends to be inferred from evidence of success (free access to desirable or scarce resources), we can predict that individuals who display the trappings of prestige (including wealth) are likely to command attention too. Therefore, quite aside from evidence of special achievements or certain professional roles which might be regarded as direct evidence of prestige, signs of wealth are also likely to influence user attention: these might take the form of photographic evidence of high value goods, expensive clothing, exotic holidays, and so on. We can surmise that status updates that mention special feats and achievements, or signal success will command more attention than updates that recount day to day activities. In addition, when it comes to Facebook it may be that users pay particular attention to those profiles that already appear to be popular (gauged through the number of friends that a user has, the number of ‘likes’ that their postings elicit, and the volume of comments that users’ ‘status updates’ produce).

Displays of dominance (Chance’s ‘agonistic mode’) also occur on Facebook. Dominant behavior involves aggressive displays, manipulation and attacks on other individuals. Our evolved response to such behavior (including our ability to detect it) involves fear and avoidance (including gaze avoidance and hunched posture—“to stare is to challenge”—as well as furtive glances to check the locality of the dominant individual (Henrich & Gil-White, 2001, p. 168). Dominant behavior on Facebook might include the posting of aggressive messages on another individuals’ Facebook wall or adding negative comments below photographs. Such behavior has been given its own label—cyberbullying. The

possibility of ‘unfriending’ or even blocking individuals on Facebook means that there is some level of added protection from aggressors. However, we can also predict that dominant behavior may manifest in fake profiles affording the possibility of attacking other users in something of a covert-manner.

How might targets of such bullying respond? We can predict that users who have been so targeted are likely to avoid ‘squaring up’ to the aggressive individual: it is highly unlikely that some targeted users will reply to any such comments, or to retaliate on the aggressor’s Facebook wall. It may even be likely that targeted users tend not to ‘unfriend’ or ‘block’ aggressive users (especially if there is the possibility of direct face-to-face contact). The frequency of logging onto Facebook may diminish for users who have been so targeted but we can expect—on the basis of adaptive responses in the evolution of subordinate behavior—that such users may not abort their profiles but will check up on them regularly (thereby maintaining—an albeit misplaced—vigilance about the ‘proximity’ of the dominant individual in cyberspace).

A second consideration in understanding the new media and evolutionary psychology is the attention attractor of physical attractiveness. Evolutionary models propose that attractiveness is valued as an indicator of health and fertility (and therefore, reproductive value) and that there are gender differences in the premium placed on attractiveness (Buss & Schmitt, 1993; Maner, Gailliot, & DeWall, 2007). It is only from an evolutionary perspective that we can explain why female attractiveness in particular is associated with youth—it is a strong indicator of fertility. Furthermore, evolutionary models propose that male attractiveness is highly valued by females but that physical attractiveness is not the only trait to which females will be attentionally attuned: signals of prestige will also command preferential attention since this indicates male ability to access limited resources (Sadalla, Kenrick, & Vershure, 1987; Maner et al., 2003, p. 1108). This gender difference in mating selectivity (with males placing a higher premium on attractiveness than females and females being ‘pickier’ with respect to mating partners) is also proposed by Trivers’ parental investment theory (Trivers, 1972). Trivers proposes that the significant early disparities in parental investment mean that there is a tendency for females to seek qualities other than physical attractiveness in a mate (that is, to seek traits that will signal benefit to her offspring in the long-term).

Other evolutionary models go further by hypothesizing that there will be attention bias among females toward attractive females. This intrasexual competition, it is hypothesized, serves as an adaptive function by heightening vigilance (including mate guarding) against potential female rivals (Buss & Shackelford, 1997). This hypothesis has received some indirect support from eye-tracking studies which demonstrate that females and males not only display significantly greater attention bias to images of attractive females than those of average females but that this attention becomes “stuck” (it transforms into gazing). Researchers have also found that attention bias is especially pronounced among single men and women who feel insecure about their current romantic relationship; furthermore, the tendency for gaze bias has not so far been demonstrated for attractive male targets (Maner, Gailliot, & DeWall, 2007).

These evolutionary theories lead to specific predictions when it comes to Facebook use. It is likely that ‘aimless browsing’ is not as random as users might consciously suppose. We can predict that

attractive images of male and female users will be 'eye-catching,' commanding user's preferential attention, and that when browsing profiles the most attractive female profiles will be subject to longer attention time from both men and women. Furthermore, we can expect this to be demonstrated not just by significantly greater gaze time at profile images but by users spending more time browsing the galleries of such profiles. And we can also predict that these biases will be especially prominent among male and female users who are single (perhaps evinced by their profile status) as well as among female users who perceive themselves to be in insecure relationships. Finally, we can predict that attention bias to high status cues (as discussed previously) will be evinced by both female and male users; correlatively, if users receive 'likes' or 'comments' from high status 'friends' this may result in boosts in self-esteem and feelings of wellbeing.

From an evolutionary point of view we can expect Facebook to abound in signs of 'high status': this is an arena for 'impression management.' The term was coined by Erving Goffman in 1958 (Goffman, 1958) to describe the strategic behavior involved in presenting a favorable image of oneself in the company of others. When it comes to Facebook, some of your 'friends' may be excelling in personal PR. However, all users will be involved in some level of furtive self-promotion: 'furtive' because impression management is not just the result of *nonconscious* psychological processes – *conscious* awareness of any self-aggrandizement is an exercise in subtle discretion. There are predictions that result from this: it is more likely that one will read more about other users' personal successes rather failures; users are more likely to upload the most attractive images; and we can also expect a marked tendency among female users to pay more attention to their profile photographs and galleries (selecting their 'best' – most flattering photos). Users will be selective in how they construct and edit their status updates, perhaps selecting humorous material to upload or insert as comments, and constructing comments that project a positive image).

As Barkow points out, Goffman's insights into the '*presentation of self in everyday life*' (Barkow, 1989, pp. 74–75) are explicable and wholly expected from an evolutionary perspective. Namely, as Barkow elucidates, sociology and evolutionary psychology have consistently observed: "[P]eople everywhere are concerned with relative standing, with status and prestige . . . ; people preoccupied with sexuality and resource-related activities of those around them . . ." (Barkow, 1989, p. 74). The key difference in these research fields, as Barkow argues, is the explanatory unity offered by the evolutionary perspective (Barkow, 1989, p. 75).

The evolutionary perspective on impression management gives us further insights into possible proximal triggers for mild depression. Being confronted by conspicuously and overwhelmingly positive impressions of one's Facebook friends increases the occasion for comparative evaluations, and escalates the risk for negative appraisals: Facebook presents more opportunities to feel like a loser. This risk is also intensified by the volume of profiles one observes. Recent statistics reveal that, on average, American users of Facebook have around 245 friends (Hampton et al., 2012) and it is important, at this juncture, to compare this finding with work on evolved social network sizes. Dunbar estimates ancestral social group sizes of between 150 to 250, where younger people tend to have larger network sizes (Dunbar, 1992; Zhou, Sornette,

Hill, & Dunbar, 2005). Research into social networks shows that these groups are further structured into stratified layers which vary inversely according to the quantity and quality of the relationships (Sutcliffe et al., 2012). Specifically, social and evolutionary research has found that humans tend to have a stronger inner support clique of around 3 to 5 members, a less emotionally supportive 'sympathy' clique of around 12 to 15 members, followed by a wider affinity group (a band) of roughly 50 members, and an active network (or clan) of around 150 individuals (Sutcliffe et al., 2012). So far research into online social networks has found some similarities to the layers of relationships within Facebook to those found offline: one study has predicted with an 80% success rate the strength of offline social ties based on the quality and levels of interaction of users online (Arnaboldi, Guazzini, & Passarella, 2013). It may be that users of Facebook consider many of their online 'friends' as mere acquaintances rather than 'real friends': the neologistic derogation "he or she is only a 'Facebook friend'" may partly substantiate this theory. On the other hand, it may be unlikely that online 'friends' are fully coextensive with 'real world' social contacts: for example, the former may predominantly comprise individuals drawn from the same age group. It would also be premature to conclude, on the basis of this research, that online social media such as Facebook do not present novel environments for eliciting a variety of (old) affective responses (including depression or sadness). The issue is how we tend to navigate Facebook and how the kinds of profiles and information that act as attractors. When users have the freedom to browse profiles anonymously, and when they have a greater pool of online 'friends' they have more opportunities for comparative social evaluation. It is the hypothesis of this article that it is the persistent exposure to certain cues on Facebook that may be sufficient to trigger feelings of low relative self-worth (which may be quantified on BID as at the high end of 'minimal depression' or as 'mild depression,' or via negative subjective reports).

'Facebook Depression': New Directions

In the Popperian spirit of bold conjecture this article advances several specific predictions about the circumstances in which Facebook users may be more susceptible to automatic, proximal triggers for mild depression. Given the foregoing discussion of social competition and relative social evaluation theories of depression I contend that individuals are more likely to suffer from depression when:

1. They have more online 'friends';
2. The greater the time spent reading updates from this wide pool of friends;
3. The more frequently the user reads these updates; *and*
4. The content of the updates tends to a bragging nature.

The greater the exposure a user has to successful others (as evinced by the content of profile images, galleries and status updates), the greater is the opportunity for negative social evaluation. We can also predict gender differences in the attention

attractors on Facebook given the evidence from evolutionary and social psychology on attraction attractors:

5. Attractive female images will command the greatest attention.

If Facebook use tends to occur when individuals are alone (perhaps when otherwise engaged in work, study, or solitary home Internet use), the social comparisons triggered by Facebook may be heightened—in such scenarios, the user logs onto Facebook and observes the evidence of the successes, busy social lives, and activities of other members. In short, solitary use of the Internet already provides a context in which the user may (given specific additional triggers) be susceptible to negative relative evaluations since, at that time, the user has no concurrent, comparative evidence of social support.

How might we test these predictions? One possible line of research is to use live Facebook pages or to create mock up profiles replete with comments, status updates, and galleries. The content of mock-up profiles would vary according to status cues (such as level of attractiveness, number of friends, profession, levels of bragging in status updates, and so on). By testing subjects' subjective well-being before and after browsing such profiles, it may be possible to gauge differences in subjective affect: negative self-evaluations may then be dependent on the content of profiles viewed. In more elaborate set-ups, it may also be possible to trace the navigation history of users in order to appraise which aspects of the mock-up profiles command the most attention. One limitation of such studies is that subjects would not be socially connected to the mock-up profiles and this may have an impact on comparative social evaluation. However, it is also likely to be the case that much Facebook browsing involves navigating the profiles of users who are not personally known to subjects—so this might yet present valuable insights into the psychological effects of Facebook use.

Ecological analysis of Facebook use may also be possible using real-time assessment (e.g., texting subjects a number of times per day over a specified time period to check whether they are on Facebook, the nature of their interactions on Facebook, and to gauge subjective well-being; see [Kross et al., 2013](#)). Additional data that might be collected from subjects in such studies could include information on subjects' number of friends on Facebook, how frequently they use Facebook, and information on whether (and why) they block any friends on Facebook from their newsfeeds. Daily logging-in information would also be necessary: this might include how often subject checked their newsfeeds in the last few hours/day; what they did when they logged on (how many status updates did they 'like' or comment on; how many people 'liked' their status updates or commented on them; what was the valence or character of the status updates on their newsfeed; and whether they instant-messaged with any friends). One problem with this methodology (more so, potentially, than with Facebook mock-up studies) is the possibility of transparency in research aims and the risk of this influencing subjects' testimonies about affective states.

Some final issues which I have not addressed in this article: Points 2 and 3 (above) also demand further mechanistic analysis: it has yet to be answered why certain users spend more time online, and why they do so frequently. There are likely myriad reasons

why people log on to Facebook frequently; perhaps use increases with 'friends' or social isolation, for example. There may also be a strong feedback loop between volume of interaction and frequency of checking Facebook. Perhaps users who are mildly depressed are more prone to log on to Facebook, seeking company or social contact. It may be that Facebook use intensifies depressive feelings among such users (again depending on conditions of interaction) and displaces time that could otherwise have been spent in face-to-face social contact ([Pinker, 2014](#)). Following the arguments in this chapter, we can predict that responses will also depend on the range of 'friends' that the user has online. Furthermore, having 'friend' requests rejected might conceivably lead to momentary feelings of mild depression especially if such requests are denied by high status users. The relationship between account deactivation and depression requires further examination.⁴ All of these are separate issues that deserve their own hypotheses and follow-up study. Finally, it should also be emphasized that if hypotheses 1 through 5 are corroborated this would thereby provide indirect support for those theories of depression which propose that low relative social evaluation acts as a key trigger. One could certainly elect to base predictions about Facebook depression on different theories of depression; my goal has been to provide an exemplary framework for understanding how and why an evolutionary approach is fruitful.

Beyond further investigating 'Facebook depression,' however, there may be other effects of the medium that are worthy of enquiry ([Krasnova et al., 2013](#)). Perhaps 'Facebook envy' is prevalent among users. Envy, like depression, involves social evaluations but where depression is hypothesized to be a modern-day mismatch of an adaptive response, elicited by overstimulation of high status prestige cues. It has been hypothesized that the adaptive function of envy is to motivate and prompt action when one's nearest competitors are perceived to be out-competing one ([Hill & Buss, 2008](#)). On Facebook, the triggers of envy therefore differ from depression: envy may be triggered when users perceive that peers whom they judge to be of similar social status and the same relative age are faring better. This might arise when Facebook users focus specifically on the status updates of a closed pool of friends in their newsfeed (these may be friends or colleagues with whom users also socialize with offline); compare this with the prediction (in the case of Facebook depression) that a larger pool of friends, and greater exposure to status updates may be involved in triggering depressive affect. Importantly, however, to examine 'Facebook envy' (just as with 'Facebook depression') we need to be clear about the cognitive mechanisms involved, the adaptive function(s) of those mechanisms, and the environmental triggers involved in eliciting those responses.

In future research it may also be necessary to overhaul our theories of the evolutionary function (if any) of depression (and envy). Expanding investigative domains from evolutionary psychology to cross-cultural work in social psychology, cognitive neuroscience, and neurobiology will be important in this endeavor; as will expanding research into cognitive domains with parallels or overlaps with depression (such as precaution, and security motivation). In addition, the consequences of Facebook depression (or

⁴ One friend told me that she felt "immense relief" after deactivating her Facebook account and that it was "one less daily pressure."

sadness) deserve long term study. We know that even a single depressive episode in adolescence can increase the risk for major depressive disorder in later life: one study estimates that even one mild depressive episode quintuples the risk for major depression (Cuijpers, De Graaf, & van Dorsselaer, 2004). The point of this article has been to show that any such theories have ramifications for how we understand Internet use and its psychological effects. The underlying message is that evolutionary psychology is not some autonomous field within human science. Social psychology needs relieved of its isolationism. The benefits of finally integrating evolution within the human sciences are explanatory consilience, research expediency, and the resolution of countless specious scholarly disputes.

References

- Albright, J., & Henderson, M. (1995). How real is depressive realism? A question of scales and standards. *Cognitive Therapy and Research, 19*, 589–609. <http://dx.doi.org/10.1007/BF02230515>
- Allen, N. B., & Badcock, P. B. (2003). The social risk hypothesis of depressed mood: Evolutionary, psychosocial, and neurobiological perspectives. *Psychological Bulletin, 129*, 887–913.
- Allen, N. B., & Badcock, P. B. (2006). Darwinian models of depression: A review of evolutionary accounts of mood and mood disorders. *Progress in Neuro-Psychopharmacology & Biological Psychiatry, 30*, 815–826. <http://dx.doi.org/10.1016/j.pnpbp.2006.01.007>
- Alloy, L. B., & Abramson, L. Y. (1979). Judgment of contingency in depressed and nondepressed students: Sadder but wiser? *Journal of Experimental Psychology: General, 108*, 441–485. <http://dx.doi.org/10.1037/0096-3445.108.4.441>
- Andrews, P. W., & Thomson, J. A., Jr. (2009). The bright side of being blue: Depression as an adaptation for analyzing complex problems. *Psychological Review, 116*, 620–654. <http://dx.doi.org/10.1037/a0016242>
- Arnaboldi, V., Guazzini, A., & Passarella, A. (2013). Egocentric online social networks: Analysis of key features and prediction of tie strength in Facebook. *Computer Communications, 36*, 1130–1144. <http://dx.doi.org/10.1016/j.comcom.2013.03.003>
- Bargh, J. A., & McKenna, K. Y. (2004). The internet and social life. *Annual Review of Psychology, 55*, 573–590. <http://dx.doi.org/10.1146/annurev.psych.55.090902.141922>
- Barkow, J. (1989). *Darwin, sex, and status: Biological approaches to mind and culture*. Toronto, Canada: University of Toronto Press.
- Barkow, J., O'Gorman, R., & Rendell, L. (2012). Are the new mass media subverting cultural transmission? 2012. *Review of General Psychology, 16*, 121–133. <http://dx.doi.org/10.1037/a0027907>
- Barkow, J. (2014). Prestige and the ongoing process of culture revision. In J. Cheng, J. Tracey, & C. Anderson (Eds.), *The psychology of social status* (pp. 29–46). New York, NY: Springer. http://dx.doi.org/10.1007/978-1-4939-0867-7_2
- Bickman, L. (1974). The social power of uniform. *Journal of Applied Social Psychology, 4*, 47–61. <http://dx.doi.org/10.1111/j.1559-1816.1974.tb02599.x>
- Blease, C. (2012). Mental health illiteracy? Perceiving depression as a disorder. *Review of General Psychology, 16*, 59–69. <http://dx.doi.org/10.1037/a0026494>
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232. <http://dx.doi.org/10.1037/0033-295X.100.2.204>
- Buss, D. M., & Shackelford, T. K. (1997). From vigilance to violence: Mate retention tactics in married couples. *Journal of Personality and Social Psychology, 72*, 346–361. <http://dx.doi.org/10.1037/0022-3514.72.2.346>
- Carson, R. C., Hollon, S. D., & Shelton, R. C. (2010). Depressive realism and clinical depression. *Behaviour Research and Therapy, 48*, 257–265. <http://dx.doi.org/10.1016/j.brat.2009.11.011>
- Chance, M. (1967). Attention structure as the basis of primate social rank. *Man, 2*, 503–518.
- Chance, M., & Jolly, C. (1970). *Social groups of monkey, apes and men*. New York, NY: Dutton.
- Cheng, J., Tracy, J., Foulsham, T., Kingstone, A., & Henrich, J. (2013). Two ways to the top: Evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. *Journal of Personality and Social Psychology, 104*, 103–125.
- Costello, E., Erkanli, A., Fairbank, J., & Angold, A. (2002). The prevalence of potentially traumatic events in childhood and adolescence. *Journal of Traumatic Stress, 15*, 99–112.
- Cuijpers, P., de Graaf, R., & van Dorsselaer, S. (2004). Minor depression: Risk profiles, functional disability, health care use and risk of developing major depression. *Journal of Affective Disorders, 79*, 71–79. [http://dx.doi.org/10.1016/S0165-0327\(02\)00348-8](http://dx.doi.org/10.1016/S0165-0327(02)00348-8)
- Dobson, K. (1989). Real and perceived interpersonal responses to subclinically anxious and depressed targets. *Cognitive Therapy and Research, 13*, 37–47. <http://dx.doi.org/10.1007/BF01178488>
- Dunbar, R. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution, 22*, 469–493. [http://dx.doi.org/10.1016/0047-2484\(92\)90081-J](http://dx.doi.org/10.1016/0047-2484(92)90081-J)
- Dunning, D., & Story, A. L. (1991). Depression, realism, and the overconfidence effect: Are the sadder wiser when predicting future actions and events? *Journal of Personality and Social Psychology, 61*, 521–532. <http://dx.doi.org/10.1037/0022-3514.61.4.521>
- Flint, J., & Kendler, K. S. (2014). The genetics of major depression. *Neuron, 81*, 484–503. <http://dx.doi.org/10.1016/j.neuron.2014.01.027>
- Foulsham, T., Cheng, J. T., Tracy, J. L., Henrich, J., & Kingstone, A. (2010). Gaze allocation in a dynamic situation: Effects of social status and speaking. *Cognition, 117*, 319–331. <http://dx.doi.org/10.1016/j.cognition.2010.09.003>
- Goffman, E. (1958/1990). *The presentation of self in everyday life*. London, UK: Penguin.
- Haaga, D. A., & Beck, A. T. (1995). Perspectives on depressive realism: Implications for cognitive theory of depression. *Behaviour Research and Therapy, 33*, 41–48. [http://dx.doi.org/10.1016/0005-7967\(94\)E0016-C](http://dx.doi.org/10.1016/0005-7967(94)E0016-C)
- Hagen, E. (1999). The functions of postpartum depression. *Evolution and Human Behavior, 20*, 325–359. [http://dx.doi.org/10.1016/S1090-5138\(99\)00016-1](http://dx.doi.org/10.1016/S1090-5138(99)00016-1)
- Hagen, E. (2002). Depression as bargaining. *Evolution and Human Behavior, 23*, 323–336. [http://dx.doi.org/10.1016/S1090-5138\(01\)00102-7](http://dx.doi.org/10.1016/S1090-5138(01)00102-7)
- Hagen, E. H. (2011). Evolutionary theories of depression: A critical review. *The Canadian Journal of Psychiatry, 56*, 716–726.
- Hagen, E. H., & Barrett, H. C. (2007). Perinatal sadness among Shuar women: Support for an evolutionary theory of psychic pain. *Medical Anthropology Quarterly, 21*, 22–40. <http://dx.doi.org/10.1525/maq.2007.21.1.22>
- Hampton, N., Goulet, L., Marlow, C., & Rainie, L. (2012, February 3). Why most Facebook users get more than they give. *Pew Internet and American Life Project*. Retrieved September 10, 2014, from http://www.pewinternet.org/~media/Files/Reports/2012/PIP_Facebook%20users_2.3.12.pdf
- Henrich, J., & Gil-White, F. (2001). The evolution of prestige: Freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior, 22*, 165–196.
- Hill, S., & Buss, D. (2008). The evolutionary psychology of envy. In R. Smith (Ed.), *Envy: Theory and research* (pp. 60–70). New York, NY: Oxford University Press. <http://dx.doi.org/10.1093/acprof:oso/9780195327953.003.0004>

- Horwitz, A., & Wakefield, J. (2007). *The loss of sadness: How psychiatry transformed normal sorrow into depressive disorder*. Oxford, UK: Oxford University Press.
- Hyde, J. S., Mezulis, A. H., & Abramson, L. Y. (2008). The ABCs of depression: Integrating affective, biological, and cognitive models to explain the emergence of the gender difference in depression. *Psychological Review*, *115*, 291–313. <http://dx.doi.org/10.1037/0033-295X.115.2.291>
- Jelenchick, L. A., Eickhoff, J. C., & Moreno, M. A. (2013). "Facebook depression?": Social networking site use and depression in older adolescents. *Journal of Adolescent Health*, *52*, 128–130. <http://dx.doi.org/10.1016/j.jadohealth.2012.05.008>
- Kapçi, E. G., & Cramer, D. (1998). The accuracy of dysphoric and nondepressed groups' predictions of life events. *The Journal of Psychology: Interdisciplinary and Applied*, *132*, 659–670. <http://dx.doi.org/10.1080/00223989809599297>
- Keller, M. C., & Miller, G. (2006). Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? *Behavioral and Brain Sciences*, *29*, 385–404. <http://dx.doi.org/10.1017/S0140525X06009095>
- Krasnova, H., Wenninger, H., Widjaja, T., & Buxmann, P. (2013). *Envy on Facebook: A hidden threat to users' life satisfaction?* Retrieved September 10, 2014, from http://karynemlira.com/wp-content/uploads/2013/01/Envy-on-Facebook_A-Hidden-Threat-to-Users%E2%80%99-Life.pdf
- Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2002). Internet paradox revisited. *Journal of Social Issues*, *58*, 49–74. <http://dx.doi.org/10.1111/1540-4560.00248>
- Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukhopadhyay, T., & Scherlis, W. (1998). Internet paradox. A social technology that reduces social involvement and psychological well-being? *American Psychologist*, *53*, 1017–1031. <http://dx.doi.org/10.1037/0003-066X.53.9.1017>
- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., . . . Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS One*, *8*, e69841. <http://dx.doi.org/10.1371/journal.pone.0069841>
- La Rose, R., Eastin, M. S., & Gregg, J. (2001). Reformulating the internet paradox: Social cognitive explanations of internet use and depression. *Journal of Online Behavior I*. Retrieved May 28, 2013, from <http://www.behavior.net/JOB/v1n1/paradox.html>
- Leary, M. (2005). Sociometer theory and the pursuit of relational value: Getting to the root of self-esteem. *European Review of Social Psychology*, *16*, 75–111. <http://dx.doi.org/10.1080/10463280540000007>
- Lefkowitz, M., Blake, R., & Mouton, J. (1955). Status factors in pedestrian violation of traffic signals. *The Journal of Abnormal and Social Psychology*, *51*, 704–706. <http://dx.doi.org/10.1037/h0042000>
- Lewis, K., Kaufman, J., Christakis, N. (2008). The taste for privacy: An analysis of college student privacy settings in an online social network. *Journal of Computer-Mediated Communication*, *14*, 79–100.
- Maner, J., Gailliot, M., & DeWall, N. (2007). Adaptive attentional attunement: Evidence for mating-related perceptual bias. *Evolution and Human Behavior*, *28*, 28–36. <http://dx.doi.org/10.1016/j.evolhumbehav.2006.05.006>
- Maner, J. K., Kenrick, D. T., Becker, D. V., Delton, A. W., Hofer, B., Wilbur, C. J., & Neuberg, S. L. (2003). Sexually selective cognition: Beauty captures the mind of the beholder. *Journal of Personality and Social Psychology*, *85*, 1107–1120. <http://dx.doi.org/10.1037/0022-3514.85.6.1107>
- Mezulis, A. H., Hyde, J. S., & Abramson, L. Y. (2006). The developmental origins of cognitive vulnerability to depression: Temperament, parenting, and negative life events in childhood as contributors to negative cognitive style. *Developmental Psychology*, *42*, 1012–1025. <http://dx.doi.org/10.1037/0012-1649.42.6.1012>
- Moreno, M., Jelenchick, L., Egan, K., Cox, E., Young, H., Gannon, K., & Becker, T. (2011). Feeling bad on Facebook: Depression disclosures by college students on a social networking site. *Depression and Anxiety*, *28*, 447–455. <http://dx.doi.org/10.1002/da.20805>
- Morrison, C. M., & Gore, H. (2010). The relationship between excessive Internet use and depression: A questionnaire-based study of 1,319 young people and adults. *Psychopathology*, *43*, 121–126. <http://dx.doi.org/10.1159/000277001>
- Murphy, D. (2005). Can evolution explain insanity? *Biology and Philosophy*, *20*, 747–766.
- Nesse, R., & Williams, G. (1995). *Why we get sick*. New York, NY: Times Books.
- Nie, N., & Erbring, L. (2000). *Internet and society: A preliminary report*. Stanford, CA: Stanford Institute for Quantitative Study of Society.
- Pantic, I., Damjanovic, A., Todorovic, J., Topalovic, D., Bojovic-Jovic, D., Ristic, S., & Pantic, S. (2012). Association between online social networking and depression in high school students: Behavioral physiology viewpoint. *Psychiatria Danubina*, *24*, 90–93.
- Parker-Pope, T. (2012, May 17). Does Facebook turn people into narcissists? *New York Times*. Retrieved September 11, 2013, from http://well.blogs.nytimes.com/2012/05/17/does-facebook-turn-people-into-narcissists/?_r=0
- Patchin, J., & Hinduja, S. (2010). Changes in adolescent online social networking behaviors from 2006 to 2009. *Computers in Human Behavior*, *26*, 1818–1821.
- Petersen, J. L., & Shibley Hyde, J. (2009). A longitudinal investigation of peer sexual harassment victimization in adolescence. *Journal of Adolescence*, *32*, 1173–1188. <http://dx.doi.org/10.1016/j.adolescence.2009.01.011>
- Pinker, S. (2014). *The village effect: Why face to face contact matters*. London, UK: Atlantic Books.
- Price, J., Sloman, L., Gardner, R., Gilbert, P., & Rohde, P. (1994). The social competition hypothesis of depression. *British Journal of Psychiatry*, *164*, 309–315. Reprinted in S. Baron-Cohen (Ed.) (1999), *The maladapted mind* (pp. 241–254). Hove, UK: Psychology Press.
- Roberts, S., Wilson, R., Fedurek, P., & Dunbar, R. (2008). Individual differences and personal social network size and structure. *Personality and Individual Differences*, *44*, 954–964. <http://dx.doi.org/10.1016/j.paid.2007.10.033>
- Sadalla, E., Kenrick, D., & Vershure, B. (1987). Dominance and heterosexual attraction. *Journal of Personality and Social Psychology*, *52*, 730–738. <http://dx.doi.org/10.1037/0022-3514.52.4.730>
- Selphout, M. H., Branje, S. J., Delsing, M., ter Bogt, T. F., & Meeus, W. H. (2009). Different types of Internet use, depression, and social anxiety: The role of perceived friendship quality. *Journal of Adolescence*, *32*, 819–833. <http://dx.doi.org/10.1016/j.adolescence.2008.10.011>
- Shaw, L. H., & Gant, L. M. (2002). In defense of the internet: The relationship between internet communication and depression, loneliness, self-esteem, and perceived social support. *CyberPsychology & Behavior*, *5*, 157–171. <http://dx.doi.org/10.1089/109493102753770552>
- Silver, J., & Day, E. (2012, February 5). Is it times to leave Facebook? *The Observer*. Retrieved September 10, 2014, from <http://www.theguardian.com/commentisfree/2012/feb/05/time-to-leave-facebook-debate>
- Sternberg, K., Lamb, M., Greenbaum, C., Cicchetti, D., Dawud, S., Cortes, R. M., . . . Lorey, F. (1993). The effects of domestic violence on children's behavior problems and depression. *Developmental Psychology*, *29*, 44–52. <http://dx.doi.org/10.1037/0012-1649.29.1.44>
- Stutzman, F., Gross, R., Acquisti, A. (2013). Silent listeners: The evolution of privacy and disclosure on Facebook. *Journal of Privacy and Confidentiality* *4*, Article 2.
- Sutcliffe, A., Dunbar, R., Binder, J., & Arrow, H. (2012). Relationships and the social brain: Integrating psychological and evolutionary perspec-

- tives. *British Journal of Psychology*, 103, 149–168. <http://dx.doi.org/10.1111/j.2044-8295.2011.02061.x>
- Trivers, R. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man, 1871–1971*, Chicago, IL: Aldine-Atherton.
- US Census Bureau. (2013). *Computer and internet use in the United States: Population characteristics*. Retrieved September 4, 2014, from <http://www.census.gov/prod/2013pubs/p20-569.pdf>
- Varga, S. (2012). Evolutionary psychiatry and depression: Testing two hypotheses. *Medicine, Health Care, and Philosophy*, 15, 41–52. <http://dx.doi.org/10.1007/s11019-010-9305-9>
- Wakefield, J. (2014, February 3). Facebook turns 10 but are its days numbered? *BBC News*. Retrieved February 10, 2014, from <http://www.bbc.co.uk/news/technology-25953225>
- Watson, P. J., & Andrews, P. W. (2002). Toward a revised evolutionary adaptationist analysis of depression: The social navigation hypothesis. *Journal of Affective Disorders*, 72, 1–14. [http://dx.doi.org/10.1016/S0165-0327\(01\)00459-1](http://dx.doi.org/10.1016/S0165-0327(01)00459-1)
- Weinstein, N. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39, 806–820. <http://dx.doi.org/10.1037/0022-3514.39.5.806>
- World Health Organization. (2010). *Depression*. Retrieved September 4, 2014, from www.who.int/mental_health/management/depression/definition/en/print.html
- Zhou, W.-X., Sornette, D., Hill, R. A., & Dunbar, R. I. (2005). Discrete hierarchical organization of social group sizes. *Proceedings of the Royal Society B: Biological Sciences*, 272, 439–444. <http://dx.doi.org/10.1098/rspb.2004.2970>

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