THE NEEDS–AFFORDANCES–FEATURES PERSPECTIVE FOR THE USE OF SOCIAL MEDIA

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Appendix A

Motivation–Need Theories

Table A1 summarizes the major motivation-needs perspectives from psychology[1] and shows how the innate psychological needs derived from self-determination (SDT) and psychological ownership (POT) theories map to the needs identified in other motivation-needs perspectives. Given that the focus of our study is on innate psychological needs, Table A1 also classifies these theories in terms of their focus on psychological versus physiological needs and on innate versus learned needs. Three major theoretical perspectives were identified. Maslow's (1938) hierarchy of needs theory is the most comprehensive in terms of capturing human needs—both physiological and psychological. He classifies needs in a hierarchy of five categories. From the bottom up, these are physiological (e.g., food, water), safety (e.g., security of body, family, property), love/belonging (e.g., friendship, family), esteem (e.g., a "lower" version of external esteem such as a need for status, recognition, prestige and attention, and a "higher" version of internal esteem such as a need for achievement, confidence, independence, and freedom), and self-actualization (e.g., morality, creativity). Alderfer's (1972) ERG perspective identifies three needs—existence, relatedness, and growth—that can be largely mapped to Maslow's hierarchy (existence encompasses Maslow's physiological and safety needs; relatedness encompasses Maslow's love/belonging and external esteem needs; and growth encompasses Maslow's internal esteem and self-actualization needs). McClelland (1987) focuses on three learned needs: need for achievement, power, and affiliation. He posits that everybody has these needs (i.e., they are innate) but that based on our culture and life experiences, one of these needs will be dominant (thus "learned"). This perspective has been mainly applied to work contexts to identify employees' motivations. SDT and POT examine *innate psychological* needs.

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[1] Murray (1938) developed a theory of psychogenic needs related to personality that provided the theoretical basis for McClelland's (1987) and Maslow's (1938) need theories. Herzberg's (1959) two-factor theory states that hygiene factors (e.g., job security, salary, work conditions) and motivators (e.g., challenging work, recognition) cause job satisfaction/dissatisfaction. Although Herzberg's theory suggests that presence of motivators leads to satisfaction and absence of hygiene factors to dissatisfaction, the actual hygiene-motivation factors parallel those in Maslow's need hierarchy. Thus, for parsimony, our table shows McClelland's and Maslow's needs.

SDT identifies the needs for autonomy, competence, and relatedness while POT identifies the needs for effectance, self-identity, and having a place as innate human needs. As we discuss in the paper, we focus on the needs suggested by SDT and POT because they are universal in nature (rather than being acquired through one's life experiences) and because social media have affordances that can satisfy these psychological needs. As Table A1 shows, these needs map well to innate psychological needs encompassed in the other theoretical perspectives.

Table A1. Motivation–Needs Theories					
	ERG Theory (Alderfer 1972)	**Hierarchy of Needs (Maslow 1938)**	**Learned Needs Theory (McClelland 1987)**	**Self-Determination Theory (Deci and Ryan 1985)**	**Psychological Ownership Theory (Pierce et al. 2001)**
Nature of needs	Physiological/ psychological	Physiological/ psychological	Psychological	Psychological	Psychological
	Innate/learned	Innate/learned	Innate/learned	Innate	Innate
Mapping of needs across theories	Growth	Self-actualization	Achievement	Autonomy/ Competence	Self-identity/ Effectance
		Internal esteem			
	Relatedness	External esteem	Power	Relatedness	
		Love/belonging	Affiliation		
	Existence	Safety			Having a place
		Physiological			

References

Alderfer, C. P. 1972. *Existence, Relatedness, and Growth: Human Needs in Organizational Settings*, New York: Free Press.

Deci, E. L., and Ryan, R. M. 1985. *Intrinsic Motivation and Self-Determination in Human Behavior*, New York: Plenum Group.

Herzberg, F. 1959. *The Motivation to Work*, New York: John Wiley and Sons.

Maslow, A. H. 1943. "A Theory of Human Motivation," *Psychological Review* (50:4), pp. 370-96.

McClelland, D. 1987. *Human Motivation*, Cambridge, UK: Cambridge University Press.

Murray, H. A. 1938. *Explorations in Personality*, New York: Oxford University Press.

Pierce, J. L., Kostova, T., and Dirks, K. T. 2001. "Toward a Theory of Psychological Ownership in Organizations," *The Academy of Management Review* (26:2), pp. 298-310.

Appendix B

Review of Prior Research on Psychological Needs in the Social Media Context ▬

Table B1. Literature on Psychological Needs in the Social Media Context					
Study	**Objectives**	**Methods**	**Needs**	**Main Findings**	**Sample Items**
Kim et al. 2012	To develop a model to explain the intention to purchase digital items.	Survey	Desire for online self-presentation	The intention to purchase digital items is determined by the desire for online self-presentation.	• I want to establish a preferred image for myself in Cyworld/Habbo. • I want to present my image in Cyworld/Habbo.
Krasnova et al. 2010	To identify factors that influenced self-disclosure on a social networking site.	Survey	Self-presentation Relationship building	Convenience of maintaining and developing relationships and platform enjoyment motivate information disclosure.	• I try to make a good impression on others on the OSN. • The OSN helps me to expand my network.
Nadkarni and Hoffmann 2012	To identity factors that motivate Facebook use.	Literature Review	Need to belong Need for self-presentation	Facebook use is motivated by the need to belong and the need for self-presentation.	N.A.
Partala 2011	To identify how using Second Life satisfied needs.	Survey Case Study	Autonomy Competence Relatedness	Usage of Second Life is motivated by the need for relatedness.	• In Second Life I feel that my choices are based on my true interests and values. • In Second Life I feel that I am successfully completing difficult tasks and projects.
Sachdev 2011	To identify the psychological reasons of the use of Web 2.0 websites.	Survey	Autonomy Competence Relatedness	Fulfillments of the three needs motivate users to use Facebook and MySpace.	N.A.
Sheldon et al. 2011	To determine whether using Facebook helps people meet their relatedness needs.	Survey	Relatedness need satisfaction	More frequent Facebook usage paradoxically correlates with more relatedness satisfaction and more relatedness dissatisfaction.	• I felt a sense of contact with people who care for me, and for whom I care. • I felt close and connected with other people who are important to me. • I felt a strong sense of intimacy with the people I spent time with. • I felt unappreciated by one or more important people.
Xu et al. 2012	To identify the antecedents of online game addiction among adolescents.	Survey	Need for Advancement Need for Relationship	Need for relationship and need for escapism can motivate online game playing.	• It is important for me to level up my game character as fast as possible. • I often have interesting conversations with other online players.
Yee 2006	To develop a model of player motivations in online games.	Survey Components Analysis	Advancement Relationship	The analysis revealed ten motivations that grouped into achievement, social, and immersion components.	N.A.
Yoon and Rolland 2012	To identify the effect of perceived autonomy, competence, and relatedness on knowledge sharing in virtual communities.	Survey	Perceived autonomy Perceived relatedness Perceived competence	Perceived competence and perceived relatedness influence knowledge sharing behaviors.	* I have been able to provide useful knowledge in this virtual community. * I feel like I can pretty much be myself in this virtual community.

References

Kim, H. W., Chan, H. C., and Kankanhalli, A. 2012. "What Motivates People to Purchase Digital Items on Virtual Community Websites? The Desire for Online Self-Presentation," *Information Systems Research* (23:4), pp. 1232-1245.

Krasnova, H., Spiekermann, S., Koroleva, K., and Hildebrand, T. 2010. "Online Social Networks: Why We Disclose," *Journal of Information Technology* (25:2), pp. 109-125.

Nadkarni, A., and Hofmann, S. G. 2012. "Why do People Use Facebook?" *Personality and Individual Differences* (52:3), pp. 243-249.

Partala, T. 2011. "Psychological Needs and Virtual Worlds: Case Second Life," *International Journal of Human-Computer Studies* (69:12), pp. 787-800.

Sachdev, V. 2011. "Motivations for Social Computing," *IT Professional Magazine* (13:4), p. 18.

Sheldon, K. M., Abad, N., and Hinsch, C. 2011. "A Two-Process View of Facebook Use and Relatedness Need-Satisfaction: Disconnection Drives Use, and Connection Rewards It," *Journal of Personality and Social Psychology* (100:4), pp. 766-775.

Xu, Z., Turel, O., and Yuan, Y. 2012. "Online Game Addiction among Adolescents: Motivation and Prevention Factors," *European Journal of Information Systems* (21:3), pp. 321-340.

Yee, N., Ducheneaut, N., Nelson, L., and Likarish, P. 2011. "Introverted Elves & Conscientious Gnomes: The Expression of Personality in World of Warcraft," paper presented at the Annual Conference on Human Factors in Computing Systems, May 7-12, Vancouver, BC, Canada.

Yoon, C., and Rolland, E. 2012. "Knowledge-Sharing in Virtual Communities: Familiarity, Anonymity and Self-Determination Theory," *Behaviour & Information Technology* (31:11), pp. 1133-1143.

Appendix C

Two Polarities Models

Table C1. Two Polarities Models in Psychology		
Studies	**Polarities**	
Angyal 1951	***Autonomy*** refers to the wish to have a self-governed organismic process***.***	***Homonomy*** refers to the wish to be in harmony with a unit one regards as extending beyond one's individual self.
Bakan 1966	***Agency*** refers to an individual's striving to master the environment, to assert the self, to experience competence, achievement, and power.	***Communion*** refers to a person's desire to closely relate to, cooperate, and merge with others.
Beck 1983	***Autonomy*** refers to an individual's emphasis on individuality, self-reliance, and a sense of power to do what one wants.	***Sociotropy*** refers to an individual's emphasis on interpersonal interactions involving intimacy, sharing, empathy, understanding, approval, affection, protection, guidance, and help.
Blatt 1991	***Self-definition*** refers to the development of a realistic, essentially positive and increasingly integrated self-definition and self-identity.	***Interpersonal relatedness*** refers to the capacity to establish increasingly mature, reciprocal and satisfying interpersonal relationships.
Blatt 1995	***Introjective*** or ***self-definitional*** refers to the development of a consolidated, realistic, essentially positive, differentiated, and integrated self-identity.	***Anaclitic*** or ***relatedness*** refers to the development of the capacity to establish increasingly mature and mutually satisfying interpersonal relationships.
Bowen 1966	***Individuality*** or ***differentiating*** refers to the force that involves the impetus to define a separate self from others.	***Togetherness*** refers to the force that entails the pressure and desire to be like others, to agree on beliefs, principles, values, and feelings.
Freud 1930	***Egoistic*** refers to the urge toward happiness.	***Altruistic*** refers to the urge toward union with others in the community.
Hermans 1987	***S-motive*** refers to the striving for self-enhancement, i.e., self-maintenance and self-expansion.	***O-motive*** refers to the longing for contact and union with other people.
Mikulincer and Shaver 2007	***Attachment avoidance*** refers to a tendency to be uncomfortable with closeness, self-disclosure, feelings and expressions of vulnerability, and dependency.	***Attachment anxiety*** refers to the predisposition for an intense need to be close, accepted, supported, and reassured.

References

Angyal, A. 1951. *Neurosis and Treatment: A Holistic Theory*, New York: Wiley.
Bakan, D. 1966. *The Duality of Human Existence: An Essay on Psychology and Religion*, Chicago: Rand McNally.
Beck, A. T. 1983. "Cognitive Therapy of Depression: New Perspectives," in *Treatment of Depression: Old Controversies and New Approaches*, P. J. Clayton and J. E. Barrett (eds.), New York: Raven Press, pp. 265-290.
Blatt, S. J. 1991. "A Cognitive Morphology of Psychopathology," *Journal of Nervous and Mental Disease* (179), pp. 449-458.
Blatt, S. J. 1995. "The Destructiveness of Perfectionism: Implications for the Treatment of Depression," *American Psychologist* (50:12), pp. 1003-1020.
Bowen, M. 1966. "The Use of Family Theory in Clinical Practice," *Comprehensive Psychiatry* (7:5), pp. 345-374.
Freud, S. 1930. "Civilization and Its Discontents," in *The Standard Edition of the Complete Psychological Works of Sigmund Freud* (Vol. 21), J. Strachey (ed.), London: Hogarth Press, pp. 57-146.
Hermans, H. J. 1987. "The Dream in the Process of Valuation: A Method of Interpretation," *Journal of Personality and Social Psychology* (53:1), pp. 163-175.
Mikulincer, M., and Shaver, P. R. 2007. *Attachment in Adulthood: Structure, Dynamics and Change*, New York: Guilford Press.

Appendix D

Identifying Social Media Affordances

We generated a comprehensive set of social media affordances by following a three-step process: (1) a comprehensive review of the prior literature on social media affordances (Table D1), (2) synthesis of the literature (Table D2), and (3) triangulation by cross checking with major social media applications used in practice (Table D3). This process yielded a list of the 12 affordances shown in Table 2 in the main text. We describe these steps in detail below.

To start with, we engaged in a comprehensive review of prior literature that had identified affordances for different social media.[2] Our review identified 14 studies as listed in Table D1; among them 13 studies explicitly identified affordances, and one (Ma and Agarwal 2007) identified IT features for perceived identity verification on online communities, which we deemed to be relevant. Five of these studies identified affordances for virtual worlds (Davis et al. 2009; Goel et al. 2013; Junglas et al. 2013; Nardon and Allen 2012; Schultze 2010); two for online communities (Faraj et al. 2011; Ma and Agarwal 2007); two for social media in general (Halpern and Gibbs 2013; Kietzmann et al. 2011); one for social media in organizations (Treem and Leonardi 2012); one for social media for knowledge sharing in organizations (Majchzak et al. 2013); one for Wikipedia (Mesgari and Faraj 2012); one for geoportals (Sigala 2012); and one for the Internet in general (Wellman et al. 2003).

Then, we took several steps to synthesize these affordances to derive a set of distinct social media affordances. First, there were cases where the same affordance was labeled differently across studies. For instance, Mesgari and Faraj (2012) define *self-presentation* as "to create and demonstrate a personal image and identity" (p. 7) while the same affordance is labeled as *identity* by Kietzmann et al. (2011) and as *identifiability* by Halpern and Gibbs (2013). Second, some studies examine an affordance broadly and others in a more specific context. For instance, with respect to the *collaboration* affordance, Davis et al. (2009) describe that social media in general can afford users to work as a team, while Sigala (2012) focuses specifically on collaborating to plan a trip. Third, different studies capture distinct but different aspects of the same affordance or at different levels of abstraction. For example, the *self-presentation* affordance refers to the ability offered to users by social media to reveal and present information related to themselves (Mesgari and Faraj 2012). One aspect of this, in the context of virtual worlds, is the ability to create life-like avatars, an affordance identified as *rendering* by Davis et al. Another aspect of this is for the avatars to engage in practices of the body that express the user (e.g., sit, smile, dress appropriately) an affordance identified as *embodiment* by Schultze (2010). Yet another aspect of this in virtual worlds is *representation support* (Junglas et al. 2013). In virtual communities, one aspect of self-presentation is *persistent labeling* (e.g., screen names; Ma and Agarwal 2007). Fourth, some affordances were not necessarily *action* affordances (i.e., action possibilities) but rather *general* affordances (Gibson 1979; for a discussion, see Michaels 2003) where actions are absent. We removed these affordances from our list. For example, Treem and Leonardi (2012) identify *persistence*, the fact that in social media the contents are usually available to users and do not expire or disappear when the user logs out, as an affordance. Given that this does not indicate a direct action possibility by the user we removed this affordance, but used the spirit of the affordance (i.e., this can enable browsing

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[2]We used the term *affordance* as the keyword for our literature search of peer reviewed journal articles. We manually went through the search results and selected papers examining affordances in the context of social media. We also went through the references of the selected papers to identify other relevant prior studies that our search may have missed.

of others' content) to inform our final list of affordances. In summary, our approach to consolidation involved grouping similar affordances together and generating a set of affordances at a more abstract level such that affordances are not specific to one social medium but rather generalize across social media. Table D2 documents how we consolidated the affordances. This process resulted in 10 of the 12 social media affordances described in Table 2 in the main text.

Finally, we triangulated the list of affordances derived from our literature review by going through a list of 21 major social media applications spanning the six types of social media applications identified by Kaplan and Haenlein (2010): blogs, social networking sites, content communities, collaborative projects, virtual social worlds, and virtual game worlds. Our triangulation included the most popular websites and applications for each type. In addition, we added crowdsourcing sites as a new type of social media application not present in the Kaplan and Haenlein framework. To construct the list of most popular websites in each category, we started from Alexa.com's top 500 websites (based on global website traffic) and eliminated those that were not social media sites (e.g., Apple.com). We combined these with Wikipedia's[3] list of social networking sites and with Pew Research Center's list of top social media sites.[4] This resulted in 19 social media websites for the first 4 types of social media. Considering the popularity of Second Life and World of Warcraft, we selected these two applications as the representatives of virtual social worlds and virtual game worlds. For each social media application, we identified its salient features by (1) going through the website for the application and reading its vision and description; (2) using the application; (3) browsing the application's page on Wikipedia; and (4) reading previous literature discussing the features of the application. This resulted in a list of 140 features in total. Three of the authors then independently mapped each feature to the affordances we had identified to see if our affordances collectively accounted for these salient features (see Table D3 for the results of this mapping). The interrater reliability for this mapping across members of the research team was .916. The purpose of this triangulation is twofold. First, to verify whether the list of social media affordances we identified comprehensively covers salient affordances provided by the major social media applications on the market. Second, to examine the relevance of the affordances derived from the literature to today's social media. Our triangulation provided evidence in support of both objectives with two exceptions. We added a *competition* affordance and a *sourcing* affordance because the set of affordances we had identified from the literature did not sufficiently capture features of virtual game worlds and crowdsourcing sites. This whole procedure produced the list of 12 affordances shown in Table 2 in the main text.

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[3] https://en.wikipedia.org/wiki/List_of_social_networking_websites.

[4] http://www.pewinternet.org/2013/12/30/social-media-update-2013/ and http://www.pewinternet.org/2015/01/09/social-media-update-2014/.

Table D1. Descriptions of Social Media Affordances in Prior Studies		
Study	**Context**	**Social Media Affordances and Descriptions**
Davis et al. 2009	Virtual world	**Rendering:** users can create or execute life-like images. **Interactivity:** users can modify the contents, move around, and use contents in a social media setting. **Communication:** users can communicate with each other. **Team process:** users can collaborate with each other as a team to cocreate contents.
Faraj et al. 2011	Online community	Affordances for **Knowledge Collaboration:** **Reviewability**: users can view and manage the content of front and back narratives over time. **Recombinability**: users can borrow and build on each other's contributions. **Experimentation**: users can try out novel ideas or provide comments or rate the creativity, potential, and excitement of a posted idea
Goel et al. 2013	Virtual world	**Social perception:** users can generate the social perception of others as being in the same space. **Social awareness:** users can generate social awareness that one can understand and interact with others in the same space in a social sense.
Halpern and Gibbs 2013	Social media	**Identifiability**: the level of identifiability versus anonymity of a user. Users can have a public space on their profiles, where they share personal information, post links, and share personal videos or pictures openly. **Networked information access**: users can have greater information access to their social networks by being automatically notified about content updates and having immediate access to information posted by their contacts.
Junglas et al. 2013	Virtual world	**Activity support**: users can observe others' presence and their actions and reciprocate them appropriately. **Context support:** a person's sense about his or her situation or where he or she is in a virtual world environment; users can have a metaphorical sense of "place." **Representation support:** users can have a sense of the meaning of artifacts in a virtual world environment. **Insight support:** users can have a sense of what others mean when communicating in a virtual world.
Kietzmann et al. 2011	Social media	**Identity**: the extent to which users reveal themselves. **Presence**: the extent to which users know if others are available. **Relationships**: the extent to which users relate to each other. **Groups**: the extent to which users are ordered or form community. **Reputation**: the extent to which users know the social standing of others and content. **Sharing**: the extent to which users exchange, distribute and receive content. **Conversation**: the extent to which users communicate with each other.
Majchrzak et al. 2013	Social Media for Knowledge Sharing in Organizations	**Generative role taking**: users can engage in the online knowledge conversation by enacting patterned actions and taking on community-sustaining roles in order to maintain a productive dialogue among participants. **Meta-voicing**: users can engage in the ongoing online knowledge conversation by reacting online to others' presence, profiles, content and activities. **Triggered attending**: users can engage in the online knowledge conversation by remaining uninvolved in content production or the conversation until a timely automated alert informs the individual of a change to the specific content of interest. **Network-informed associating**: users can engage in the online knowledge conversation informed by relational and content ties.
Mesgari and Faraj 2012	Wikipedia	**Self-presentation:** users can create and demonstrate their personal image and identity. **Management**: users can organize the community and define how the job should be done. **Control**: users can observe the changes, others' behaviors, and their contributions. The control affordance provides a variety of possible actions such as watchlisting Wikipedia pages, checking for the previous versions of any page, protecting or unprotecting article pages, blocking or unblocking vandal users, etc. **Contribution:** users can add, remove, and edit every piece of information on the wiki. **Broadcasting**: users can circulate content or knowledge and share it with an appropriate number of audiences. **Collaboration:** users can cooperate and handle interdependent activities in the Wikipedia community.

Table D1. Descriptions of Social Media Affordances in Prior Studies (Continued)		
Study	**Context**	**Social Media Affordances and Descriptions**
Nardon and Aten 2012	Virtual world in organizations	**Interaction:** users can interact with other people, places and real or imagined situations. **Presence:** users can "feel" as if they are there with the other participants. **Rendering:** users can create avatars and virtual places that closely resemble real life.
Schultze 2010	Virtual world	**Embodiment:** users can engage in practicing embodiment (e.g., sit, smile, and dress appropriately). **Presence:** users can have the sense of others' existing in a given setting.
Sigala 2012	Geoportals	**Collaboration**: users can collaborate to plan a trip through collaborative exploration, collaborative synthesis/review, collaborative analysis and collaborative presentation.
Treem and Leonardi 2012	Social media in organizations	**Visibility:** social media afford users the ability to make their profiles, behaviors, knowledge, preferences, postings, and network connections visible to others. **Persistence:** in social media, the contents are usually available to users and do not expire or disappear when the poster logs out. **Editability:** in social media, individuals can spend time and effort crafting and re-crafting a communicative act before it is viewed by others. **Association:** social media can help individuals to establish connections between each other, between contents, and between an actor and a presentation.
Wellman et al. 2003	Internet	**Broader bandwidth:** on the Internet, users can go from sending short, simple text messages to posting and sending political manifestos, images, graphics, and videos. **Always connected:** on Internet, communication can be sent immediately and easily. **Personalization:** on Internet, users have control over the sources people want to get messages from, when, and about what. **Wireless portability:** wireless connectivity enables telephone and Internet access anywhere and on the go. **Globalized connectivity:** Internet facilitates transnational connectivity.

Table D2. Synthesis of Prior Literature on Social Media Affordances

No.	Affordances	Davis et al. 2009	Faraj et al. 2011	Goel et al. 2013	Halpern and Gibbs 2013	Junglas et al. 2013	Kietzmann et al. 2011	Ma and Agarwal 2007
1	Self-presentation	Rendering			Identifiability	Representation support	Identity	Self-presentation Persistent labeling
2	Content Sharing						Sharing	
3	Interactivity	Interactivity						
4	Presence Signaling			Social perception		Context support	Presence	Virtual co-presence
5	Relationship Formation						Relationships Groups	
6	Group Management						Groups	
7	Browsing Others' Content	Information processing			Networked information access		Sharing	
8	Meta-voicing		Experimentation				Reputation	
9	Communication	Communication		Social awareness		Activity support	Conversations	
10	Collaboration	Team process	Recombinability Reviewability Experimentation			Insight support		
11	Competition							
12	Sourcing							

No.	Affordances	Majchrzak et al. 2013	Mesgari and Faraj 2012	Nardon and Aten 2012	Schultze 2010	Sigala 2012	Treem and Leonardi 2012	Wellman et al. 2003
1	Self-presentation	Generative role taking	Self-presentation	Rendering	Embodiment			
2	Content Sharing		Contribution Broadcasting				Editability Visibility	Broader bandwidth
3	Interactivity							
4	Presence Signaling			Presence	Presence			
5	Relationship Formation						Association	
6	Group Management		Management					
7	Browsing Others' Content	Triggered attending	Control				Visibility	Personalization
8	Meta-voicing	Meta-voicing						
9	Communication			Interaction				Connected Personalization Wireless portability Globalized connectivity
10	Collaboration	Network-informed associating	Collaboration			Collaboration		
11	Competition							
12	Sourcing							

Table D3. Mapping of Popular Social Media Applications Features to Social Media Affordances																
				Affordances												
Types	Applications	Descriptions	Main Features	1	2	3	4	5	6	7	8	9	10	11	12
Blog	LiveJournal	LiveJournal, is a weblogs service where Internet users can keep a blog, journal or diary.	browsing							✓					
			commenting								✓				
			friending					✓							
			joining and creating communities					✓	✓						
			personal message									✓			
			posting blogs	✓	✓										
			profile pages	✓											
			tagging blogs									✓			
	Xanga	Xanga is a website that hosts weblogs, photoblogs, and social networking profiles.	browsing							✓					
			commenting								✓				
			following					✓							
			posting blogs	✓	✓										
			profile pages	✓											
	Blogster	Blogster is a blogging community that features specific-interest blogs.	browsing							✓					
			commenting								✓				
			friending					✓							
			joining and creating communities					✓							
			personal message									✓			
			posting blogs	✓	✓										
			profile pages	✓											
			rating								✓				
Social Networking Site	Facebook	Facebook is an online social networking service.	browsing other people's albums							✓					
			chatting									✓			
			commenting								✓				
			friending					✓							
			liking								✓				
			sharing links of contents		✓										
			sharing my own photos	✓											
			sharing my own videos	✓											
			tagging photos								✓				
			updating my geographic location	✓											
			updating my new status	✓											
			watching videos shared by others							✓					
	Twitter	Twitter is an online social networking service that enables users to send and read short 140-character messages called "tweets."	following					✓							
			liking								✓				
			posting tweets	✓	✓										
			profile pages	✓											
			reading tweets							✓					
			retweet		✓						✓				
			twitter polls									✓			
	LinkedIn	LinkedIn is a business-oriented social networking service.	congratulate								✓				
			connections					✓							
			get introduced					✓							
			join a group					✓							
			news "signals"				✓								
			profile pages	✓											
			recommendations								✓				
			who has visited								✓				

Types	Applications	Descriptions	Main Features	Affordances											
				1	2	3	4	5	6	7	8	9	10	11	12
Social Networking Site	Pinterest	Pinterest is a web and mobile application that offers a visual discovery, collection, sharing, and storage tool.	browsing							✓					
			commenting								✓				
			following					✓							
			liking								✓				
			personal message									✓			
			uploading pins	✓	✓										
	Tumblr	Tumblr is a micro-blogging platform and social networking website.	browsing							✓					
			chatting									✓			
			commenting								✓				
			following					✓							
			liking								✓				
			posting microblogs	✓	✓										
			reblogging		✓						✓				
			tagging microblogs								✓				
	Myspace	Myspace is a social networking service with a strong music emphasis.	connections					✓							
			listening to music							✓					
			personal message								✓				
			uploading songs/videos	✓	✓										
			watching videos							✓					
	Google+	Google+ is a social networking and identity service	browsing							✓					
			commenting								✓				
			conversation									✓			
			friending					✓	✓						
			liking								✓				
			posting contents	✓	✓										
			profile pages	✓											
			sharing links of contents		✓										
Collaborative Project	Wikipedia	Wikipedia is a free-access, free-content Internet encyclopedia. Anyone who can access the site can edit almost any of its articles.	adding, deleting, editing content										✓		
			article discussion page										✓		
			browsing						✓						
			history pages										✓		
			page protection										✓		
			user blocking										✓		
			user talk page									✓			
			village pump						✓				✓		
			voting features						✓		✓		✓		
			watchlist										✓		
	Yelp, Inc.	Yelp publishes crowd-sourced reviews about local businesses.	browsing							✓					
			connecting								✓				
			friending					✓							
			personal message									✓			
			posting reviews	✓											
			profile pages	✓											
			rating system								✓				
	Wikispecies	Wikispecies is a wiki-based online project aimed at creating a catalogue of all species.	editing content									✓			
			personal message								✓				
			reading						✓						

Table D3. Mapping of Popular Social Media Applications Features to Social Media Affordances (Continued)

Table D3. Mapping of Popular Social Media Applications Features to Social Media Affordances (Continued)																
Types	**Applications**	**Descriptions**	**Main Features**	**Affordances**											
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Content Community	YouTube	YouTube is a video-sharing website.	commenting								✓				
			liking								✓				
			subscribing					✓		✓					
			uploading videos	✓	✓										
			watching videos							✓					
	Instagram	Instagram is an online photo-sharing, video-sharing, and social networking service.	browsing							✓					
			following					✓							
			geotag images	✓	✓										
			leaving comments								✓				
			liking								✓				
			uploading images	✓	✓										
			web profiles	✓											
	Imgur	Imgur is an online image hosting service.	browsing							✓					
			commenting								✓				
			liking								✓				
			meme generator	✓	✓										
			tagging images								✓				
			uploading images	✓	✓										
	Flickr	Flickr is an image hosting and video hosting website.	browsing							✓					
			commenting								✓				
			following					✓							
			group					✓							
			liking								✓				
			uploading images	✓	✓										
Virtual Social World	Second Life	Second Life is an online virtual world.	building/creating			✓							✓	✓	
			chatting									✓			
			creating avatars	✓											
			group					✓	✓						
			meeting others					✓							
			moving around			✓	✓								
			trading											✓	
Virtual Game World	World of Warcraft	World of Warcraft (WoW) is a massively multiplayer online role-playing game (MMORPG) in which a very large number of players interact with one another within a virtual world.	achievement system								✓			✓	
			building/creating			✓							✓	✓	
			chatting									✓			
			completing tasks										✓	✓	
			creating a character	✓											
			guild					✓	✓						
			moving around			✓	✓								
			progression	✓										✓	
			trading											✓	
Crowdsourcing Platforms	CouchSurfing	CouchSurfing is a hospitality exchange and social networking website.	joining a group					✓							
			joining an event					✓							
			offering a couch												✓
	InnoCentive	InnoCentive is a crowdsourcing platform.	posting a problem												✓
			solving a problem												✓

Notes: 1 = Self-presentation, 2 = Content Sharing, 3 = Interactivity, 4 = Presence Signaling, 5 = Relationship Formation, 6 = Group Management, 7 = Browsing Others' Content, 8 = Meta-voicing, 9 = Communication, 10 = Collaboration, 11 = Competition, 12 = Sourcing

References

Davis, A., Murphy, J., Owens, D., Khazanchi, D., and Zigurs, I. 2009. "Avatars, People, and Virtual Worlds: Foundations for Research in Metaverses," *Journal of the Association for Information Systems* (10:2), pp. 91-117.

Faraj, S., Jarvenpaa, S. L. and Majchrzak, A. 2011. "Knowledge Collaboration in Online Communities," *Organization Science* (22:5), pp. 1224-1239.

Gibson, J. J. 1979. *The Ecological Approach to Visual Perception*, Boston: Houghton Mifflin.

Goel, L., Johnson, N., Junglas, I., and Ives, B. 2013. "Predicting Users' Return to Virtual Worlds: A Social Perspective," *Information Systems Journal* (23:1), pp. 35-63.

Halpern, D., and Gibbs, J. 2013. "Social Media as a Catalyst for Online Deliberation? Exploring the Affordances of Facebook and YouTube for Political Expression," *Computers in Human Behavior* (29:3), pp. 1159-1168.

Junglas, I., Goel, L., Abraham, C., and Ives, B. 2013. "The Social Component of Information Systems—How Sociability Contributes to Technology Acceptance," *Journal of the Association for Information Systems* (14:10), pp. 585-616.

Kaplan, A. M., and Haenlein, M. 2010. "Users of the World, Unite! The Challenges and Opportunities of Social Media," *Business Horizons* (51:3), pp. 59-68.

Kietzmann, J. H., Hermkens, K., McCarthy, I. P., and Silvestre, B. S. 2011. "Social Media? Get Serious! Understanding the Functional Building Blocks of Social Media," *Business Horizons* (54:3), pp. 241-251.

Ma, M., and Agarwal, R. 2007. "Through a Glass Darkly: Information Technology Design, Identity Verification, and Knowledge Contribution in Online Communities," *Information Systems Research* (18:1), pp. 42-67.

Majchrzak, A., Faraj, S., Kane, G. C., and Azad, B. 2013. "The Contradictory Influence of Social Media Affordances on Online Communal Knowledge Sharing," *Journal of Computer Mediated Communication* (19:1), pp. 38-55.

Mesgari, M., and Faraj, S. 2012. "Technology Affordances: The Case of Wikipedia," Paper 13 in *Proceedings of the 18th Americas Conference on Information Systems*, Seattle, WA.

Michaels, C. F. 2003. "Affordances: Four Points of Debate," *Ecological Psychology* (15:2), pp. 135-148.

Nardon, L., and Aten, K. 2012. "Valuing Virtual Worlds: The Role of Categorization in Technology Assessment," *Journal of the Association for Information Systems* (13:10), pp. 772-796.

Schultze, U. 2010. "Embodiment and Presence in Virtual Worlds: A Review," *Journal of Information Technology* (25:4), pp. 434-449.

Sigala, M. 2012. "The Impact of Geocollaborative Portals on Group Decision Making for Trip Planning," *European Journal of Information Systems* (21:4), pp. 404-426.

Treem, J. W., and Leonardi, P. M. 2012. "Social Media Use in Organizations: Exploring the Affordances of Visibility, Editability, Persistence, and Association," *Communication Yearbook* (36:1), pp. 143-189.

Wellman, B., Quan-Haase, A., Boase, J., Chen, W., Hampton, K., Díaz, I., and Miyata, K. 2003. "The Social Affordances of the Internet for Networked Individualism," *Journal of Computer-Mediated Communication* (8:3).

Appendix E

A Brief Discussion on Why Some Psychological Needs Are Not Fulfilled by Certain Affordances

As shown in our propositions (also see Table 3 in the main text), each psychological need is fulfilled by some, but not all, affordances. We provide brief explanations for instances where a psychological need is not fulfilled by a specific affordance (that is, for all empty cells in Table 3).

The need for *autonomy* refers to people's desire to engage in activities not because one should or must (e.g., because of social pressures, norms, or obligation) but rather volitionally because one freely chooses to. Not all social media affordances can support this. For some actions on social media, users must comply with rules (e.g., how to manage group, how to compete) and restrictions (e.g., how to move around and signal presence in virtual worlds). For some other actions, there may exist social pressures and norms (e.g., clicking "like" on a post) and users may need to compromise with others' suggestions (e.g., discussing topics that others want in a conversation, taking others' suggestions during collaborations). As a result, we did not map the need for autonomy to the affordances of presence signaling, group management, competition, meta-voicing, communication, and collaboration.

The need for *competence* refers to people's desire to achieve the feeling of competence and effectance in action by applying and honing their skills. Therefore, people seek challenges that are optimal for their capacities in the context of social media. Affordances that cannot provide optimal challenge for the individual to conquer (i.e., self-presentation, content sharing, browsing others' content, interactivity, presence signaling, relationship formation, and communication) cannot fulfill the need for competence. As we state in the paper, showing off competence by posting a video, for example, that shows how one has conquered a challenge (e.g., climbing a mountain), or posting about the acceptance of one's paper in a top journal, or posting a tutorial about some statistical technique does not satisfy the need for competence. Doing these things (climbing, revising the paper, putting together the tutorial) does. Posting these is an example of self-presentation and fulfills the need for expression of self-identity, not competence.

In the context of social media, the need for *having a place* refers to people's desire to possess a virtual territory. As indicated in Table 3 in the main text, affordances that focus on interpersonal interactions (that is, allocentric affordances) cannot fulfill the need; rather, it is those affordances that engage users in personalizing their surroundings (i.e., interactivity such as creating furnishings, self-presentation such as profile page and posting own pictures, and content sharing such as posting videos on my blog) that can fulfill the need. As a result, we do not map the need for having a place as being satisfied by any of the allocentric affordances.

The need for *relatedness* refers to people's desire to develop interpersonal relationships. As such, affordances that do not focus on forming and developing interpersonal relationships cannot fulfill the need. For example, content sharing focuses on the distribution of content, interactivity focuses on interactions with the external virtual environment, and competition and sourcing focus on completing tasks. The *primary* focus of these affordances is not developing interpersonal relationships, that is, users do not use these affordances aiming to relate to others in the way they use relationship formation, presence signaling, or communication affordances, which aim to relate to others. For example, the purpose of posting content on YouTube may not necessarily be to relate to other people. Although it is possible that other features and affordances of the social media platform may interact with content sharing to satisfy the need for relatedness, this is not the primary purpose of the content sharing affordance. The same reasoning can be applied to other affordances such as interactivity, competition, and sourcing. That is, through these affordances, individual users do not fulfill their need to develop interpersonal relationships, although these affordances can interact with other features and affordances of the platform to enable this as a by-product. Therefore, they are unlikely to fulfill the need for relatedness.

Finally, the need for self-identity refers to people's desire to have a clear sense of self-appraisal of their physical, cognitive, and emotional attributes, personality traits, and social roles. Thus, affordances that have nothing to do with appraising, communicating, and sharing of self-identity cannot fulfill the need. For example, moving around in a virtual world (interactivity) and signaling one's presence do not directly help satisfy one's need for self-identity. The primary purpose of group management activities is not identity related in that the purpose of these activities are neither to discover the self nor to express self-identity. On crowdfunding (more broadly crowdsourcing) platforms, the primary goal of projectors is to obtain the needed funds and the primary goal of backers is to obtain expected returns, both of which are economic-oriented rather than identity-related goals (Agrawal et al. 2014; Kleemann et al. 2008). In practice, backers may even be concerned about releasing their individual information because it can include sensitive elements related to real personal identity and financial information. Some platforms provide features that allow backers to remain anonymous to mitigate such concerns (Burtch et al. 2015). We thus do not expect that the sourcing affordance will fulfill the need for self-identity.

Some other affordances satisfy some self-identity sub-dimensions but not others. In terms of *maintaining continuity of self-identity*, any affordance that does not allow storage of self-identity expression through time does not fulfill this need. In terms of *coming to know the self*, we did not posit any relationships with affordances that did not allow for reflected appraisals, social comparison, or understanding the self through exploration of one's environment. Finally, the *need for expressing self-identity* cannot be fulfilled with affordances that do not allow for expression of the self. As a result, we omitted links to these affordances.

References

Agrawal, A. K., Catalini, C., and Goldfarb, A. 2014, "Some Simple Economics of Crowdfunding," *Innovation Policy and the Economics* (14:1), pp. 63-97.

Burtch, G., Ghose, A., and Wattal, S. 2015. "The Hidden Cost of Accommodating Crowdfunder Privacy Preferences: A Randomized Field Experiment," *Management Science* (61:5), pp. 949-962.

Kleemann, F., Voß, G. G., and Rieder, K. 2008. "Un(der) Paid Innovators: The Commercial Utilization of Consumer Work through Crowdsourcing," *Science, Technology & Innovation Studies* (4:1), p. 5.

Appendix F

Empirical Study in the Context of Facebook ▮▮▮▮▮▮▮▮▮▮

We conducted an empirical study in the context of Facebook to illustrate the use of the NAF perspective. Below we report details of the model development, empirical method, and results.

A NAF Model for Facebook

We took three steps to develop a NAF model for Facebook. First, as we have discussed, to identify what psychological needs motivate use of a specific social media application, one has to identify the social media affordances provided by the social medium. To identify the salient affordances provided by Facebook, we started with Facebook's mission: "Facebook's mission is to give people the power to share and make the world more open and connected. People use Facebook to stay connected with friends and family, to discover what's going on in the world, and to share and express what matters to them."[5] This suggests that self-presentation, content sharing, browsing others' content, relationship formation, and communication are salient affordances. Second, given that affordances are provided through specific features (Leonardi 2011), we selected the most popular features of Facebook based on a synthesis of relevant research (e.g., Hughes et al. 2012; Kietzmann et al. 2011; Tong et al. 2008; Zhao et al. 2008). We then asked five social media researchers (four faculty and a doctoral student) to map these features to the 12 social media affordances listed in Table 2 in the main text. Table F1 shows the result of the mapping (the raw agreement was 0.97). The only other affordance included by the raters was meta-voicing. As such, the salient social media affordances provided by Facebook are *self-presentation, content sharing, relationship formation, browsing others' content, meta-voicing,* and *communication*. Third, given these salient Facebook affordances, we used our propositions (also Table 3 in the main text) to predict which psychological needs motivate use of Facebook in general (Figure F1) and which psychological needs motivate use of specific Facebook affordances (Figure F2). This resulted in testable models shown in Figures F1 and F2.

Table F1. Mapping of Facebook Features to Facebook Affordances						
Facebook Features	**1**	**2**	**3**	**4**	**5**	**6**
Updating my geographic locations	✓					
Sharing my own videos	✓					
Watching videos shared by others				✓		
Leaving comments for other people					✓	
Updating my new status	✓					
Liking what others have posted					✓	
Friending			✓			
Sharing my own photos	✓					
Browsing other people's albums				✓		
Chatting						✓
Sharing links of videos, photos, or blogs with others		✓				

Notes: 1 = Self-presentation; 2 = Content Sharing; 3 = Relationship Formation; 4 = Browsing Others' Content; 5 = Meta-voicing; 6 = Communication

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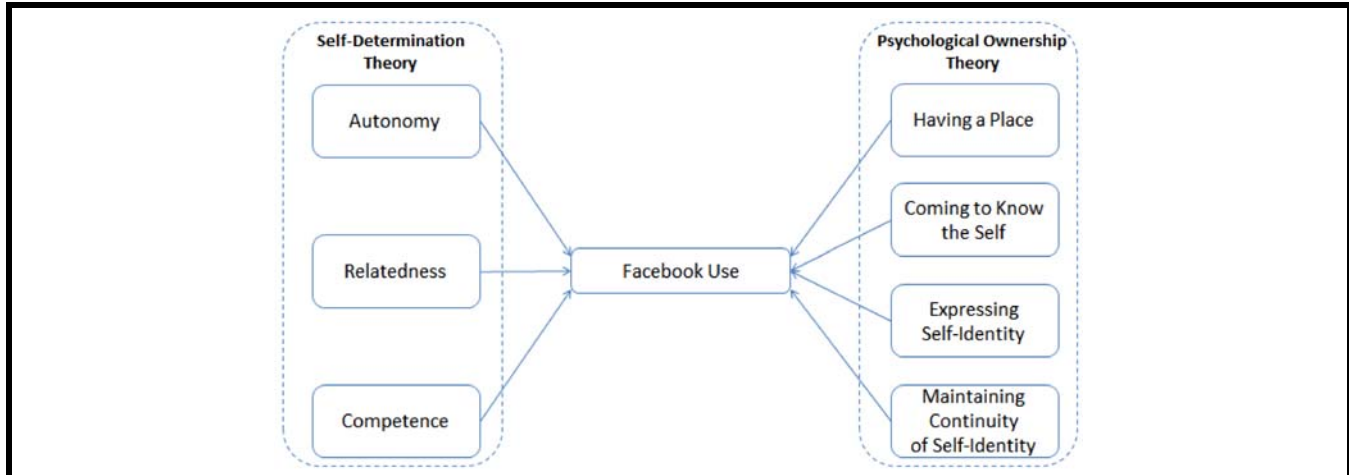[5]https://www.facebook.com/facebook/info?tab=page_info.

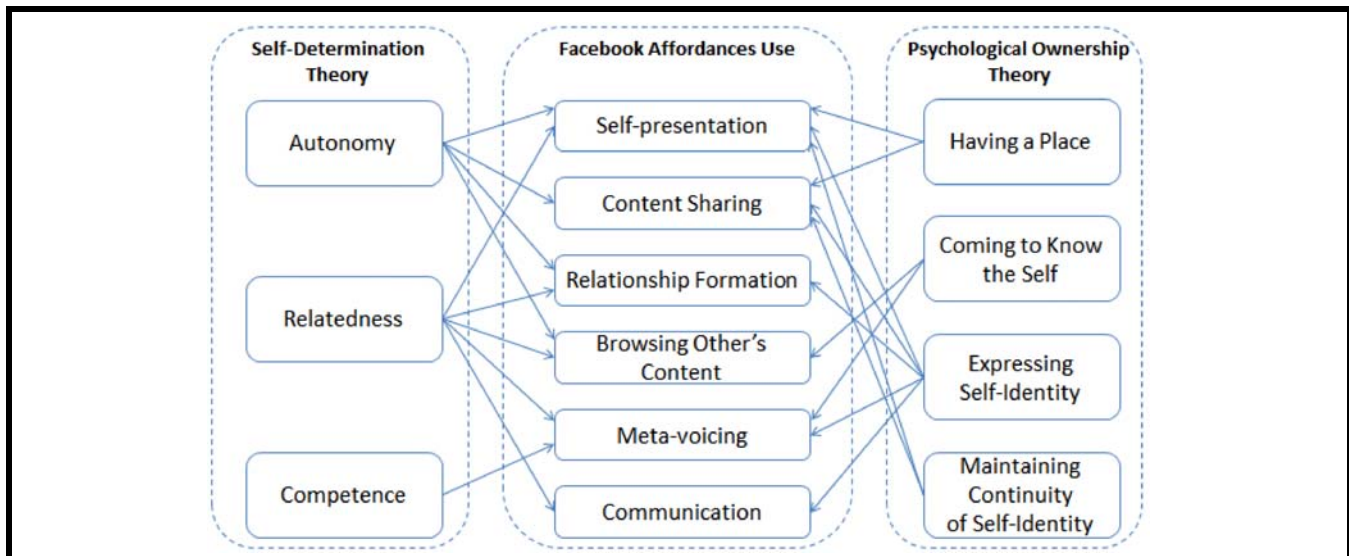**Figure F1. NAF Model for Facebook Use**

Figure F2. NAF Model for Facebook Affordances Use

Data and Sample

To test the model, we collected data through a longitudinal online survey. We used a market research firm (eSearch) to survey a broad range of individuals about their psychological needs and their use of Facebook features. To control for common methods bias, we created temporal separation between the measurement of psychological needs (independent variables) and use of Facebook features (dependent variables) (Podsakoff et al. 2003). The first questionnaire (wave 1) collected data on psychological needs. Four weeks later, individuals who completed the first questionnaire were sent a second questionnaire (wave 2) that measured Facebook use. In total, 302 individuals accessed our first survey and 240 of these completed it. Of the 240 individuals who completed the first questionnaire, 151 provided us with an identifier that enabled us to send them a second questionnaire.[6] Of these, 110 respondents completed the second questionnaire, which constitutes our final sample.

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[6]The respondents were not aware that a follow-up questionnaire was going to be sent. The identifier provided was an eSearch identifier and the respondents knew via the consent letter that their responses were anonymous to the researchers. Therefore, whether or not they provided an identifier was not linked to not wanting to participate in a follow up questionnaire (since they did not know it was coming) or to our being able to tie responses to respondents, since this was anonymous to us.

We assessed the representativeness of our sample by comparing it with the population of U.S. Internet users (Table F2) and with the eSearch panel, our sampling frame (Table F3). We also compared earlier and later respondents (Table F4). Table F5 presents the descriptive statistics of use of Facebook features by our sample (five-point Likert scale).

Table F2. Demographics of Participants and Comparison with U.S. Internet Users (N = 3946 for eSearch Panel, N = 240 for Wave 1, N = 110 for Wave 2)

Variable	Category	Frequency (%)			
		e-Search Panel	Wave 1	Wave 2 (Final Sample)	U.S. Census Bureau[a] (N = 231276*)
Gender	Male	1977 (50.1)	119 (49.6)	55 (50.0)	143780 (49.0)
	Female	1969 (49.9)	121 (50.4)	55 (50.0)	149634 (51.0)
Age	18-34	1441 (36.5)	65 (27.1)	26 (23.6)	71210 (30.8)
	35-44	540 (13.7)	34 (14.2)	12 (10.9)	39478 (17.1)
	45-64	1459 (37.0)	101 (42.1)	51 (46.4)	80947 (35.0)
	Above 65	506 (12.8)	40 (16.7)	21 (19.1)	39641 (17.1)
Internet experience (years)		Mean (S.D.)			
		Panel	Wave 1	Wave 2	U.S. Census Bureau
		N/A	14.2 (4.2)	14.8 (5.6)	N/A

[a]http://www.census.gov/hhes/computer/

Table F3. Sample Comparisons with eSearch Panel (N = 3946 for eSearch Panel, N = 240 for Wave 1, N = 110 for Wave 2)

	Panel Mean (S.D.)	W1 Mean (S.D.)	W2 Mean (S.D.)	Panel vs. W1	Panel vs. W2	W1 vs. W2
Gender	0.50 (0.50)	0.50 (0.50)	0.50 (0.50)	t = 0.054 [n.s.]	t = 0.061 [n.s.]	t = 0.047 [n.s.]
Age	45.12 (17.21)	50.10 (16.70)	49.40 (16.48)	t = 0.723 [sig.]	t = 0.820 [n.s.]	t = 0.345 [n.s.]
Internet experience	N/A	14.4 (5.0)	14.8 (5.6)	N/A	N/A	t = 0.682 [n.s.]

Notes: sig. = significant; n.s. = not significant; W1 = Wave1, W2 = Wave 2

Table F4. Assessment of Non-Response Bias (N = 94 for Early Respondents, N = 16 for Late Respondents)

	Early Respondents Mean (S.D.)	Late Respondents Mean (S.D.)	Early vs. Late
Gender	0.50 (0.50)	0.50 (0.52)	t = 0.001 [n.s.]
Age	49.22 (16.34)	50.44 (17.82)	t = 0.271 [n.s.]
Internet experience	14.8 (5.6)	15.1 (6.1)	t = 0.197 [n.s.]

Notes: n.s. = not significant

The table presents t-tests on demographics. T-tests on constructs of the study were also nonsignificant.

Table F5. Descriptive Statistics of Use of Facebook Features			
Facebook Features	**Min/Max**	**Mean**	**Std.**
Updating my geographic locations	1.00/4.00	1.43	0.70
Sharing my own videos	1.00/5.00	1.46	0.88
Watching videos shared by others	1.00/5.00	2.46	1.27
Leaving comments for other people	1.00/5.00	3.16	1.17
Updating my new status	1.00/5.00	2.51	1.15
Liking what others have posted	1.00/5.00	3.29	1.27
Friending	1.00/5.00	2.87	0.93
Sharing my own photos	1.00/5.00	2.55	1.22
Browsing other people's albums	1.00/5.00	3.18	1.15
Chatting	1.00/5.00	2.16	1.06
Sharing links of videos, photos, or blogs with others	1.00/5.00	2.30	1.18

Measurement Model

We developed multi-item scales to measure our model constructs. Table F6 presents our scale items. We used covariance-based structural equation modeling in AMOS to test the measurement model. The fit statistics for the measurement model ($\chi^2 = 330.335$, df = 164, χ^2/df = 2.01, RMR = 0.13, GFI = 0.79, NFI = 0.84, CFI = 0.91, RMSEA = 0.10) indicate acceptable fit. Further, as shown in Table F7 and Table F8, the scales exhibit good reliability (composite reliabilities range from .855 to .948), good convergent validity (all item loadings are above .707 and the AVE is greater than .5 for all constructs), and good discriminant validity (AVE greater than inter-construct correlations).

Table F6. Scale Items		
Construct	**Abbr.**	**Items**
Psychological Needs[*]		
Autonomy	A	I need to be able to decide for myself how to live my life. I need to be able to freely voice my ideas and opinions. In my daily life, I have the need to act freely.
Relatedness	R	I feel the need to socially interact with people. I feel the need to have a lot of social contacts. I feel the need to develop friendships with people I regularly interact with. I feel the need to be close to many people.
Competence	C	I need to feel competent. I need to feel capable in what I do. I need to have opportunities to show how capable I am.
Having a place	HP	I need to have a safe and secure place like home. I need places that feel like home to me.
Coming to know the self	CK	I feel a need to develop a sense of self-identity. I feel a need to discover what kind of person I am. I feel a need to learn about myself.
Expressing self-identity	ES	I feel a need to express who I am. I feel a need to express my personality. I feel a need to express my self-identity.
Maintaining continuity of self-identity	MC	I have a need that who I am today also incorporates my past. I have a need that my past be an important part of my self-identity. I feel a need that who I am today does not ignore my past.
[*]All needs items were measured on a 7-point scale: 1 = strongly disagree and 7 = strongly agree.		
Use of Facebook Features[#]		
		Please indicate the extent to which you use each of the following Facebook features
Frequency of use of Facebook (aggregate of use across features)	F1	Updating my geographic locations
	F2	Sharing my own videos
	F3	Watching videos shared by others
	F4	Leaving comments for other people
	F5	Updating my new status
	F6	Liking what others have posted
	F7	Friending
	F8	Sharing my own photos
	F9	Browsing other people's albums
	F10	Chatting
	F11	Sharing links of videos, photos, or blogs with others
[#]All use items were measured on a 5-point scale: 1 = never and 5 = very often.		

Table F7. Summary Statistics			Correlation Matrix						
	Constructs	**Mean (S.D.)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Self-Determination	(1) A	5.56 (1.13)	.82						
	(2) R	4.14 (1.35)	.43***	.83					
	(3) C	5.25 (1.18)	.79***	.41***	.85				
Psychological Ownership	(4) HP	5.82 (1.02)	.56***	.18	.64***	.91			
	(5) CK	4.01 (1.43)	.51***	.50***	.75***	.34**	.81		
	(6) ES	4.71 (1.49)	.60***	.57***	.72***	.38***	.67***	.93	
	(7) MC	5.15 (1.18)	.76***	.36**	.62***	.48***	.34**	.63***	.84

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

A = autonomy; R = relatedness; C = competence; HP = having a place; CK = coming to know the self; ES = expressing self-identity; MC = maintaining continuity of self-identity.

The diagonal elements represent the square root of the AVE.

Table F8. Measurement Model Results					
Constructs	**Items**	**Loadings**	**Cronbach's Alpha**	**Composite Reliability**	**Average Variance Extracted**
Autonomy	A1	0.842	0.855	0.860	0.674
	A2	0.885			
	A3	0.728			
Relatedness	R1	0.836	0.894	0.895	0.681
	R2	0.863			
	R3	0.757			
	R4	0.840			
Competence	C1	0.890	0.873	0.882	0.715
	C2	0.885			
	C3	0.755			
Having a place	HP1	0.961	0.897	0.902	0.822
	HP2	0.849			
Coming to know the self	CK1	0.830	0.853	0.855	0.664
	CK2	0.856			
	CK3	0.755			
Expressing self-identity	ES1	0.859	0.946	0.948	0.859
	ES2	0.964			
	ES3	0.953			
Maintaining continuity of self-identity	MC1	0.807	0.869	0.876	0.704
	MC2	0.749			
	MC3	0.948			

Results of Hypotheses Testing

First, we tested the NAF model for Facebook use by running regressions. Facebook use was measured as an aggregate of feature use. The advantage of an aggregate measure is that random noise in individual measures can be averaged out (Fichman 2001). The results are shown in Table F9. Second, we tested a NAF model of use of Facebook affordances. For this model, our dependent variables are affordances' usage

determined by aggregating use of Facebook features grouped by the affordance they provide. This provides a test of our mapping of psychological needs to affordances as per Table 3 in the main text. We used seemingly unrelated regression (SUR) (Zellner 1962) for this analysis because our dependent variables, use of different affordances, may be correlated. This is because individuals' use of different features may co-vary due to individual characteristics, such as personal interests. In addition, due to the limitation of one's time and cognitive resources, it is possible that the use of a particular feature reduces the time one can allocate to others. Thus, it is appropriate to use SUR since it correlates regression error terms across a set of regression equations. The SUR results of this analysis are shown in Table F10. Both regressions include the control variables of age, gender, and Internet experience for the following reasons. Although SDT posits the same innate needs for males and females, research alludes to possible societal influences that may make different needs more salient for each gender (for a discussion, see Deci and Ryan 1985). Furthermore, age, gender, and Internet experience have been found as significant demographic influences in models that examine technology use (e.g., Venkatesh el al. 2003).

Table F9. Regression Results (N = 110)	
	Facebook Use[#]
Psychological Needs	
Autonomy	.295[*] (.131)
Relatedness	.221[*] (.101)
Competence	-.210 (.154)
Having a Place	-.055 (.110)
Coming to Know the Self	.020 (.124)
Expressing Self-Identity	.322[*] (.140)
Maintaining Continuity of Self-Identity	.055 (.120)
Controls	
Age	-.114 (.098)
Gender	.186[*] (.093)
Internet Experience	.083 (.098)
R²	.401
Adjusted R²	.337

Notes: [*]$p < 0.05$; [#]betas (standard errors); Gender: 0 = Male, 1 = Female

We have two high-level observations: each of the Facebook affordances is related to fulfilling some psychological needs, and the salient psychological needs that are use drivers in the Facebook context are *autonomy*, *relatedness*, and *expressing self-identity*. A detailed discussion follows.

Table F10. SUR Results (N = 110)						
	Self-presentation	**Content Sharing**	**Relationship Formation**	**Browsing Others' Content**	**Meta-voicing**	**Communication**
Psychological Needs						
A	.061 (.088)	-.098 (.102)	.130 (.088)	.181[*] (.092)		
R	.172 (.090)		.197[*] (.099)	.137 (.092)	.123 (.093)	.293[**] (.091)
C					-.043 (.097)	
HP	-.119 (.071)	-.155 (.087)				
CK				.133 (.094)	.031 (.090)	
ES	.356[***] (.107)	.403[***] (.106)	.091 (.109)		.231[*] (.114)	.082 (.096)
MC	-.138 (.083)	.114 (.101)				
Controls						
Age	-.038 (0.95)	-.090 (.093)	.065 (.097)	-.117 (.098)	.070 (0.96)	-.151 (.093)
Gender	.164 (.093)	.261[**] (.091)	-.006 (.093)	.224[*] (.088)	.256[**] (.091)	.124 (.090
IE	.063 (.099)	-.033(.097)	-.009 (.099)	.208[*] (.096)	.128 (.099)	-.101 (.096)
R²	.235	.285	.203	.265	.246	.263
Adj. R²	.171	.233	.154	.220	.191	.225

Notes: [*]p < 0.05, [**]p < 0.01, [***]p < 0.001. Table entries are estimated coefficients (standard errors).
Gender: 0 = Male, 1 = Female.
A = autonomy; R = relatedness; C = competence; HP = having a place; CK = coming to know the self; ES = expressing self-identity; MC = maintaining continuity of self-identity; IE = Internet Experience (in years).

Our results support links between the need for *relatedness* and use of relationship formation and communication affordances. We find nonsignificant links from the need for relatedness to the self-presentation, browsing others' content, and meta-voicing affordances. Although these three affordances may also help individuals develop relationships with others, our results seem to suggest that this is not why Facebook users employ these. It could be that when individuals are offered multiple affordances that can fulfill the same psychological need, they select the ones that most directly fulfill the psychological need. Based on our results, the "friending" feature (enabling the relationship formation affordance) and the "chatting" feature (enabling the communication affordance) are the ones used to fulfill the need for relatedness on Facebook.

The need for *autonomy* is significantly related to the browsing others' content affordance, but not to other expected affordances. This suggests that, while Facebook users can indeed freely determine what to browse and when, some restrictions may limit the degree of freedom to which users present themselves, share content, and form relationships. People on Facebook, which enforces a strict "real name" policy in all versions of its application, may feel constrained by social norms that arise from their social network (e.g., family, friends, colleagues, etc.) and by the need to engage in impression management. Therefore, users' behaviors may not be truly self-determined, and as a result, they may not find that Facebook fulfills their need for autonomy. In other words, the constraint set by social norms and users' impression management may set boundaries when users present themselves, share content, and form relationships. A stark comparison may be Twitter or virtual game worlds where users can be anonymous and thus can engage more freely in authentically autonomous behaviors. For example, research has found that the reduction of social pressure brought about by anonymity on Twitter makes people express more freely (Huberman et al., 2008; Hughes et al. 2012). This suggests that how an affordance is provided (e.g., in this case, with or without anonymity; in the context of one's social network or among strangers) may influence whether the affordance fulfills a specific need, suggesting that future research should examine the role of moderators on these relationships. We also did not find a link between coming to know the self and browsing others' content. The logic for positing this link was one of social comparison: by comparing oneself with others (as reflected by their postings), one is able to better appraise one's own abilities and standing. The social nature of postings on Facebook may preclude more meaningful social comparisons.

The link between meta-voicing and the need for *competence* is nonsignificant. One possible interpretation is that on Facebook there is less of an opportunity to provide feedback to others that requires competence. Indeed, much of the meta-voicing on Facebook is in the form of "likes" or social comments. This may also explain why meta-voicing does not fulfill the need of coming to know the self on Facebook.

Further, our results support that individuals high on the need to *express self-identity* will use Facebook features that provide self-presentation, content sharing, and meta-voicing affordances that enable them to fulfill this psychological need. Use of the relationship formation and

communication affordances are not found to be driven by that psychological need. The nature of Facebook's social network (which consists of many offline friends and family) and the social pressure to accept "friend" requests from offline friends, may constrain the opportunity for relationship formation (enabled by "friending") to truly express one's self-identity through connections. Further, the information communicated regarding self through the chatting feature (enabling communication) may not be as rich as compared to sharing videos, photos, or blogs (i.e., self-presentation and content sharing affordances). In other words, if people want to use Facebook features to fulfil the need for expressing self-identify, they may be more likely to use features for self-presentation and sharing, rather than use the friending and chatting features.

The *need for having a place* plays a nonsignificant role in driving Facebook use. Our expectation was that, by sharing self-related videos and photos, or other content people may come to see Facebook as their own place. This expectation, however, is not supported by our empirical evidence. Prior research (Davis et al. 2009; Saunders et al. 2011) suggests that, in order to create "own place" on social media, users need to engage with the environment (e.g., changing their "home" by personalizing it). It may be that, on Facebook, people are mainly immersed in social activities with others, rather than engaged in developing Facebook to be a place of their own.

Finally, the need for *maintaining continuity of self-identity* may not be what drives people to use Facebook. Instead, satisfaction of this psychological need may be a byproduct of engaging in Facebook use. For example, people will post and share material to express their self-identity on Facebook. Over time, the persistent nature of this material (i.e., it stays on one's wall unless one erases it) provides a retrospective view and temporal continuity for the identity. This may explain the nonsignificant effect.

In sum, our empirical results suggest that the salient psychological needs that motivate Facebook use are autonomy, relatedness, and expressing self-identity. These are fulfilled by the affordances of browsing other's content for autonomy, relationship formation and communication for relatedness, and self-presentation, content sharing, and meta-voicing for expressing self-identity.

References

Davis, A., Khazanchi, D., Murphy, J., Zigurs, I., and Owens, D. 2009. "Avatars, People, and Virtual Worlds: Foundations for Research in Metaverses," *Journal of the Association for Information Systems* (10:2), pp. 91-117.

Deci, E. L., and Ryan, R. M. 1985. *Intrinsic Motivation and Self-Determination in Human Behavior*, New York: Plenum Group.

Fichman, R. G. 2001. "The Role of Aggregation in the Measurement of IT-Related Organizational Innovation," *MIS Quarterly* (24:4), pp. 427-455.

Huberman, B. A., Romero, D. M., and Wu, F. 2008. "Social Networks that Matter: Twitter under the Microscope," unpublished paper, Cornell University (available at SSRN: http://ssrn.com/abstract=1313405 or http://dx.doi.org/10.2139/ssrn.1313405).

Hughes, D. J., Rowe, M., Batey, M., and Lee, A. 2012. "A Tale of Two Sites: Twitter vs. Facebook and the Personality Predictors of Social Media Usage," *Computers in Human Behavior* (28:2), pp. 561-569.

Kietzmann, J. H., Hermkens, K., McCarthy, I. P., and Silvestre, B. S. 2011. "Social Media? Get Serious! Understanding the Functional Building Blocks of Social Media," *Business Horizons* (54:3), pp. 241-251.

Leonardi, P. M. 2011. "When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies," *MIS Quarterly* (35:1), pp. 147-167.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., and Podsakoff, N. P. 2003. "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology* (88:5), pp. 879-903.

Saunders, S., Rutkowski, A. F., Van Genuchten, M., Vogel, D., and Orrego, J. M. 2011. "Virtual Space and Place: Theory and Test," *MIS Quarterly* (35:4), pp. 1079-1098.

Tong, S. T., Van Der Heide, B., Langwell, L., and Walther, J. B. 2008. "Too Much of a Good Thing? The Relationship between Number of Friends and Interpersonal Impressions on Facebook," *Journal of Computer Mediated Communication* (13:3), pp. 531-549.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. 2003. "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* (27:3), pp. 425-478.

Zellner, A. 1962. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias," *Journal of the American Statistical Association* (57:298), pp. 348-368.

Zhao, S., Grasmuck, S., and Martin, J. 2008. "Identity Construction on Facebook: Digital Empowerment in Anchored Relationships," *Computers in Human Behavior* (24:5), pp. 1816-1836.