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# A preliminary investigation of materialism and impulsiveness as predictors of technological addictions among young adults

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*Background and aims:* The primary objective of the present research is to investigate the drivers of technological addiction in college students – heavy users of Information and Communication Technology (ICT). The study places cell phone and instant messaging addiction in the broader context of consumption pathologies, investigating the influence of materialism and impulsiveness on these two technologies. Clearly, cell phones serve more than just a utilitarian purpose. Cell phones are used in public and play a vital role in the lives of young adults. The accessibility of new technologies, like cell phones, which have the advantages of portability and an ever increasing array of functions, makes their over-use increasingly likely. *Methods:* College undergraduates ($N = 191$) from two U.S. universities completed a paper and pencil survey instrument during class. The questionnaire took approximately 15–20 minutes to complete and contained scales that measured materialism, impulsiveness, and mobile phone and instant messaging addiction. *Results:* Factor analysis supported the discriminant validity of Ehrenberg, Juckes, White and Walsh's (2008) Mobile Phone and Instant Messaging Addictive Tendencies Scale. The path model indicates that both materialism and impulsiveness impact the two addictive tendencies, and that materialism's direct impact on these addictions has a noticeably larger effect on cell phone use than instant messaging. *Conclusions:* The present study finds that materialism and impulsiveness drive both a dependence on cell phones and instant messaging. As Griffiths (2012) rightly warns, however, researchers must be aware that one's addiction may not simply be to the cell phone, but to a particular activity or function of the cell phone. The emergence of multi-function smart phones requires that research must dig beneath the technology being used to the activities that draw the user to the particular technology.

**Keywords:** cell phones, technological addictions, materialism, impulsiveness, young adults

## INTRODUCTION

It appears that Americans, much like the rest of the world, are spending an ever increasing amount of time with new technologies ("electronic gadgets") at the expense of human interaction (Griffiths, 1999, 2000). Polak and McCullough (2006) argue that the desire for new technologies is a human universal, part of our evolutionary programming. The use and display of such gadgets, argue the authors, is to "signal one's wealth, status, or resourcefulness, and therefore, one's desirability as a mate…" (p. 344).

Nowhere is this preoccupation with new technologies more pronounced than in teens and young adults (Choliz, 2012; Harman & Sato, 2011; Massimini and Peterson, 2009). The accessibility of new technologies, like cell phones, which have the advantage of portability and availability (compared to desk-top or lap-top computers) make their over-use more likely. Smart phones have essentially placed computers at the fingertips of nearly every American teen and young adult. The recent advent of new cell phone functions including cameras, music players, GPS systems, games, and Internet access have made their use even more prone to possible overuse and addiction. Takao, Takahashi and Kitamura (2009) state that the "mobile phone is no longer only a tool of communication but an indispensable instrument of an individual's social and work life" (p. 501).

Smart phones have greatly expanded what can be performed on this newest generation of cell phones. And, college students have been found to be one of the heaviest users of information and Communication Technology (ICT) (Massimini & Peterson, 2009). Sixty-seven percent of young adults between the ages of 18–24 own a smartphone compared to 53 percent of all cell phone users. Young peoples' proclivity toward ICT in general, and cell phones specifically, was the driving force behind the present research. Young adults send an average of 109.5 text messages a day or approximately 3,200 texts each month (Brenner, 2012). They receive an additional 113 text messages and check their cell 60 times in a typical day (Harman & Sato, 2011). On average, college students spend approximately seven hours daily interacting with ICT (Junco & Cotton, 2012). Sixty percent of students feel they may be addicted to their cell phone (www.hackcollege.com/blog/2011/18131/generation-mobile.html, retrieved August 9, 2012).

At first glance, one might have the tendency to dismiss such aberrant cell phone use as merely youthful nonsense – a passing fad. But an emerging body of literature has given in-

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creasing credence to cell phone addiction and similar behavioral addictions. An expanded understanding of the brain's reward system – where there is reward there is a chance of addiction – has led many researchers to consider behaviors as potentially addictive (Griffiths, 1995, 2012; Chonko, Roberts & Jones 2006).

Alavi et al. (2012) state that, although differences between behavioral addiction and substance addiction exist, behavioral science researchers "believe that all entities capable of stimulating a person can be addictive, and whenever a habit changes into an obligation, it can be considered as an addiction" (p. 290). Behavioral addictions may include gambling, over-eating, sex, gaming, exercise, and a myriad of technological addictions (Griffiths, 1996). Behavioral addiction, like substance addiction, is best thought of as a habitual drive or compulsion to continue a behavior even when it leads to negative events and consequences. Loss of control over one's behavior is the sine qua non of any addiction. As identified by Griffiths (1996), behavioral addictions share six core components: salience, euphoria, tolerance, withdrawal symptoms, conflict, and relapse.

A behavior becomes salient when it becomes an integral part of a person's life dominating their thoughts, emotions, and behavior. Euphoria is the feeling of elation or excitement that precedes and/or follows the behavior in question. Tolerance requires that an ever increasing amount of the behavior is needed to achieve the desired level of satisfaction. Unpleasant emotions or physical symptoms that occur when a person is denied a given behavior (or attempts to cut-back) constitute withdrawal symptoms. Conflict is the tension between the individual and others created by the behavior in question. This conflict can also be the tension experienced within an individual because of the repetition of a particular behavior and its impact or the well-being of the affected individual. Relapses occur when the affected individual attempts to stop or control the behavior in question.

It is obvious from the above list that behaviors can potentially become addictive. Alavi et al. (2012) note that a high comorbidity between behavioral and substance addictions exist, suggesting similar etiological origins for the two categories of addictions. The authors conclude that, "All in all, it seems appropriate to categorize excessively conducted behaviors which lead to suffering, as behavioral addictions" (p. 292).

Technological addictions such as addictive Internet or cell phone use are thought to be a sub-set of behavioral addictions (Griffiths, 1995). Griffiths (2000) defines technological addictions as "non-chemical (behavioral) addictions that involve human-machine interaction" (p. 211). Such addictions can be either passive (watching TV) or active (cell phones) and have features that attract and reinforce which can produce addictive tendencies in the affected individual.

By far, the most researched technological addiction has been the Internet. A review of the literature on Internet, video games, and cell phones addiction by Carbonell, Guardiola, Beranuy & Belles (2009), found that approximately 85 percent of all articles addressed the issue of Internet addiction, followed by video games addiction (13.6%), and lastly cell phones at about 2 percent of the 179 articles retrieved between 1996 and 2005. These results are not surprising given the commercial emergence of the Internet during this time period.

Of the research conducted on Internet addiction, Widyanto and Griffiths (2006) conclude that, "if 'Internet addiction' does indeed exist, it affects a relatively small percentage of the online population" (p. 31). And, the authors conclude, what these people are addicted to on the internet is unclear. Griffiths (2012) later argues that the term "Internet Addiction" may be out-dated. Individuals, reasons Griffiths, are addicted to a particular activity not simply to the Internet. He argues that even "Facebook addiction" may be obsolete terminology. Facebook offers a variety of different activities that a person can pursue (e.g. Farmville, gambling, messaging friends, viewing photos, posting updates and watching videos). This same argument, contends Griffiths, holds true for cell phone use as well.

As evidenced by the Carbonell et al. (2009) survey of the literature investigating the topics of Internet, video games, and cell phone addiction, there has been a dearth of studies investigating the addictive potential of cell phone use. The authors only uncovered four articles addressing the topic of cell phone addiction. The emergence of smart phones, and their ever-expanding number of functions and ubiquity (53% of young adults 18–24 own a smart phone) suggest that cell phone addiction will become an increasingly common topic of research in the years ahead. The potential health hazards of cell phone use and the issue of texting and driving have already made excessive cell phone use a topic of general conversation and garnered much media attention. Researching the topic of cell phone addiction, Choliz, had this to say about the real possibility of being addicted to one's cell phone, "the construct of 'mobile phone addiction' is really plausible and merits inclusion in DSM-V as a kind of technological addiction" (2010, p. 125).

Yet, careful research on the topic of addictive, or excessive, cell phone use is scarce. The purpose of the present research is not to provide an exhaustive review of the cell phone addiction literature but to highlight research conducted in the area of addictive (or, excessive, problematic) cell phone use relevant to the present study's objectives of viewing cell phone addiction in the broader context of consumption pathologies. Clearly, cell phones serve more than just utilitarian purposes. Cell phones are used in public and play a vital role in young adults' social lives. Many young adults view their cell phone as essential to their happiness. The brand of phone purchased and the many opportunities to customize the phones look and sound make cell phones an integral part of many young adults-self-identity (Takao et al., 2009).

Young adults use communications technology like cellphones to maintain a sense of 'perpetual contact' throughout the day (Katz & Aakhus, 2002), yet ironically these technologies have been linked to social disconnectedness (Baker, Comer & Martinak 2008; Haddon & Silverstone, 2000), beckoning a deeper understanding of such technological addictions. Recent research by Ehrenberg et al. (2008) provides a promising start toward understanding two manifestations of technological addictions – mobile phone use and instant messaging – as the outcome of personality traits normally associated with antisocial behavior.

The study's results suggested that extraverted and neurotic people spent more time text messaging where disagreeable people spent more time on calls and instant messaging. Those with lower self-esteem spent more time instant messaging. However, noting the small amount of variability accounted for by these variables (from approximately 2–12 percent); the authors of the study recommend that "we continue to identify the factors predicating people's use of and potential overreliance on these technologies" (p. 740).

The present study makes several important contributions in this area of research. It is the first to investigate the role materialism plays in cell phone addiction. Materialism is an important consumer value that impacts many of the decisions we make as consumers. Additionally, cell phone use and over-use have become so common that it is critical that we better understand what drives these types of technological addictions. Including impulsiveness in our model is also an important contribution of the present research. Behavioral addictions are often driven by the lack of impulse control (Billieux, Van Der Linden, d'Acremont, Ceschi & Zermatten, 2007; Billieux, Van Der Linden & Rochat, 2008). An additional significant contribution is the use and analysis of the Mobile Phone and Instant Messaging Scales developed by Ehrenberg et al. (2008) which provides further evidence of their value in this area of research.

The perspective taken here is to view mobile phone and instant messaging addictions in a broad context of consumption pathologies that include compulsive buying and credit card misuse, both of which are growing problems among young adults (Mueller et al., 2010; Pirog & Roberts, 2007; Roberts & Roberts, 2012; Roberts & Jones, 2001). A notable theme in studies on these pathologies is the mutual role of impulsiveness and materialism (Mowen, 2000; Pirog & Roberts, 2007). *Impulsiveness* is commonly interpreted in terms of making choices that discount future rewards relative to more immediate gains (Puri, 1996; Rook & Fisher, 1995). Cell phones and instant messaging provide the means to search for immediate gratification when the current social setting fails to do so.

Recent research by Billieux et al. (2008) uncovered a link between impulsiveness and problematic cell phone use. The study's sample consisted of 339 participants ranging from 20–35 years of age with a mean age of 25.80 and approximately half males and females. The four-factor UPPS Impulsive Behavior Scale was used to measure the respondent's level of impulsivity. The four facets of impulsiveness included an urgency, premeditation, perseverance, and sensation seeking factor. Impulsivity was included in the study because problematic cell phone use can be considered a "behavioral addiction" and such addictions are often driven by impulsiveness.

An earlier study by Billieux et al. (2007) found that the urgency and lack of perseverance ("staying on task") dimensions of impulsivity were related to perceived cell phone dependence. The authors' 2008 study also found that the urgency dimension of impulsivity was the strongest predictor of problematic cell phone use. The tendency to experience strong impulses, particularly during bad mood states (urgency factor) is a likely antecedent of cell phone addiction. Cell phones are a convenient coping tool when dealing with negative mood states.

*Materialism* may best be understood as the importance placed on worldly possessions (Belk, 1985). We would expect materialistic adults to emphasize communications that involve valued possessions such as the cell phone or computer; a greater degree of materialism should therefore result in a higher dependence on communications technology. Based on a convenience sample of 204 shoppers from eight major shopping malls across the Northeastern U.S., Fitzmaurice and Comegys (2006) concluded that, "materialists are sensitive to the social acceptability and communicative ability of products and brands" (p. 287). As Richins (1994) noted earlier, those high in materialistic values value possessions that were worn or seen in public as compared to products consumed in more private settings. Consistent with Belk's (1988) concept of the extended-self, consumers commonly use products to define themselves to others.

Materialists do not purchase brands solely for their status appeal but also for the social meaning they convey to others (Fitzmaurice & Comegys, 2006; Polak & McCullough, 2006). Conspicuous consumption has been a staple of American society for hundreds of years (Veblen, 1899/1965). Given the importance (and public visibility) of cell phones to teens and young adults in today's technology obsessed world, it is posited that the more a person is driven by a social consumption motive, the more likely they are to exhibit addictive cell phone tendencies.

Cell phones, along with a myriad of other consumer products, are a desired possession whose purchase goes well beyond the practical aspects of the product itself. Especially in youth and young adults, cell phones are a source of status and a natural outgrowth of a materialistic desire to own, display and use products that enhance their self-esteem and image (Katz & Sugiyama, 2005).

Two types of effects on technological addiction can be attributed to materialism. First, is a direct effect, signifying the depth of one's relationship with the technology itself. Second, is an indirect effect via the impulsiveness trait, analogous to that found for other pathologies (Mowen, 2000; Pirog & Roberts, 2007) whereby low satisfaction associated with materialistic lifestyles inspires the immediate gratification that may be found through communications technology. Accordingly, our hypothesized path model presented in Figure 1 specifies impulsiveness (exogenous) and materialism (endogenous) as indicators of communications technology addictions (either mobile phone or instant messaging), with impulsiveness mediating the effect of materialism.

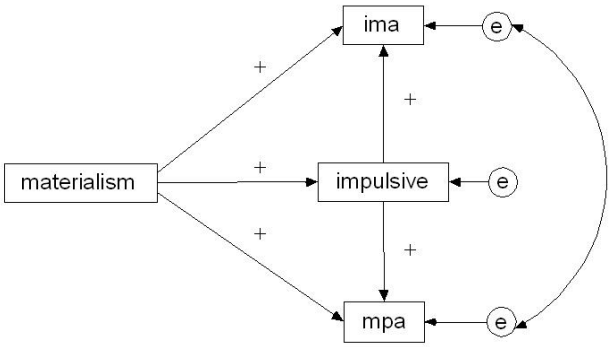


*Figure 1.* Hypothesized relationships between materialism, impulsiveness and technological addictions

## METHODS

### *Procedures*

Data for this study come from self-report surveys of business students at two U.S. universities. The students completed (during class) a paper and pencil questionnaire that contained scales that measured materialism, impulsiveness, and mobile phone and instant messaging addiction tendencies. The questionnaire took approximately 15 minutes to complete. The test administrator was present while the respondents completed the questionnaire. A short debriefing was conducted after the questionnaires were collected. All respondents in the initial sample of 226 used cell phones but, of these, 46 individuals did not use instant messaging; omis-

sion of their responses resulted in a final sample of 191. The 191 subjects ranged in age from 19 to 38 years ($M = 21$, $SD = 1$) and skewed male (59.4 percent).

*Measures*

Addictive tendencies toward mobile phone use and instant messaging were measured using the MPAT and IMAT scales developed by Ehrenberg et al. (2008). Responses were recorded on a seven-point Likert scales. Three similar items were used to measure both MPAT and IMAT: (1) "The first thing I do each morning is check my mobile phone (instant messaging account) for missed calls or messages", (2) "I find it hard to control my mobile phone (instant messaging) use", and (3) "I feel lost without my mobile phone (instant messaging)". The mean scores for MPAT ($a = .692$) and IMAT ($a = .905$) were 5.06 and 2.52, respectively. A higher score on each reflected a higher level of dependency.

Impulsiveness was measured using Puri's twelve item scale ($a = .654$); items were measured on a seven-point scale ranging from "usually describes me" (7) to "seldom describes me" (1). Respondents were asked to rate how well 12 adjectives described them. Adjectives included impulsive, careless, extravagant, easily tempted, and enjoy spending. Reverse coded items included the adjectives self-control, responsible, farsighted, restrained, rational, and methodical. A higher score meant a higher level of impulsiveness.

Materialism was measured using Mowen's four-item scale ($a = .944$); items were measured on a nine-point scale. Respondents were asked to rate how accurately four personality traits described them. Scale items included, "enjoy buying nice things", "enjoy owning luxurious things", "acquiring valuable things is important to me", and "like to own nice things more than most people". A higher score meant a higher level of materialism.

## RESULTS

Table 1 contains a correlation matrix of the study's variables along with descriptive statistics for each scale.

Factor analysis was used to assess construct validity for MPAT and IMAT, which was not evaluated in the Ehrenberg et al. (2008) study. Oblique rotation resulted in two factors, as shown in Table 2. The large factor loadings (all above .745) follow the expected pattern and indicate discriminant validity.

To assess the impact of impulsiveness and materialism on technology addictions, AMOS 16.0's maximum likelihood path analysis was used. A just-identified path model was specified that included each criterion variable. Results are shown in Table 3. Both materialism ($p < .001$) and impulsiveness ($p = .029$) are predictors of MPAT ($R^2 = .09$). Similarly, materialism ($p = .001$) and impulsiveness ($p = .029$) are predictors of IMAT ($R^2 = .16$). Note that the impact of materialism on either addictive behavior is large relative to that of impulsiveness.

Together, the coefficients for materialism's impact on all the exogenous variables and impulsiveness' impact on the

*Table 1.* Means, standard deviations and correlations

| | Mean | *SD* | *N* | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| 1. Materialism | 5.315 | 2.308 | 190 | – | | |
| 2. Impulsiveness | 3.241 | 0.587 | 185 | .217 * | – | |
| 3. MPAT | 5.093 | 1.272 | 190 | .359** | .227 * | – |
| 4. IMAT | 2.529 | 1.593 | 191 | .263** | .209 * | .313 ** |

MPAT = mobile phone technology addiction; IMAT = instant messaging technology addiction.
* $p < 0.01$; ** $p < 0.001$.

*Table 2.* MPAT and IMAT Scale items* and factor loadings

| Scale item | Variable name | Factor loadings | |
|---|---|---|---|
| | | 1 | 2 |
| The first thing I do each morning is check my mobile phone for missed calls or messages. | MPAT1 | –.107 | **.769** |
| I find it hard to control my mobile phone use. | MPAT2 | .156 | **.752** |
| I feel lost without my mobile phone. | MPAT3 | .015 | **.819** |
| The first thing I do each morning is check my instant message account for missed calls or messages. | IMAT1 | **.895** | –.044 |
| I find it hard to control my instant messaging use. | IMAT2 | **.929** | .045 |
| I feel lost without access to instant messaging. | IMAT3 | **.930** | .018 |

* *Source:* Ehrenberg et al., 2008.
Rotation method: Oblimin with Kaiser normalization. Pattern matrix loadings are reported.

*Table 3.* Coefficients for path model

| | | | B | Beta | *SE* | *p* |
|---|---|---|---|---|---|---|
| Impulsiveness | ← | Materialism | .056 | .221 | .018 | .002 |
| MPAT | ← | Materialism | .183 | .332 | .038 | < .001 |
| MPAT | ← | Impulsiveness | .331 | .152 | .151 | .028 |
| IMAT | ← | Materialism | .160 | .233 | .049 | .001 |
| IMAT | ← | Impulsiveness | .411 | .152 | .195 | .036 |

MPAT = mobile phone technology addiction; IMAT = instant messaging technology addiction.
Saturated model used ($\chi^2 = 0$, df = 0).
$R^2$ values: Impulsiveness .049; MPAT .156; IMAT .093.

criterion variables, which all are significant, indicate that impulsiveness mediates the effect of materialism on the criterion variables MPAT and IMAT (Baron & Kenny, 1986). To assess the strength of this mediation Sobel's test statistic (1982) was estimated for both MPAT (1.792, $p = .073$) and IMAT (1.745, $p = .081$). Given the conservative nature of the Sobel test (Kenny, Kashy & Bolger, 1998) and its ability to detect only strong to medium mediation for the given sample size (MacKinnon & Lockwood, 2003), only a small mediation effect can be inferred.

## DISCUSSION

While the factor analysis provides support for treating MPAT and IMAT as distinct constructs, their respective paths in the tested model tell very similar stories. Impulsivity is shown to increase both mobile phone addiction and instant messaging addiction to a similar degree. Materialism has an even larger effect on the two constructs. Its larger impact on mobile phone use relative to instant messaging may reflect the fact that mobile phones are conspicuous artifacts of acquisition and sometimes are viewed as extensions of the self (Gant & Kiesler, 2001; Oksman & Rautiainen, 2003) as well as fashion statements (Katz & Sugiyama, 2005). A recent study of cell phone use in UK pubs found that as the ratio of men to women increased men were more likely to display their cell phones, essentially using them to signify status and power (Lycett & Dunbar, 2000). In this regard instant messaging, an application rather than possession, is not as inherently material in its appeal. Nevertheless, materialism's impact on IMAT (as well as on MPAT) is significant and still is noticeably larger than that of impulsiveness.

This finding is of particular interest given warnings by Griffiths and coauthors (Griffiths, 1999, 2000, 2010, 2012; Kuss & Griffiths, 2011; Widyanto & Griffiths, 2006) that researchers must be aware that one's addiction may not simply be to the cell phone but, to a particular activity or function of the cell phone. The array of multiple functions presently performed by cell phones requires that researchers must dig beneath the mere technology being used to the activities that draw the affected person to the particular technology. In the present study, however, it appears that materialism and impulsiveness drive a dependence on both the cell phone itself (MPAT) and to instant messaging (IMAT) as one function of personal computers.

Placing cell phone addiction in the broader context of consumption pathologies is an important first step for future research in this area. The constructs of materialism and impulsiveness have been shown to be associated with credit card misuse, compulsive buying and other consumer pathologies (e.g., Manolis & Roberts 2008; Manolis, Roberts & Kashyap, 2008; Pirog & Roberts, 2007; Rindfleisch, Burroughs & Denton, 1997; Roberts, Manolis & Tanner, 2008; Roberts & Tanner 2000, 2002; Xu, 2008). An important bridge between the two areas of research is that materialism is often viewed as a coping mechanism in the consumer behavior and psychology literature (Burroughs & Rindfleisch, 1997; Chang & Arkin, 2002; Kasser, 2002; Rindfleisch et al., 1997; Roberts et al., 2006, 2008).

Much in the same way as consumers who use materialistic pursuits to cope with stress, anxiety, and feelings of low self-worth, cell phone and other technological addictions are likely similar attempts to cope with the exigencies of life and self-esteem struggles (Billieux et al., 2008; Ehrenberg et al., 2008; Griffiths, 2000; Jenaro, Flores, Gomez-Vela, Gonzalez-Gil & Caballo, 2007; Takao et al., 2009). The confluence of ever-increasing levels of materialism in the U.S. and abroad and accelerating technological change make this a critical area for future research endeavors.

Study limitations include a small and non-random selection of college students, self-report data, and a slight overrepresentation of male respondents. The omission from the model of other variables that impact technological addictions also limits the study's integration into the existing cell phone addiction literature. Viewing cell phone addiction from a consumer perspective, however, is a positive first step in increasing our understanding of cell phone and other technological addictions as consumption behaviors.

While the models used here explain a larger amount of variance than those employed by Ehrenberg et al. (2008), the explained variance is still small and may signal the need to expand the model. For example, the study exclusively focuses on impulsiveness as a mediating trait in explaining addictions, but further research should consider the possibility of other traits such as self-esteem, locus of control, and social signaling that may mediate materialism. Impulsiveness as a potential moderator in technological addictions also merits future research scrutiny. Additionally, reasons for using the technologies should be investigated to distinguish among types of use. As pointed out by Griffiths (2012), "There is a fundamental difference between addictions *to* the Internet and addictions *on* the Internet" (p. 519).

More generally, the results support the approach of viewing technological addictions in the broader context of socially maladaptive behaviors, which commonly are attributed to low quality of life. Future efforts to understand personality's impact on technology addictions should consider the roles of both impulsiveness and materialism. Furthermore, the possible co-morbidity between technological addiction and other consumption pathologies merits future investigation.

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