Media, Social Networking, and Pediatric Obesity

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MEDIA AND THE AMERICAN FAMILY

Since the advent of television in the early 1950s, its impact on American life, and especially its impact on children, has been the subject of great interest and great debate. The United States became a nation of television viewers between 1950 and 1960, and the popularity of television has continued unabated.[1] Consumer electronics are now requisite components of American family life. Ownership of televisions and other devices (eg, DVD players, video game system, computers) is nearly universal among families with children.[2] More telling is that, in 2009, American families reported owning an average of almost 4 (3.8) televisions, almost 3 (2.9) VCR/DVD players, and 2 computers. Eight-four percent had cable/satellite television as well as Internet access. Moreover, 71% of children between 8 and 18 years old had a television in their bedroom, 50% had cable/satellite channels, and a third had a computer with Internet access in their bedrooms.[2] American children are growing up with unprecedented levels of access to media, and this trend seems unlikely to decline.

The Digital Era and the New Media Landscape

During the first decade of the new millennium, the number of devices available for accessing media content (eg, televisions, DVDs, DVRs, computers, cell phones, tablets such as iPads, networked video game consoles such as the Wii or xBox360, or other devices whose sole purpose is to stream content to televisions or existing screens, such as AppleTV) increased rapidly. The current plethora of possibilities and platforms renders long-standing concerns of scholars and practitioners alike about the impact of television on children almost quaint. Although television remains highly popular, technological advances have rendered the means of delivery of media content nearly irrelevant.

The large variety of consumer electronics and entertainment technology available to consumers has been greatly facilitated by the switch from analog to digital delivery technologies. Digital technology offers users the capability to use more media

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simultaneously, producing the phenomenon of media multitasking.[2,3] Computers, tablets (eg, iPads) and even cell phones can run multiple applications simultaneously, everything from streaming video to resident application programs. The combination of digital delivery with significant advances in component miniaturization, touch screens, and wireless technologies in recent years has forever changed the kinds of devices people rely on, the ways in which people use media, and how people access media content.

As an example, between 2004 and 2009, cell phone ownership among US youth has increased from about 48% to 84%.[4] Among youth aged 12 to 18 years, mobile-to-mobile texting has become the primary way they communicate with friends, surpassing face-to-face contact, email, instant messaging, and voice calling as the preferred mode of daily communication.[5] However, voice calling is still the preferred mode for reaching parents[5] (probably because of parental preferences rather than those of teens). Increasingly, even cell phones are morphing into smartphones, allowing Internet access and surfing, online game playing, video streaming, and all manner of activities far removed from the humble purpose of sending and receiving communications, either voice or text.

Facebook was launched in 2004, the same year that Google made its first public stock offering. Facebook now has 750 million active users (the youngest of whom are 13 years old), and Google has changed the lexicon: the verb to google can now be found in the Webster Collegiate and Oxford English Dictionaries, defined as "to use the Google search engine to obtain information on the Internet."[6,7] The first iPhone went on the market in June 2007, and Apple released the first iPad tablet computer in April 2010, selling 3 million of the devices in 80 days.[8]

These 3 products alone represent major conceptual and technological innovations that have altered the media landscape for current and future generations of children. In their own way, each has provided the foundation for ensuing paradigmatic shifts, altering the way people think about media, how people use it in their daily lives, what people expect from it, and the role people expect it to play in their lives and the lives of their children.

Regarding the impact of media, children and youth have always been a special audience, in part because they are developmentally vulnerable, and in part because they have always been among the earliest adopters and heaviest users of entertainment technology.[9] There is popular and scholarly consensus that today's adolescents, in particular, have widely adopted the use of digital media for daily life activities. An image of typical American teenagers is conjured up: these teenagers are in their rooms, doing homework on the computer, perhaps with a word-processing program open for text, surfing the Internet for information related to the topic of their particular paper. Although both writing and surfing, they are texting friends on their cell phones or about events at school, who likes whom, who dissed whom, or what a pain the assignment is. Alternatively, they are posting this same information in more public forums via updates on their own Facebook statuses, or posts on the walls of their Facebook friends. All this is happening with the television on in the background (or video content streamed via iPads, or networked game consoles), and/or while listening to music on their iPods. It is commonly thought that this image describes most adolescents in America today, and there is some evidence to support this notion.[2]

Influences of Media on Pediatric Obesity: the Good, the Bad, and the Equivocal

Youth of all ages spend a large proportion of their time using electronic media (eg, 3–5 hours a day watching television), more time than for any other single free-time activity except for sleep.[10] Partly because of this, the notion that media use is an important contributor to the increased prevalence of obesity in American youth is held by the lay public and scholars alike.[11–15] Moreover, this conviction has shaped prominent public health policies. The US Department of Health and Human Services listed the reduction of television viewing as a national health objective in both *Healthy People 2010* and *Healthy People 2020*. Likewise, the American Academy of Pediatrics (AAP) policy statement regarding the prevention of pediatric overweight and obesity identifies limiting television and videogame use to no more than 2 hours per day as an important strategy for preventing obesity among children and adolescents.[16]

However, empirical evidence for this belief is mixed. Despite high levels of media use[2,17] and a high incidence of obesity among youth, evidence that these concurrent trends are strongly related is poor.[18] In a recent meta-analysis, Marshall and colleagues[19] found that the associations between media use and obesity among youth, although consistently positive, are weak, and concluded that they are of little clinical relevance. Similarly, they reported average effect sizes (Pearson *r*) of −0.12 and −0.10 for the relationship between television viewing and video/computer game use, respectively, and physical activity. The investigators conclude that "…media-based inactivity may be unfairly implicated in recent epidemiologic trends of overweight and obesity among children and youth" (p. 1238).[19] They noted critical flaws with the current body of literature, including the general lack of attention to important contextual factors or confounders (including socioeconomic resources, parental weight status, and child pubertal status), a heavy reliance on cross-sectional correlations, and, because of a general lack of longitudinal studies, that temporal precedence has not been established.

These findings have important implications for the notion that electronic media use has contributed to the obesity epidemic in US youth via its impact on physical activity. There is ample evidence that American children are not active enough.[20] The question is whether electronic media use plays an important role in this problem. Generally, the assumption is that, if children were not using media, they would be outside running up and down a soccer field. However, the existing evidence suggests that this is not the case, and that media use mainly displaces other kinds of sedentary activities.[10,18,21] The current body of empirical evidence suggests that reduction of moderate to vigorous physical activity is not one of the major mechanisms by which media use contributes to childhood obesity.

If the role of media use in childhood obesity is not via its impact on physical activity, the other possible mechanism is caloric intake. Many hold advertising responsible for childhood obesity because of its abundant promotion of calorically dense food products with high proportions of fat, sugar, and salt.[22–24] Evidence for this hypothesis is more robust than for the sedentary lifestyle hypothesis. A large body of findings from diverse methods (eg, experimental, correlational, longitudinal) and samples (eg, community, convenience, population level) now exists. Taken together, it seems that (1) screen-based media viewing encourages indiscriminate eating and greater caloric intake[25,26]; (2) exposure to advertised

food products increases children's choice of, and preference for, such products[27] and increases children's product purchase requests and parental product purchases,[27–29] with these purchase requests reflecting product advertising frequency[30]; and (3) media-based food advertising is related to both poor dietary habits[25,26,31] and increased caloric intake.[23,28] Advertising works, and is likely to be a central mechanism linking screen media use to childhood obesity.

Effects of Social Networking, Friends, and Peers on Pediatric Obesity

For children and youth, literature in this area is scarce. Although researchers are aware of the popularity of social media, and the likelihood that friends and peers might influence behaviors, which might have implications for children's obesity and/or weight status, empirical evidence examining these issues is sparse to nonexistent. There is some literature examining implications of online social ties among youth.[32,33] However, this literature has focused almost exclusively on either the implications of online relationships for youth social competence and relationship development,[32,34,35] or on the dangers of online relationships and sexual predators.[36,37]

Friend Me: Implications of Social Media for Childhood Obesity

Social media is a term coined in the last few years, and generally refers to Web sites in which user members present information about themselves and connect with friends. As of 2011, Facebook and MySpace are the most prominent examples, and also the most popular among children, but other sites, typically with a more narrow purpose (LinkedIn, Twitter, and so forth) also exist. Because social media platforms are rapidly evolving, as companies try to develop the next big thing (eg, Google Plus), the importance of any particular social media site for youth is difficult to predict. Regardless, the commonality among all social media sites is that the fundamental purpose is to become part of a social network through linkages with other members.

The popularity of Facebook in terms of sheer numbers has resulted in some profound shifts in the ways people think about and use technology in their daily lives. As early adopters of virtually all new technology, this is particularly true of children and youth. In part because of the rapidity of changes in popularity and availability of social media, even simple descriptive information is scarce. Currently, one of the primary sources for information regarding teen use of social media is the Pew Internet & American Life Surveys. They report that, in 2009, 93% of youth aged 12 to 17 years went online, and use of social networking sites among online youth has increased steadily from 55% in 2006, to 65% in 2008, to 73% in 2009.[38]

If social networking sites continue in their popularity among youth, there may be the potential for using such sites to promote healthy behaviors and positive health behavior change. There is emerging evidence that support from peers, friends, and family can have important influences on youth weight-related behaviors, including physical activity and eating patterns.[35,39–41] There is evidence that family support is important for both youth physical activity and eating habits,[39,42] that youth are more motivated to be physically active in the presence of friends, and that the presence of peers can increase overweight youth's motivation to be physically active.[40]

Among adults, there is evidence that social contexts have important influences on eating behaviors,[43] and that social support (including online groups with shared goals, such as Weight Watchers) can facilitate individual success of desired behavior change.[44] At present, the power or potential of social media as sites of prevention and intervention programs intended to influence youth behaviors related to obesity and weight status have not been fully investigated.

Yes, There's an App for That

The term app originated within the technology industry as an abbreviation of application. This meaning morphed into apps as additional functionalities, tools, and resources for smartphones. Today, apps are commonly understood as software applications designed for mobile technologies, including smartphones or tablet computers with specific operating systems (eg, iPhone, iPad, or Android apps).

In some sense, apps are the tweets of the programming world. Apps are characterized by small storage and memory demands, a concise and focused objective, and ease of use with little or no training required. Covering a wide variety of topics (eg, education, entertainment, business, social life, health, fitness, lifestyle), apps have rapidly become a mainstay of daily life. It is estimated that apps were downloaded more than 18.5 billion times by midyear 2011.[45,46] The number of apps to choose from is so vast (estimated at more than half a million among the different platforms[47]) that finding relevant apps, even if you know what you want, can be difficult. Despite, or because of, the constant influx of new apps, more than 70% of Android and iPhone users report downloading apps in the last 30 days,[48] and 60% and 68% of them, respectively, report using their apps multiple times daily.[49]

Apps for Nutrition, Physical Activity, and Weight Loss

Most apps relevant to weight-related behaviors, such as caloric intake, nutrition, physical activity, or fitness, are categorized as health care and fitness apps, at least by Apple. Of the 459,923 active apps available from Apple, just 2% are in this category. As of August 2011, there were 1504 paid and 629 free health care and fitness apps. Most of these apps are electronic versions of strategies known to be effective for weight loss, namely logging caloric intake and physical activity. Many of them are app versions of popular Web-based logging programs, such as My Fitness Pal, thus offering users more opportunities to log without having to sit down to a computer with an Internet connection. Despite the large number of apps promoting health and fitness now available, most target adults. Thus far, although there are some cooking and recipe apps (mainly designed for parents) related to cooking with healthy child-friendly recipes, apps specifically designed to appeal to children and youth with the goal of either healthy weight maintenance or weight loss are an untouched market. In addition, despite their popularity, the efficacy of apps related to nutrition, physical activity, or weight loss has not yet been empirically evaluated, although discussions of their potential have begun to emerge in the scientific literature.[50,51]

The Intersection of Apps and Biometric Sensors

Embedded sensors, particularly in smartphones, have proved essential to the development of mobile health programs. Microphones, cameras, gyroscopes, global positioning systems

(GPS), digital compasses, pedometers, and accelerometers provide information regarding the user's activities and location that can be used to foster health. Data from body-worn sensors can also be combined with data collected from mobile device sensors to enhance the richness of the data and/or ease of data transmission. In an ongoing chronic disease management study (eCAALYX [Enhanced Complete Ambient Assisting Living Experiment]), data from physiologic sensors embedded in a smart garment worn by patients is combined with smartphone-based GPS data.[52]

Many available health and fitness apps use built-in features/characteristics of smartphones such as pedometers, accelerometers, or GPS readings, and/or link to such data provided by body-worn sensors. Wahoo Fitness apps rely on data collected via proprietary fitness sensors to track, record, and relay data on physical activity performance.[53] Research has indicated that a positive feedback loop based on behavior monitoring data could promote individuals to engage in healthy behavior.[54] For instance, it has been shown that Nike+ users who uploaded personal exercise data more than 5 times to the analytics portal are likely to be engaged in the data analytics feedback loop, which encourages them to continue exercising and data uploading.[55]

Depending on the app and the amount of data collected, data can be stored on the smartphone, a company Web site, or the cloud database, allowing either real-time analysis or analysis at any later time. Although currently of limited availability to the general public, mainly because of their high cost, health sensors measuring blood pressure, temperature, weight, and glucose are available using ANT technology. However, data collected from such sensors are continuously streaming from the moment of initiation to ending. Thus, there are potentially millions of data points per user, depending on the epoch or length of time between assessments. Efforts are underway to cope with the amount of such data and issues related to how to reduce these data in ways that are meaningful either at the individual or population level; this is now called the problem of big data.[56]

A Rare Opportunity: the Intersection of Social Media and Mobile Apps

Numerous apps invite users to track and/or share their geographic position while practicing a physical activity such as running, walking, or cycling through social media sites. Combining aspects of behavioral theories with technological advances, apps like Fit Friendzy rely on the power of social networks and connections to motivate exercise plans among youth patients; the app lets them connect with friends, share scores, and encourages them to join in multiple fitness challenges.

The intersection between social media and fitness apps providing data collected via the smartphone/linked device, or data reported by the user, provides a rich opportunity for both clinicians and scholars to understand the power and potential of various aspects common to health behavior change intervention and prevention programs. First, although most apps are designed to communicate and share data with real or virtual friends, relevant data collected by the app could also be shared with designated individuals, such as coaches or health care providers. The implications of the public aspect of information relayed via social media sites has yet to be examined. Unanswered, but possibly important, questions include whether keeping track of progress publically has some added benefit to keeping track of it privately.

Does it matter who one's public is or who many of them are watching one's progress? What is the effect of reminders, likes, or cheers from family, friends, or strangers?

App Regulation

There is no current governmental regulation of apps, although this may change soon.[57] In July 2010, the US Food and Drug Administration (FDA), in collaboration with the Federal Communications Commission issued a joint statement in which they acknowledged the potential benefits of wireless medical technology advances for the US population but also the need for "clear regulatory pathways, processes, and standards to bring broadband and wireless-enabled medical devices to market."[57] Although some fear that the cost related to getting FDA approval might refrain innovation, others deplores the lack of regulation.[58] For the first time in February 2011, the FDA cleared a software application for use by physicians to view images and make medical diagnoses from their portable devices such as the iPhone or Android.[59] However, in the absence of federal guidelines, some in the industry have established their own criteria in which patient safety and privacy are not core concerns. For example, Apple decides whether apps will be offered to consumers in their App Store based on design, inoffensive content, and lack of technical flaws. Neither veracity of claims by the app developers nor evaluations of effectiveness/ efficacy are considered.

SUMMARY AND IMPLICATIONS

In the last decade, the media landscape, and hence the role of media in the lives of children and youth, has undergone important changes. As the result of major technological and conceptual innovations, electronic media have become part of the fabric of daily life in previously unimagined ways. They are the backdrop against which people's lives are set. They are an endemic part of daily life, and, in many ways, they provide the foundation for a large number of daily activities. They are used for information, for entertainment, for relaxation, for stress relief, as a means of socializing, as a tool for household management, for shopping, for work, for communication, for scheduling. People turn to electronic media for company when they are alone. People turn to them when they are bored, when they are lonely, when they are tired, when they need solace, when they need information, when they need entertainment. People turn to them for a myriad of uses, and they use them without thinking much about it.

Although the popularity of these media, and the technologically and media-saturated world in which American children are growing up has fostered a great deal of debate, controversy, and general anguish among parents, practitioners, policy makers, and scholars,[60] they are here to stay. The huge popularity of social media and mobile technologies, especially among youth, may make them likely to provide a fruitful hub for treatment, intervention, and prevention efforts to address pediatric obesity. However, few have taken advantage of this possibility, and research on the feasibility and efficacy of doing so is almost nonexistent. Given the rapidity of their growth and popularity (against the backdrop of the slow and often protracted process of securing research funding), this is perhaps not surprising. However, we argue that at least some of the dearth of attention in this area is the result of other, more personal factors on the part of professionals, including ambivalence about the usefulness of

such media,[60] and discomfort with new technologies (largely as a result of generational cohort). For most clinicians, practitioners, and scholars (including the authors), the technologies discussed in this article represent departures from those we grew up with. Many of us (until forced to by teenage children) have taken little advantage of even the capabilities of our cell phones. As a consequence, the use of these technologies as a tool for contact, treatment, practice, or research is often an afterthought for us; they simply do not come to mind. This omission is not shared by the children we are hoping to help in either primary or secondary intervention programs. Although surveys still clumsily ask how much children and youth use different kinds of devices, this will soon become irrelevant. In the near future, all televisions, computers, tablets, phones (and yet-to-be invented devices) will become touch-screen and Internet connected, and the choice of where to stream chosen content will simply be a matter of which device we are closest to at the moment.

Despite more than 30 years of both prevention and remediation, the prevalence of overweight and obesity among US youth has proved surprisingly intractable.[61,62] Although energy imbalance is often cited as the root cause for overweight and obesity, if equilibrium were easy to achieve, more children would have been helped to achieve it by now.[63] The reasons for this imbalance are complex and varied. Whatever the solution, because obesity in childhood tends to persist in adulthood,[64,65] the striking increase in the prevalence of childhood obesity since the 1980s will dramatically affect public health expenses, programs, and priorities well into the twenty-first century. Given the rate of technological innovation, it seems likely (even guaranteed) that previously unimagined media devices may change the future media landscape in unimagined ways many times over. Current and future generations of children will never know life without the Internet, Wi-Fi, computers, touch screens, tablets, or smartphones. They are technological natives, and we clinicians ignore (or reject) the possible power of these new media and technologies as a way for reaching them at our (and their) peril.

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