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## Assessing media access and use among Latina adolescents to inform development of a physical activity promotion intervention incorporating text-messaging

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### Introduction

Hispanic adolescent girls suffer a heavy burden of physical inactivity and obesity. Compared to non-Hispanic white girls, Hispanic girls have disproportionately higher rates of obesity (19.9% vs. 14.5%) and morbid obesity (14.1% vs. 9.1%) (Ogden, Carroll, & Flegal, 2008), and lower self-reported levels of moderate-to-vigorous physical activity (Gordon-Larsen, McMurray, & Popkin, 1999). Also, fewer Hispanic high school girls (15.6%), and Hispanic high school students overall (10.5%), meet the recommended physical activity guidelines compared to the general high school population (18%) (Centers for Disease Control and Prevention, 2010). Given that overweight and obesity developed during preadolescence extends into adulthood (Herman, Craig, Gauvin, & Katzmarzyk, 2009), increasing the risk for many health problems, including diabetes and cardiovascular disease (Bell et al., 2007; Herman et al., 2009; Serdula et al., 1993; Singh, Muldure, Twisk, van Mechelen, & Chinapaw, 2008), it is crucial to focus efforts on preventing obesity among children and adolescents. The obesity trend among Hispanic adolescent girls is of particular concern given that Hispanic adult women currently have higher-than-average rates of overweight (78.8%) and obesity (39.1%) compared to non-Hispanic white women (66.7% and 34.3%, respectively) (Flegal, Carroll, Kit, & Ogden, 2012).

Because regular physical activity reduces obesity risk, increasing physical activity during preadolescence and adolescence is critical to reversing the obesity epidemic, especially among girls who experience sharp declines in physical activity during adolescence, and in particular among Latina girls who report less enjoyment of physical activity than their peers (Kelly et al., 2010). Thus, innovative, culturally tailored, age-appropriate strategies are needed to engage preteens and teens. A recent report described the promising role of eHealth

—the use of new media for health promotion—in reducing and preventing childhood obesity, particularly among underserved populations (Ahern, Phalen, Le, & Goldman, 2007). Given that 77% of U.S. teens ages 12-17 own a cell phone (Lenhart, 2012) and “20% of media consumption occurs on mobile phones” (Rideout, Foehr, & Roberts, 2010), a cell phone may be an appropriate tool for engaging young teens in health promotion. A recent review of interventions utilizing mobile telephone text messages—or short-message service (SMS)—to deliver health and clinical care behavior change interventions found positive short-term behavioral outcomes (Fjeldsoe, Marshall, & Miller, 2009). In addition, SMS is popular among adolescent girls, who send and receive an average of 100 text messages a day compared to boys’ 50 texts/day (Lenhart, 2012). However, the use of SMS as a health promotion intervention delivery tool to promote physical activity among youth, especially minority youth, has not been adequately investigated and only a few conflicting results have been reported in the literature (Devis-Devis, Perio-Velert, Beltran-Carillo, & Tomas, 2010; Rideout et al., 2010; Sirriyeh, Lawton, & Ward, 2010).

Social marketing practices have shown that a mixed approach—such as combining mediated health communication with interpersonal contact—can effectively promote behavioral change (Daniel, Bernhardt, & Eroglu, 2009). Therefore, to examine the potential of cell phones and social media as intervention delivery channels, this study assessed access and use of various media types (i.e., cell phones, computers, video game systems, Internet, social networking sites) and examined the relationship between physical activity and media access and use among adolescent Latino girls living on the Westside of San Antonio, Texas. The Westside is a low-income urban area considered a high-risk area for ongoing public health problems where 82% of residents are Latino and the median household income is \$26,824 (San Antonio Metropolitan Health District, 2007). Study results will be used to help understand media use among Latino girls and inform the development of intervention strategies that utilize low-cost, mobile phone, SMS, and wireless technologies to increase moderate to vigorous physical activity.

## Methods

### Data source and study sample

Data were collected from April to July 2010 as part of an intervention planning grant spearheaded by the Institute for Health Promotion Research at The University of Texas Health Science Center at San Antonio (UTHSCSA), in collaboration with The University of Texas at San Antonio, Girl Scouts of Southwest Texas (GSSWT), and Edgewood Family Network (EFN), a community organization that helps residents of Westside San Antonio overcome social, economic, and health disparities through education and programs.

The convenience sample of 110 Latino girls ages 11-14 was recruited with help from GSSWT and EFN. GSSWT and EFN arranged for two project staff members to conduct a 10 minute presentation (on study purpose and procedures) to groups of prospective girls at GSSWT locations or community groups in their networks. At each presentation, girls received a project information sheet and informed consent form to take to their parent(s), and were asked to return the forms within a week. Girls took the media use survey approximately one week later, the same day they returned parental consent forms and

provided assent. Girls recruited through GSSWT (n=31) received a free T-shirt and a one-year Girl Scout membership (\$12 value) with accompanying programs and activities. Girls recruited from sites other than GSSWT (n=79) received a monetary incentive: a \$10 gift card to Target or H-E-B, San Antonio's largest grocery store chain. The incentive structure was planned with input from community research partners. Study protocol was approved by the UTHSCSA Institutional Review Board.

### Data Collection

The media use survey was self-administered via personal digital assistants (PDAs) using a sound-enhanced data collection application (SEDCA) (Stork, 2010). To address literacy issues, questions were audio recorded so girls could simultaneously read and listen to each question. Each girl had her own PDA and entered answers by selecting checkboxes, choosing from dropdown lists, and using an onscreen keyboard to type in answers. All surveys were completed in English, took 15-20 minutes to complete, and were administered in group settings in rooms provided by the participating organizations. Two staff persons were available during survey administration to provide technical assistance and answer questions.

### Measures

The 96-item media use survey assessed ownership and use of various media (i.e., cell phones, computers, video gaming systems, the Internet, and social networking websites), and self-esteem and participation in physical activity. Items assessing ownership and use of media, personal contentment and parental rules were taken and/or adapted from Generation M<sup>2</sup>: Media in the Lives of 8- to 18-Year Olds, a recent Kaiser Family Foundation study (Rideout et al., 2010). Items assessing physical activity and sedentary behavior were obtained from the Centers for Disease Control and Prevention (CDC) 2009 Youth Risk Behavior Surveillance System (Centers for Disease Control and Prevention, 2009).

Demographic information collected included age, country of birth, other language spoken at home, family size, and school grades. Main measures included:

**Cell phone access**—Girls were asked to report whether they had their “own cell phone.” Girls who did not have their own phone were asked whether they regularly used someone else's phone, such as a parent's or sibling's phone. Response categories were coded as Yes (access to cell phone) vs. No (no access to cell phone). The “No” category included girls who reported sharing a phone (n=37) and those with no phone access (n=12). These two groups were combined for intervention planning purposes as we were interested in differentiating between girls with around-the-clock access to a personal cell phone versus girls with limited or intermittent access.

**Cell phone use**—Girls who reported having their “own cell phone” were asked to report: 1) number of days in the past week they used their cell phone; and 2) on the days they used their cell phone, number of hours per day spent on the phone, including time spent talking, texting, listening to music, and browsing the Internet. The two responses were combined to create “mean hours per week.”

**Other media access and use**—Girls were asked to report whether they had access (at home) to a computer (laptop or desktop), a video gaming system, or the Internet, and if they use social networking websites. For each type of media, girls also were asked: 1) number of days used in the past week; and 2) number of hours per day of use. For each type of media, the two responses were combined to create “mean hours per week.”

**Physical activity**—Questions derived from the 2009 Youth Risk Behavioral Surveillance System (YRBSS) included: 1) during the past 7 days, how many days were you physically active for a total of at least 60 minutes per day? Responses were coded as “5 or more days” vs. “less than 5 days”; 2) in an average week when you are in school, how many days do you go to physical education (PE) class? Responses were coded as “daily PE” vs. “less than 5 days per week”; and 3) during the past 12 months, on how many sports teams did you play (including any teams run by your school or community groups)? Responses were coded as “play on 1+ sports team” vs. “0 teams.” Responses were coded per CDC conventions.

**Personal contentment**—Girls were given six statements on personal contentment and asked how well each described them. The six statements were: I have a lot of friends; I get along well with my parents; I am often bored; I often feel sad and unhappy; I have been happy at school this year; and I get in trouble a lot. Response categories were: a lot like me; somewhat like me; not much like me; or not at all like me. Responses were coded as 1 (a lot like me and somewhat like me) vs. 0 (not much like me and not at all like me).

**Parental rules**—Girls were asked whether their parents had rules about the amount of time they could spend and types of activities they engage in on cell phones, computers, gaming systems, the Internet, and social networking websites. Responses were Yes vs. No.

## Statistical Analyses

All analyses were performed using Stata version 11. Simple descriptive statistics were used to analyze demographic characteristics of the sample and to report access and use of cell phones and other media by age. Differences between age groups were assessed with post-hoc pairwise comparison tests using the Bonferroni method for continuous variables and single degree-of-freedom comparisons of categorical pairs adjusting for multiple contrasts for categorical variables. Bivariate logistic regressions were conducted to assess associations among cell phone and other media access and use, personal contentment, and physical activity. Multiple regression analyses, adjusted for age, were used to examine the independent effect of cell phone and other media access and use on physical activity.

## Results

### Description of sample

Table 1 shows girls’ demographic and descriptive characteristics. All girls were ages 11-14 years, with a greater percentage of 11-year-olds (37%). Almost all girls were born in the U.S. and 58% reported speaking a language other than English (i.e., Spanish) at home. Over 70% of girls reported earning good grades (mostly A’s and B’s).

**Cell phone and other media access and use (mean hours per week)**—Table 2 shows that 55% of girls reported having a cell phone and spending a mean of  $40 \pm 4.2$  hours per week talking, texting, listening to music, and browsing the Internet. Most girls reported that they can send text messages (97%) and have unlimited texting (79%) and talking (57%) plans on their phones, as well as Internet access (50%) and the ability to take (89%) and send (79%) pictures and video (61%). However, most girls were not able to report whether their phones were smartphones, Java-, or WiFi-enabled. Access to other media was also high. Most girls (81%) reported owning a laptop or desktop home computer and 70% reported owning a video gaming system. Girls also reported having access to the Internet (89%) and social networking websites (74%) at home or through their cell phones. Pairwise comparisons between age groups revealed significant differences in access to cell phones and social networking sites. Significant differences were observed in the proportion of girls ages 11 and 13 ( $p=.002$ ), 11 and 14 ( $p=.000$ ), and 12 and 14 ( $p=.002$ ) for access to cell phones, and girls ages 11 and 13 ( $p=.018$ ) and 11 and 14 ( $p=.000$ ) with access to social networking sites, with older girls having greater access to cell phones and social networking sites. Pairwise comparisons for use (mean hours per week) also revealed significant differences between age groups for cell phones and video gaming systems. Significant differences in cell phone use were observed between girls ages 11 and 13 ( $p=.002$ ), 11 and 14 ( $p=.000$ ), and 12 and 14 ( $p=.002$ ), with older girls reporting more time on their cell phones, and between girls ages 12 and 13 ( $p=.030$ ) and 13 and 14 ( $p=.036$ ) for use of video gaming systems, with 13-year-olds spending the most time playing games.

**Cell phone and other media access and physical activity (Table 3)**—Regression analysis of the independent effect of cell phone ownership on physical activity, controlling for age, revealed that girls who owned a cell phone, compared to girls who did not own a cell phone, were significantly more likely to report engaging in 5 or more days of physical activity in the past week ( $p<0.001$ ), going to PE classes daily ( $p=0.003$ ), and playing on one or more sports team ( $p=0.027$ ). There were no significant relationships between other media access and physical activity.

**Cell phone and other media use (mean hours per week) and physical activity**—Regression analysis of the independent effect of cell phone and other media use on physical activity, controlling for age, revealed that “engaging in 5 or more days of physical activity in the past week” showed a significant ( $p=.022$ ) and positive association with cell phone hours per week. There were no significant relationships between other media (computer, video gaming system, Internet, and social networking) use and physical activity (data not shown).

**Cell phone access and personal contentment (Table 4)**—Forty percent of girls without a cell phone reported they were often sad or unhappy, whereas only 15% of girls who owned a cell phone reported such feelings. Regression analysis controlling for age confirmed that girls with access to a personal cell phone had lower odds of reporting they were sad or unhappy (odds ratio 0.25; 95% confidence interval 0.097, 0.663) compared to girls without access.

**Parental rules**—Most girls (62%) reported that their parents do not regulate the time they spend on the cell phone and 49% reported no regulation on types of activities they can engage in on the phone. Similarly, girls reported no parental regulation on time they spend on the computer (58%), video gaming system (64%), or Internet (55%). However, girls did report parental regulation on types of social networking sites they can access (63%), and types of activities they can engage in on the Internet (60%) and computer (61%). Over half (55%) the girls reported no parental regulation for games played on the video gaming system.

## Discussion

Our findings on cell phone ownership and physical activity reveal that over half (55%) the girls own a cell phone, and those who do own a cell phone report engaging in more physical activity than girls who do not own one. Although a few studies have examined the relationship between cell phone use and physical activity among adolescents, results are mixed. Devis-Devis et al. found a positive relationship between cell phone use and light physical activity on weekdays, but not weekends (Devis-Devis et al., 2010). Yet other researchers who crafted a more comprehensive definition of “media use,” including “listening to music, playing video games, using a computer, talking on the phone, and reading print media,” found no difference in physical activity levels between heavy and light media users (Rideout et al., 2010).

Our study results may reflect our unique study sample. Although we targeted a poor urban population, girls were recruited through organizations that provide community programs and services. Thus, girls were connected to community resources and engaged in extracurricular activities, such as Girl Scouts. Similar results were found in a study of cell phone ownership among Hungarian children: girls who were members of sports teams were more likely to own cell phones (Mezei, Benyi, & Muller, 2007). One possible explanation for the observed association between physical activity and access to cell phones may be parental monitoring. Children who participate in sports or community activities spend time away from home without direct parental supervision. Parents generally say they provide their child a cell phone for safety reasons, because they want to be able to reach the child any time and easily arrange after-event pickup (Olsen, 2010).

Given the relationship between cell phone access and physical activity, cell phones might be an effective channel for communicating with girls about physical activity, especially older girls who report greater access to and more time spent on their cell phones. First, cell phones are mobile devices a person carries 24 hours a day, seven days a week and that are used for social interaction and networking. The girls in this study reported texting, instant messaging, and taking pictures as their top three cell phone activities. Girls use their phones to interact and stay connected to friends throughout the day, which might explain why girls without a cell phone reported being sad or unhappy more frequently than girls with a phone. Our findings are consistent with data showing that teens, especially girls, use their cell phones mainly for social connection, often texting friends “just to say hello and chat” (Lenhart, Ling, Campbell, & Purcell, 2010). Second, parents may be more comfortable with their daughters using cell phones than other media, such as computers, the Internet and social

networking sites. A survey among parents of teen cell phone users found that only 34% of parents report using parental controls on their child's cell phone (Lenhart, 2012). Similarly, girls in this study reported that their parents do not regulate the time they spend on the cell phone or the types of activities they engage in on the cell phone, but do place more limits on Internet activities. This may indicate that parents would be more receptive to allowing their daughters to enroll in health promotion programs that use cell phones to disseminate information.

This study has some limitations. First, recruiting a convenience sample from various locations in San Antonio's Westside means the results are not generalizable to other settings and populations. Second, data is self-reported. Girls may have inaccurately reported hours spent on cell phones and social media and thus may have overestimated their answers or simply given socially desirable responses, which are prevalent in survey research (Newell, Girgis, Sanson-Fisher, & Savolainen, 1999). Third, this study is cross-sectional and cannot be used to establish a cause and effect relationship between cell phone use, physical activity, and personal contentment. Lastly, this study did not collect data on family income, which may account for variation in cell phone access. A recent report found that teens from families with a household income of more than \$75,000 have greater access to cell phones than those with less than \$75,000. Disparities also exist in lower-income families: 62% earning \$30,000 - \$49,999 have access to a cell phone compared to 75% earning \$30,000 - \$49,999 and 72% earning \$50,000 - \$74,999 (Lenhart, 2012).

Despite these limitations, the study provides vital information on the extent of cell phone and other media access and use in this vulnerable population to inform the development of a low-cost, mobile phone, SMS, and wireless technology intervention to increase moderate to vigorous physical activity among Latino girls on the Westside of San Antonio.

## Conclusions

Young people today, "Generation C," are identified by their level of connectivity to other people and to digital content (NMincite, 2011). They have grown up with the Internet and have lifelong use of multiple communication and media technologies. These "digital natives" access the Internet from home computers and mobile devices. But as with any technological revolution, there are differences within populations on access, adoption, and use. Our research shows that even a young financially disadvantaged study population is Internet-connected, and mobile devices, such as cell phones, can be used to deliver interventions to such populations. However, much remains to be learned about how to craft messages that engage girls and influence their behavior. A recent study of obese adolescents receiving health-related text messages found that text message shorthand and chat acronyms diluted credibility and limited comprehension of messages received (Stork, 2010). Also, more research is needed on appropriate message delivery (e.g., timing and frequency) and level of interactivity to achieve maximum exposure and influence. Another important aspect of promoting health to adolescents via mobile devices is the role of parents. Parents provide access to cell phones and monitor use, but given that many parents may be less technologically sophisticated in the new media environment than their children, it will be critical to understand their perspectives, the acceptability of this channel of delivery, and

their potential role in health promotion interventions that target their children via cell phones. As we move forward it will be critical to assess access, use, and comfort with technology, and behavioral and attitudinal factors of children and their parents, to design health promotion interventions that can be delivered via mobile devices.

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**Table 1**

Demographic characteristics of Latina girls (N=110)

	%
Age (years)	37
11	25
12	15
12	23
14	
US Born	95
Speak a language other than English at home	58
Grades	71
Mostly A's and B's	

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**Table 2**

Cell phone and other media access and use (mean hours per week) by age

		AGE				Total
		11	12	13	14	
<b>Phone</b>	Access* n (%)	16 (39)	16 (59)	10 (59)	19 (76)	61 (55)
	Use** n (mean ± SD)	13 (17.5 ± 22.8)	16 (24 ± 22)	9 (61.7 ± 30)	19 (58.1 ± 29)	57 (40 ± 32)
<b>Home computer</b>	Access n (%)	33 (80)	22 (81)	12 (75)	20 (83)	87 (81)
	Use n (mean ± SD)	28 (12.8 ± 16.4)	20 (8.5 ± 9)	13 (20.7 ± 24.4)	20 (11 ± 8.1)	81 (12.5 ± 15.2)
<b>Internet</b>	Access n (%)	34 (83)	24 (89)	15 (94)	24 (96)	97 (89)
	Use n (mean ± SD)	29 (7.2 ± 9)	21 (8.7 ± 9.6)	15 (13.7 ± 21.3)	23 (13.5 ± 18.1)	88 (10.3 ± 14.5)
<b>Video gaming system</b>	Access n (%)	31 (76)	20 (74)	10 (59)	16 (64)	77 (70)
	Use** n (mean ± SD)	27 (4.4 ± 7.7)	18 (5.9 ± 8.8)	10 (20 ± 26.5)	12 (5.1 ± 4.9)	67 (7.2 ± 13.1)
<b>Social networking sites</b>	Access* n (%)	22 (54)	19 (70)	15 (94)	23 (96)	79 (74)
	Use n (mean ± SD)	18 (7.9 ± 13.7)	16 (5.8 ± 8)	14 (16.6 ± 24.7)	22 (10.9 ± 18.5)	70 (10.1 ± 17.1)

Note:

\* significant differences between age groups using single degree-of-freedom comparisons adjusting for multiple contrasts;

\*\* significant differences between age groups using the bonferroni method

**Table 3**

Logistic regressions of physical activity (PA) among Latina girls (N=110)

Regression <sup>^</sup>			n	OR <sup>**</sup> (CI)
1	5+ days of PA in past week	Cell phone access Yes No	61 49	5.5 <sup>*</sup> (2.1, 14) 1
2	Daily physical education class in average week	Cell phone access yes No	61 49	2.6 <sup>*</sup> (1.1, 5.9) 1
3	Play on 1+ sports team	Cell phone access yes No	61 49	2.1 (.91, 4.9) 1

Note:

\* Significant at  $p < .05$ ;

\*\* Odds Ratios are age-adjusted

**Table 4**

Personal contentment and cell phone ownership

	Phone ownership		<i>P</i>
	Yes n (%)	No n (%)	
Have lots of friends (n=103)	52 (93)	41 (87)	.337
Get along with parents (n=107)	54 (90)	42 (89)	.914
Have been happy at school (n=108)	54 (90)	43 (90)	.943
Often bored (n=109)	37 (62)	31 (63)	.864
Get into trouble a lot (n=109)	19 (31)	17 (35)	.638
Often sad or unhappy (n=108)	9 (15)	19 (40)	.004

Note: p-values calculated using Chi-square and refer to comparisons between girls who own and girls who do not own a phone

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