Communication Research
1–20

DOI: 10.1177/0093650214565925
crx.sagepub.com
SAGE

Disadvantaged Minorities' Use of the Internet to Expand Their Social Networks

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Abstract

An essential argument of the social diversification hypothesis is that disadvantaged groups use the Internet rather than face-to-face communication to broaden social networks, whereas advantaged groups use the Internet to reinforce existing network ties. Previous research in this area has not accounted for both online and off-line communication, has only been examined with cross-sectional data, and has primarily been studied in Israel. To address these gaps with a U.S. data set, 2,669 conversations were analyzed over 6-day periods using ecological momentary assessment (EMA). Indeed, unlike participants from racially or educationally advantaged groups, participants who were from a racially marginalized group or lacked college training were more likely to broaden social networks online rather than face-to-face with interracial and weak tie exchanges. This proof of concept of social diversification theory across cultures is the first to use real-time, within-person measures of both race and tie strength.

Keywords

Internet, race, network diversity, limited homophily, social diversification, social capital, diary data

Social network composition is a critical factor in shaping quality of life. For example, having a healthy, professionally successful social network is associated with better health and professional success (DiTomaso, 2013; Link & Phalen, 1995; Marmaros & Sacerdote, 2002; Pampel, Krueger, & Denney, 2010); having a more diverse social

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network is associated with better community health and greater economic growth (Eagle, Macy, & Claxton, 2010; Kim, Subramanian, & Kawachi, 2006). Yet marginalized groups in the United States—such as African Americans, Latinos, and those without college training—are often segregated from more advantaged groups, making it difficult to diversify their social networks to include people with greater resources (DiMaggio & Garip, 2012). It has been suggested, however, that Internet communication may be a valuable tool for marginalized groups who want to broaden their social networks in a manner that circumvents off-line segregation (DiMaggio & Garip, 2012; Kang, 2000; Mesch, 2012).

One theory exploring this phenomenon is the *social diversification hypothesis* (SDH). A central argument of the SDH is that the Internet, designed for social networking across geographic distances, allows traditionally marginalized groups to broaden their social networks in new and valuable ways (Mesch, 2012). According to Mesch (2012), "minorities and immigrants will be more likely to use computer-mediated communication to compensate for their lack of social capital" (p. 317), where social capital includes economic resources as well as "mutual support, shared language, shared norms, social trust, and a sense of mutual obligation" (p. 321). As evidence of this, he finds that ethnically marginalized citizens in Israel are more motivated to use the Internet to broaden their networks than advantaged citizens.

Yet SDH research to date has not measured actual diversification behaviors as they manifest, particularly in interracial and weak tie interactions. Moreover, extant social diversification research has focused exclusively on online behaviors without examining whether there are differences in the diversity of off-line communication networks, despite predicting these differences. As a result it is difficult to know if diversification behaviors actually unfold as expected in everyday settings and, if so, how the Internet uniquely contributes to that process compared to face-to-face communication. To address these theoretical gaps, and the lack of empirical tests of these ideas in a U.S. setting (see D. T. Smith, 2013, for exception), this article examines both online and off-line communication diversity using randomly collected ecological momentary assessment (EMA) data, or diary data, from a diverse U.S. sample.

EMA data are collected using short in situ surveys repeated at randomly programmed moments throughout the day over multiple days. EMA methods avoid peak and recency biases associated with cross-sectional data (Kahneman, 1999), as well as sampling biases associated with scheduled diary studies (Stone & Shiffman, 2002). As a result, these responses collected in real time are a better measure of behavior than retrospective recall used in traditional surveys (Stone et al., 1998). EMA also enables evaluation of within-person processes, allowing individuals to act as their own controls (Almeida, 2005; Bolger, Davis, & Rafaeli, 2003) and making it possible to compare the racial and tie diversity of online and face-to-face communication for each participant. Using EMA methods for the first time in SDH research thus provides a "proof of concept" of the theory and allows for investigation of untested claims regarding differences in diversification between Internet and face-to-face communication.

Bonding Ties and Bridging Ties

The diversity of social networks influences both the amount and type of social capital acquired. Social capital refers to resources acquired through relationships (Bourdieu & Wacquant, 1992), such as a letter of recommendation, a job interview, or some other economically or culturally valuable good. *Bridging social capital* unifies groups "across diverse social cleavages" which enables "linkage to external assets and information diffusion" (Putnam, 2000, p. 22). A diverse social network likely includes more bridging social capital, including relationships with others of dissimilar demographic status (e.g., race, education, age, etc.). *Bonding social capital*, on the other hand, is associated with the reinforcement of existing ties (Gittell & Vidal, 1998). Bonding social capital is important for keeping in contact with long-standing, close bonds that are critical for support, and allows people in capital-rich networks to maintain access to established resources.

According to Granovetter's (1974) theory of the strength of weak ties, bridging social capital is an important source for increasing social capital. Granovetter's theory has been tested across multiple studies, demonstrating that bridging capital or weak tie contacts improve employment opportunities and salary negotiations by providing access to novel information (Lin, Ensel, & Vaugh, 1981; Seidel, Polzer, & Stewart, 2000). Outside of the workplace, bridging ties are positively associated with a variety of resources, including immigration (Liu, 2013), health (Kim et al., 2006), and regional economic prosperity (Eagle et al., 2010). For example, a network analysis of telephone communication across the United Kingdom found that greater network diversity within a community was associated with positive economic development (Eagle et al., 2010). Although the authors did not test causal mechanisms, they provide compelling evidence that increasing bridging ties is associated with greater social capital. In other words, communication with new relationships introduces new information, access, and opportunity into a network which can improve the lives of individuals and communities (for discussion of constraints on this process, see Aral & Alystyne, 2011).

Although Internet communication enables both bridging and bonding social capital (Ellison, Steinfield, & Lampe, 2007; Norris, 2004), it may be especially useful for facilitating bridging social capital relative to previous forms of communication (e.g., Burke, Kraut, & Marlow, 2011). On one hand, demographic similarities are still likely to enact a strong influence on interpersonal processes online (Aral, Muchnik, & Sundararajan, 2009; Kossinets & Watts, 2009). People are likely to exchange emails or instant messages with others of the same race, gender, and so on. Yet, Internet communication is associated with having a more diverse network (Hampton, Sessions, & Her, 2011), and in low-income communities, digital technologies can improve neighborhood cohesion by facilitating new social ties (Gad, Ramakrishnan, Hampton, & Kavanaugh, 2012; Hampton, 2010). Scholars have long pointed to the potential for Internet communication to increase social interaction across traditional social boundaries (Kang, 2000); the Internet may thus be a useful new resource for accessing social resources in alternative networks.

The Importance of Bridging Ties for Reducing Inequality

Using the Internet to enhance bridging social capital may be particularly important for people from socio-economically marginalized groups (DiMaggio & Garip, 2012; Massey, 2007). In the physical world, *homophily*, the physical and social affiliation of demographically alike people (McPherson, Smith-Lovin, & Cook, 2001), is associated with social inequalities. This is because preferences for affiliation with socio-economically and demographically similar others at the interpersonal or small group level (i.e., neighbors and friends) influences societal-level segregation (Feld, 1981). When combined with historical prejudices, this micro-level segregation can result in entire demographic segments of the population becoming physically and socially segregated into groups of haves and have-nots. Over time, distributions of wealth, knowledge, health, and political power remain in the networks of some groups while remaining outside others. There is, however, a growing body of theoretical and empirical research that suggests that members of disadvantaged groups may be able to use the Internet to circumvent some of these off-line inequalities by facilitating access to weak or bridging ties (DiMaggio & Garip, 2012; Mesch, 2012; Mesch, Mano, & Tsamir, 2012).

For example, using the concept of *limited homophily*, DiMaggio and Garip (2012) argue that the same network pressures described above that perpetuate inequality can reduce inequality, "if homophily is insufficient to amplify initial advantages" (p. 109). That is, if disadvantaged people intentionally expand their social networks to include dissimilar others via the Internet, for example, they may be able to tap into novel, resource-rich social networks and minimize the likelihood of having a circumscribed resource-deprived network. Recall that Internet use is associated with network diversification (e.g., Hampton et al., 2011). Given this, DiMaggio and Garip point to Granovetter's (1974) theory to argue that the social capital gained from Internet-based weak tie communication may improve quality of life, particularly for members of disadvantaged groups typically excluded from access to resources.

Similarly, the SDH proposes that members of marginalized groups are motivated to use the Internet to increase weak ties or bridging capital (Mesch, 2012; Mesch et al., 2012). Indeed, researchers have found that Arab Israelis report turning to Internet communication for increasing weak ties, whereas Jewish Israelis turn to the Internet to reinforce existing ties (Mesch, 2012). The author investigates these results across separate mediated communication channels (e.g., social networking sites, weblogs, and email), finding minimal evidence that this trend varies by channel.[1] Mesch et al. (2012) have also found that Arab Israelis are more motivated to use the web for health information than Jewish Israelis, as "minority groups that do not have access to specialized networks use the Internet to overcome their lack of access to specialized information" (p. 854). In sum, SDH research articulates how marginalized groups can use the Internet to access bridging social capital by seeking greater contact with individuals and information outside of their off-line networks.

Despite the contribution of the SDH thus far, extant research provides opportunities for further development. This study builds on the SDH in three key ways. First, previous SDH research to date has measured diversification by asking users to

retrospectively record *motivations* for Internet use.[2] In this study, participants record behaviors in real time, which previous research has found to be methodologically more accurate than retrospective surveys (e.g., Stone et al., 1998). As a result, these data serve as a "proof of concept" of the SDH using an added outcome measure of interracial diversification. Doing so helps to establish the predictive power of SDH. Second, because these data measure both online and off-line diversification, they are the first to establish whether social diversification is more likely to take place on the Internet than face-to-face communication. The SDH argues that the Internet is a tool for disadvantaged groups to "overcome existing physical and social barriers to information and association" (Mesch, 2012, p. 321), which presumes that it is more diverse than off-line communication, though this assumption has not been tested. These data are the first to test this claim by enabling within-person comparisons of online and off-line behaviors, a benefit of EMA data (Almeida, 2005; Bolger et al., 2003). Third, most SDH research has examined marginalized and advantaged groups in Israel. One exception is a single U.S. study that has found that African Americans are more likely than Whites to use the Internet to promote work or meet new business contacts (D. T. Smith, 2013). Again, however, that study uses retrospective rather than real-time measures; thus, this study lends additional credibility to the predictive power of the SDH cross-culturally.

Social Inequality in the United States

In order for marginalized groups to use the Internet to expand their network diversity in the United States, members of these groups must have access to the Internet. Previous digital divide research has demonstrated the existence of gaps in access to digital technologies by race and education status (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Zickuhr & Smith, 2012). For example, less educated Americans are consistently less likely to own and use digital technology (Zickuhr & Smith, 2012). Similarly, race and ethnicity predict access to and ownership of Internet devices, though this gap is shrinking and no longer exists for those who get online on a mobile device (Zickuhr & Smith, 2012).

Race and education are in fact long-standing predictors of access to resources more broadly. For example, in the United States, the median income in 2011 was markedly higher for Whites (US$55,000) and Asians (US$65,000) than for Hispanics (US$38,000) and African American/Blacks (US$32,000); African Americans/Blacks and Latinos were also twice as likely to live in poverty (DeNavas-Walt, Proctor, & Smith, 2012a). Similarly, there are striking racial difference in median net household worth in the United States, with African American/Black and Latino households in 2011 having a household worth of less than US$7,000 on average, compared with US$78,000 for Asians and US$113,000 for Whites (Taylor, Kochhar, Fry, Velasco, & Motel, 2011). Whites and Asians also have more education on average, with 25% of Asians and 15% of Non-Hispanic Whites having a bachelor's degree, compared with 9% of African Americans and 8% of Hispanics (U.S. Census Bureau, 2012b). In addition, Asians and Whites are somewhat less likely to live in racially segregated

neighborhoods than African Americans or Hispanics (Iceland, Weinberg, & Steinmetz, 2002), and the racial homophily that perpetuates these trends persists over decades (J. A. Smith, McPherson, & Smith-Lovin, 2014). Taken together, these data suggest that Asians and Whites have more economic and social resources in the United States than African American/Blacks and Latinos, and are more likely to have access to diverse real-world social networks.

Hypotheses

Given that marginalized groups must be able to access Internet technologies in order to expand their online social networks, it is first useful to establish the existence of disparities in information communication technology (ICT) access and ownership in this sample. I thus pose the following first hypothesis:

> *Hypothesis 1*: African Americans, Latinos, and people with no college experience will be less likely to have access to Internet technologies than Whites, Asians, or people from more educated backgrounds.

The primary aim of this study is to validate and extend the SDH using new methods, including an additional measure of diversification: interracial communication. Given differences in resources by race and education in the United States, the SDH would predict that African Americans, Latinos, and people from less educated backgrounds may have less diverse off-line networks and therefore, perhaps, may be more inclined to create more diverse online networks compared with Whites, Asians, or people from more educated backgrounds.[3] Indeed, findings from representative survey data are consistent with this prediction (D. T. Smith, 2013). I thus pose the following two hypotheses:

> *Hypothesis 2a (H2a)*: African Americans, Latinos, and people with no college experience will be more likely to have interracial exchanges online rather than off-line, whereas Whites, Asians, and those with some college experience are more likely to have interracial exchanges off-line rather than online.
> *Hypothesis 2b (H2b)*: African Americans, Latinos, and people with no college experience will be more likely to have weak tie exchanges online rather than off-line, whereas Whites, Asians, and those with some college experience are more likely to have weak tie exchanges off-line rather than online.

Method

Participants

All participants were recruited with flyers posted throughout Philadelphia advertising a study "that involves taking surveys for 6 days," including the urban city center, college campuses, public housing offices, and Women, Infant, and Children (WIC) program

offices. There was no reference to technology in the flyer. Ninety-eight participants between the ages of 18 and 39 years completed the study; age was capped at 40 to reduce age-related variance in exposure to technology. Participants were compensated US$90 for their participation. There were no recruitment quotas for age or race, though efforts were made to ensure that at least 25% of participants had no college experience. Twenty-two participants were excluded from the final analysis because they did not complete surveys as directed; these participants were all dropped before any statistical tests of hypotheses were performed.[4] The final analyses were performed on data from 76 participants and 2,669 surveys of interpersonal exchanges. The final sample size is comparable with samples used in other reputable diary studies (e.g., Rafaeli, Cranford, Green, Shrout, & Bolger, 2008; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Stone et al., 1998). Additional details on these participants are described in Table 1.

Procedure

Participants first contacted the lab by phone or email. They were asked about their typical waking-sleeping hours and then scheduled for an initial 1-hr meeting. There participants completed a battery of baseline psychological surveys (see also Gonzales, 2014) and were provided with a booklet describing the purpose and procedures of the study, which they were told was designed to answer the question: "Who do people talk to, and how often are they using technology?" They were then given a Palm Pilot that was pre-programmed to emit 56 random alarms over 6 days with 6 to10 alarms per day during each participant's unique average waking hours.[5] When an alarm rang, participants were asked to complete a short survey on the Palm Pilot about her or his two "most recent social interactions," including the channel in which it took place, the race of the participant, and whether or not the person was a strong tie relationship or weak tie relationship.

Social interactions were defined broadly for participants as "anything that is social." Participants were told that this included asynchronous digital interactions, or "half of an interaction (e.g., writing a text, reading a SNSs post, etc.)." Participants were also told that a substantial change in topic or long pause between conversations with the same person might qualify as a new social interaction and were instructed to use personal judgment in defining the beginning and end of a single interaction in all instances of ambiguity. If participants were engaging in a social interaction as an alarm rang, they were asked to complete a survey about that interaction. Participants could skip surveys if they had not communicated with anyone since completing the previous survey.[6]

In a 30-min training session with the author, each participant was given basic instruction on how to operate the Palm Pilot, as well as detailed instructions on completing the survey. The Palm Pilot was chosen as a data collection tool because it digitally time stamped each survey without enabling additional communication, and minimized the fact that some participants would be more familiar with the technology than others. After all instructions, participants left with the Palm Pilot and instruction booklet and were asked to return to the lab in 7 days to complete the same baseline psychological surveys.

Table 1. Descriptives of Independent and Dependent Variables.

	Overall (n = 76)		Black/Latino(n = 31)		White/Asian (n = 45)		No college (n = 16)		Some college (n = 60)	
	Obs = 2,669		Obs = 1,007		Obs = 1,662		Obs = 531		Obs = 2,138	
	M/%	*n*	*M*/%	*n*	*M*/%	*n*	*M*/%	*n*	*M*/%	*n*
Individual-level variables										
Age	25 years		28 years		23 years		30 years		24 years	
Gender (female)	54%	41	45%	17	53%	24	38%	6	58%	35
Race/ethnicity										
Black/Latino	41%	31					81%	13	30%	18
White/Asian	59%	45					19%	3	70%	42
Employed	51%	39	35%	11	62%	28	31%	5	57%	34
Digital access										
Home Internet	83%	63	61%	19	98%	44	44%	7	93%	56
Own computer	87%	66	68%	21	100%	45	44%	7	98%	59
Own smartphone	62%	47	71%	22	56%	25	63%	10	62%	37
Some college	79%	60	58%	18	93%	42				
Repeated variables										
Online exchange (vs. Face-to-Face)	15%	395	11%	112	17%	283	9%	47	16%	348
Interracial exchange	36%	968	36%	359	37%	609	29%	151	39%	817
Weak tie exchange	60%	1,609	51%	511	66%	1,098	53%	276	62%	1,333

Note. Age was capped at 40 and the overall standard deviation was 6.2 years. Race was self-rated. Three mixed-race individuals were placed into their minority racial category (1 Black/White, 1 Latino/White, and 1 Asian/White). Missing data: tie strength = 0 cases; racial composition = 13 cases. Percentages reflect the percent representation associated with each variable in the data, across all data (overall), and within a given sub-category (e.g., Black/Latino), based on the number of participants and observations in that sub-category. Obs = observation.

Measures

Independent variables. Independent variables in the model included participant age, gender, race, employment, education, access (see "Dependent Variables" section), and communication channel used during each social exchange reported on the EMA surveys. All variables were self-reported by participants. Race was recoded into a dichotomous variable. For race, African Americans and Latinos were categorized as socio-economically disadvantaged (1) and Whites and Asians were not (0). Participant education was also recoded into a dichotomous variable distinguishing those who were enrolled in or had completed at least some college (1) from those who had a high school degree or less education (0). Finally, communication channel was reported for each social interaction from the following options: face-to-face communication, landline telephone, cell phone, email, texting, Facebook, instant messaging, online discussion board/forum, video games, Twitter, and other. The 395 online (1) exchanges in the final data set included email (47%), Facebook (37%), instant messaging (13%), online discussion board/forum (<1%), Twitter (<1%), YouTube (<1%), and blog (<1%) exchanges. The reference category was face-to-face communication (0).[7]

Dependent variables. Measures of interracial diversity and weak tie diversity of an interactant were collected in each real-time survey. Participants recorded the race of the people they engaged with from the following categories: White, Black, Latino/a, Asian, Middle Eastern, and Other. To calculate interracial diversity, participants' racial/ethnic information was matched with the communication partners' race for each social exchange. A dichotomous measure of interracial diversity was then created for each social interaction to indicate whether it was a same race (0) or interracial (1) social interaction.

To measure weak tie diversity, participants were asked at baseline to give the initials "of each person that you can count on to provide you with emotional support" (derived from Sarason, Levine, Basham, & Sarason, 1983). People represented by each set of initials indicated participants' primary strong tie relationships. Participants recorded the initials of these strong ties in the baseline survey and also on an index card that remained with participants throughout the study. To efficiently assess whether each interaction was with a strong tie or weak tie, participants were asked in each real-time survey whether or not the communication partner was "on your index card." The result was a consistent, dichotomous measure of strong (0) or weak (1) tie communication for all social interactions.

Dichotomous, single-item measures of technology access were also taken at baseline to test H1, including measures of Internet access in the home, ownership of a computer, and ownership of a smartphone (all coded 1 = *yes*, 0 = *no*). Note that these variables were also included as independent variables in models testing H2a and H2b in order to account for the effect of digital access on Internet diversification.

Analytic Approach

Because outcome measures of access and network diversity are all binary, logistic regression analyses were used. In tests of H2a and H2b, "multi-level" or "mixed"

Table 2. Odds Ratios of Demographic Variables Predicting ICT Access.

	Internet in home		Own computer		Own smartphone	
	OR	*SE*	OR	*SE*	OR	*SE*
Age	0.91	0.05	0.98	0.07	0.96	0.04
Gender (*F* = 1)	2.27	1.92	0.44	0.44	0.50	0.25
Employed	1.02	0.90	1.14	1.12	0.71	0.36
Marginalized race/ethnicity	0.06*	0.07	0.15	0.18	2.63	1.61
Some college	6.74*	5.52	23.55**	24.52	1.61	1.16

Note. For the model on computer ownership to execute, 1 datapoint was changed to make the test of ethnic differences more conservative ($p = .11$). OR = odds ratio.
*$p \leq .05$. **$p \leq .01$.

modeling using STATA 11 was used to account for the interdependence of within-participant measurement when modeling both individual-level (fixed) and repeated (random-effects) variables (Rabe-Hesketh & Skrondal, 2008). Fixed-effects variables in this data set include demographic variables (age, gender, employment, race, and education) and access variables (Internet in home, computer ownership, and smartphone ownership). Repeated or random-effects variables include a channel measure for each exchange (online vs. face-to-face communication), and network diversity measures of interracial and weak tie communication for each exchange. In these models, the intraclass correlation (ICC) ranged from .34 to .43. These findings support the use of mixed models to account for individual-level effects on the likelihood of having interracial or weak tie exchanges as a function of communication channel.

Results

Differences in Access and Use

The first hypothesis (H1) was proposed to establish rates of access to digital technology in this sample. Multiple logistic regression was used to test for demographic effects on the odds of having Internet access at home, ownership of a computer, and ownership of a smartphone, after accounting for age, gender, and employment (Table 2). Age, gender, and employment did not have an effect on any of the three access outcomes. Race and ethnicity predicted the propensity to have desktop or laptop Internet access at home, where the odds of African Americans and Latinos having Internet access at home were about 1/16 that of Whites and Asians. For someone with some college experience, the odds of having Internet access at home were almost 7 times greater than for someone without any college experience and the odds of owning a computer were more than 23 times greater. There were no differences in the odds of smartphone ownership by demographic variables. These findings are consistent with previous research that finds that race and education are associated with home access to the Internet and computers but

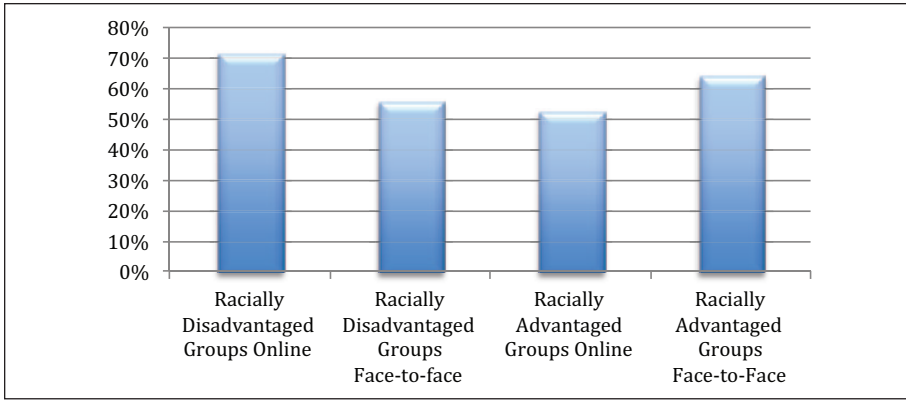

Figure 1. Probability of having an interracial social interaction.
Note. Racially disadvantaged groups: African Americans and Latinos; racially privileged groups: Whites and Asians. Online communication includes email, SNSs, instant messaging, microblogs, blogs, YouTube, and online forums. These probabilities reflect results from a significant interaction term without covariates in the model ($\beta = 1.17$, $SE = 0.30$, $p < .001$). See text for significant interaction terms that account for covariates.

not with smartphone ownership (DiMaggio et al., 2004; Zickuhr & Smith, 2012). Although it is important to underscore that this is not a representative sample, these data are useful descriptives of access in this sample.

Differences in Network Diversity

To test H2a and H2b, all independent variables were first entered into each mixed-effects logistic regression model for interracial and weak tie diversity. These included variables for age, gender, race, education, employment status, communication channel (online vs. off-line), and digital access (i.e., Internet in home, computer ownership, and smartphone ownership). There were no main effects of any independent variables on either the likelihood of having an interracial conversation or a weak tie conversation. In other words, simply being online did not increase the chances of having more diverse communication.

Next, interaction terms for Channel × Race and Channel × Education were entered into mixed-effects logistic regression models of interracial and weak tie diversity. In support of H2a, results revealed a statistically significant association between the Channel × Race variable and the likelihood of having an interracial exchange ($\beta = 1.11$, $SE = 0.32$, $p = .001$). That is, as predicted, African Americans and Latinos were considerably more likely to have an interracial conversation online compared with off-line, whereas Whites and Asians were more likely to have an interracial conversation off-line compared with online (see Figure 1 for graphical representation of results). There was no effect of Channel × Education on interracial diversity in day-to-day communication.

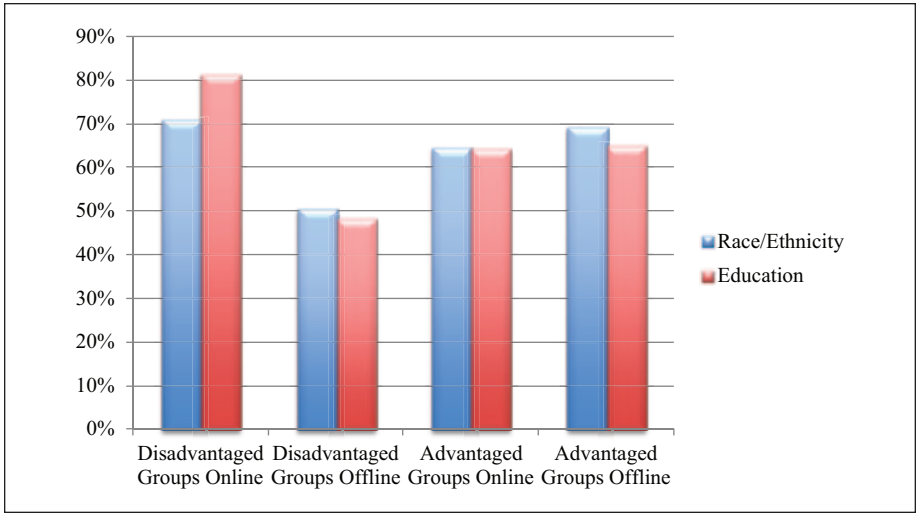

Figure 2. Probability of having a weak tie social interaction.
Note. See text for significant interaction terms that account for covariates. Racially disadvantaged groups = African Americans and Latinos; racially privileged groups = Whites and Asians. Educationally disadvantaged = no college experience; educationally advantaged = some college experience. Online communication includes email, SNSs, instant messaging, microblogs, blogs, YouTube, and online forums. These probabilities reflect results from two models without covariates. One model revealed a significant interaction effect of Race × Channel (β = 1.10, *SE* = 0.30, $p < .001$), the other model revealed a significant interaction effect of Education × Channel (β = −1.57, *SE* = 0.47, $p = .001$).

In support of H2b, results revealed a statistically significant association between both Channel × Race and weak tie diversity ($\beta = 0.86$, $SE = 0.32$, $p = .007$) and Channel × Education and weak tie diversity ($\beta = -1.25$, $SE = 0.49$, $p = .01$). As predicted, African Americans, Latinos, and people without college experience were substantially more likely to have weak tie exchanges online rather than off-line, whereas Whites, Asians, and people with some college experience were slightly more likely to have weak tie exchanges off-line rather than online (see Figure 2 for a graphical representation of results).

To further facilitate interpretation of these findings, the models were stratified by communication channel for each of the dependent variables (Table 3). As predicted, the odds of having an interracial exchange online were more than 3 times greater for African Americans and Latinos than for Whites and Asians, though there was no difference in the likelihood of having an interracial exchange face to face between members of marginalized and advantaged racial groups. In contrast, the odds of having a weak tie exchange off-line for African Americans and Latinos was around one third that of Whites and Asians but there was no effect of race on the likelihood of having a weak tie exchange online (Table 4). This is consistent with previous research in off-line contexts that find that higher status individuals (e.g., those with greater education; males) have more diverse networks "since these groups have both homophilous high-status relationships *and* ties that extend lower into the educational occupational/

Table 3. Multi-Level Logistic Regression of Interracial Diversity Stratified by Communication Channel Accounting for Within-Person Repeated Measures.

	Interracial diversity			
	Online		Face to face	
	OR	*SE*	OR	*SE*
Age	1.07	0.06	0.96	0.03
Gender (*F* = 1)	1.28	0.68	0.96	0.36
Employed	1.35	0.70	1.42	0.51
Access variables				
Home Internet	0.35	0.39	0.29**	0.18
Own computer	1.57	2.18	1.77	1.39
Own smartphone	0.37	0.20	0.53	0.19
Marginalized race/ethnicity	3.77**	2.26	1.17	0.51
Some college	2.56	2.57	2.79	1.81

Note. Marginalized race: African American/Black and Latino, with White and Asian as the reference group. OR = odds ratio. **$p \leq .05$.

Table 4. Multi-Level Logistic Regression of Weak Tie Diversity Stratified by Communication Channel Accounting for Within-Person Repeated Measures.

	Weak tie diversity			
	Online		Face to face	
	OR	*SE*	OR	*SE*
Age	1.05	0.07	0.98	0.03
Gender (*F* = 1)	1.88	1.12	1.55	0.58
Employed	1.77	1.02	1.13	0.41
Access variables				
Home Internet	0.56	0.75	0.67	0.41
Own computer	2.74	4.58	0.34	0.25
Own smartphone	0.68	0.43	1.05	0.39
Marginalized race/ethnicity	0.60	0.41	0.35**	0.15
Some college	0.27	0.33	2.48	1.54

Note. Marginalized Race: African American/Black and Latino, with White and Asian as the reference group. OR = odds ratio. **$p \leq .05$.

occupational status hierarchy (Marsden 1987, Campbell et al 1986, Campbell 1988, Fischer 1982)" (McPherson et al., 2001, p.427). Finally, in face-to-face settings, participants with some college had more weak tie communication compared with those with no college, whereas in online settings, participants with no college had more weak tie communication compared with those with some college. Although neither

pairwise odds ratio was significantly different from one in this analysis, these substantially different odds ratios yield a significant interaction of Education × Channel, demonstrating support of H2 (Table 4).

Finally, to better approximate past analyses that examined individual motives to reinforce or diversify ties (Mesch, 2012), I performed the interaction analyses only on personal social interactions (i.e., excluding all social interactions conducted for work, school, and errands). Similar to Mesch's findings that individuals are personally motivated to expand or reinforce ties depending on demographic status, these findings hold or become stronger when isolating only participants' personal communication (interracial exchange: Race × Channel, $\beta = 1.81$, $SE = 0.45$, $p < .001$; weak tie exchange: Race × Channel, $\beta = 1.48$, $SE = 0.40$, $p < .001$; and Education × Channel, $\beta = -1.24$, $SE = 0.61$, $p = .04$; $n = 76$, observation = 1,627). Overall, these findings demonstrate support for H2, which predicted that disadvantaged people will use the Internet to diversify their off-line network and advantaged people will use the Internet to maintain the diversity of off-line network ties.

Discussion

According to both the *limited homophily* framework (DiMaggio & Garip, 2012) and the *SDH* (Mesch, 2012), disadvantaged groups may seek diverse communication online that they do not have access to off-line. This form of diversification is an example of *bridging capital*, which is associated with an increase in individual and community well-being (e.g., Eagle et al., 2010; Kim et al., 2006; Lin et al., 1981; Liu, 2013; Seidel et al., 2000). Indeed, findings from this study largely support the theoretical prediction that disadvantaged groups are using the Internet to engage with dissimilar or weak tie relationships that they do not engage with off-line, especially compared with advantaged groups who do not display this pattern. Evidence of this in a subset of only personal communications suggests that this is driven by personal motive rather than external circumstances (e.g., work, errands), which further supports the mechanisms articulated by the SDH. Put another way, these findings are the first evidence of a "proof of concept" of the SDH using real-time surveys and are also the first to demonstrate that, compared with face-to-face communication, the Internet is a uniquely useful tool for enhancing bridging communication for marginalized groups.

Tests of H1 revealed support for previous work on access by disadvantaged groups (DiMaggio et al., 2004; Zickuhr & Smith, 2012). Members of marginalized groups had lower rates of Internet use and access but were not less likely to own smartphones (Zickuhr & Smith, 2012). These findings add greater complexity to interpretation of the diversification findings (H2) in that marginalized groups, especially African Americans and Latinos, managed to have only a somewhat smaller percentage of online exchanges despite greater barriers to access (see Table 1). This particularly implicates smartphone technology as a tool for creating opportunities for social diversification and suggests the need for future research.

Results from tests of the subsequent two hypotheses expand on previous SDH research in three important ways. First, previous research in this area has employed survey methodologies that are susceptible to response biases (Kahneman, 1999). In contrast, these data were collected within minutes of each communication exchange, reducing recall error, social desirability biases, and other limitations of cross-sectional data. In fact, EMA methodology has been found to be a better measure of actual behavior than retrospective surveys (e.g., Stone et al., 1998). As a result, the findings act as a valid proof of concept of the SDH, underscoring the value of EMA methodologies as a compliment to survey methods.

Second, the SDH and limited homophily theories have argued that the Internet affords greater access to diverse networks for marginalized groups than face-to-face communication, but this had not been tested. A key benefit of EMA methodologies is the availability of within-person control data; because participants reported on both mediated and non-mediated communication, comparisons could be made both within and between disadvantaged and advantaged participants. Statistically significant interactions suggest that the Internet differs from face-to-face communication by allowing for diversification of communication network. In other words, marginalized groups did not have broader networks in general; rather they used the Internet in particular to diversify their networks. This was the first time this aspect of the SDH had been tested.

Third, these data build on previous work by using a novel U.S. sample and by operationalizing diversification in a novel way using measures of interracial communication and real-time measures of tie maintenance. Coupled with a recent study (D. T. Smith, 2013), this further demonstrates that diversification is not specific to an Israeli population. Also, given research that interracial contact can reduce prejudice and anxiety about cross-race communication, these findings point to broader implications of diversification for promoting positive social change in different societies (Pettigrew & Tropp, 2006; Shook & Fazio, 2008). Additional research that examines how marginalized groups across nations are using the Internet for interracial diversification would further expand the cross-cultural value of the SDH. It is possible that any society deeply divided by ethnicity or race may reflect patterns of the SDH.

In sum, these data add to a growing body of work that contends that marginalized people may be able to take advantage of Internet communication to broaden their social networks. In most cases, the homophily that dominates most social networks often reinforces existing inequalities, resulting in a "rich get richer" effect (DiMaggio & Garip, 2012). These data suggest that the Internet may actually be a 21st century resource for reducing inequality if marginalized groups can use the web to increase network heterogeneity. Future work is needed to determine whether social diversification actually translates to improvements in social capital, as is found in earlier studies (e.g., Eagle et al., 2010). If so, this would pose an exciting benefit of digital communication for those marginalized individuals with Internet access. Such findings would also inform the design of future systems or policy debates about the benefits of ensuring that marginalized groups have digital access.

Limitations

One limitation of this study is that EMA surveys are not generalizable and they do not explicitly measure internal diversification motives, as in previous SDH research. Although this was done intentionally to minimize risk of response biases, it also makes it unclear whether marginalized groups were intentionally or unintentionally using the Internet to diversify networks. A subset of only personal communications was analyzed to better approximate the mechanisms of intentional diversification articulated by Mesch (2012), but future studies could measure both intentions and real-time behavior to address this gap.

Also, although participants were encouraged to answer surveys frequently without compromising their social activity, it is impossible to know how this process may have altered communication. In addition, the sample was capped at age 40 and many participants failed to follow instructions, thus were removed from the data set. Although these choices were made to minimize age-related variance and maximize the integrity of the data, these choices represent further limitation of the current sample and should be addressed in future research.

Another concern is the fact that Mesch (2012) explores differences in the SDH by channel. In these data, however, the fact that there are many fewer online interactions than off-line interactions limits the ability to look at subcategories of Internet communication in a meaningful way. Given the demographic findings of H1, future research should also better address whether diversification behaviors are taking place with large-screen or mobile computers. Also, accurate measures of income were not available in these data but would have been a valuable control variable to address the effects of race and education after accounting for economic status. Measures of employment and digital technology access were used to somewhat account for socioeconomic status, but income variables should be included in future studies of this nature. Finally, education did not predict differences in interracial exchange. Further research is needed to better understand this inconsistency in the data.

Future Research

This study rests on the assumption that diversification is beneficial for increasing social capital (e.g., Granovetter, 1974). EMA methodologies are often necessary for making real-world, within-person comparisons of behavior; thus, these data are an important step toward demonstrating that some marginalized groups, compared with more advantaged groups, are in actuality using Internet communication rather than face-to-face communication for diversifying their networks in naturalistic settings. Longitudinal research that measures both diversification behaviors as well as the outcomes of diversification on social capital would underscore the value of the Internet-based diversification behaviors. Also, because these findings suggest that smartphones may be critical for enabling diversification, they serve as a compliment to research on the mobile digital divide, which has found smartphones to be a useful but subpar bridge toward Internet access for marginalized groups (Brown, Campbell, & Ling,

2011; Mossberger, Tolbert, & Hamilton, 2012). Additional research on diversification should target smartphone use to better understand its role in this capital building process. Finally, qualitative research on diversification processes would serve to enrich understanding of exactly what different groups are doing when they are online.

Conclusion

These findings suggest an alternative to the classic digital divide narrative that emphasizes the inability of disadvantaged groups to exploit the offerings of digital technology due to a lack of access and skill. Instead, this study suggests that Internet technology may bridge pervasive access divides and allow marginalized groups to diversify their online social networks even though their off-line social networks remain, perhaps for demographic and geographic reasons, less diverse. A long history of research on weak ties suggests that this has great potential for improving quality of life for these populations. In addition to continued theoretical development, future work in this area should address the long-term consequences of expanding networked for marginalized groups and should explore ways that institutions may support these processes.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This project was funded through a grant from the Robert Wood Johnson Foundation. The author is indebted to Elisa Baek, Grisselle DeFrank, Robyn Jordan, and Terry Ye for their help in collecting and transcribing data. In addition, thanks to Annie Lang for feedback on earlier drafts.

Notes

1. Mesch (2012) finds differences in the frequency of weblog use but did not find any differences in the use of other Internet channels. In this sample, less than 1% of the 395 online interactions utilized weblogs. Given this, all the Internet communication in this study was combined into a single text-based “Internet” variable.
2. Mesch (2012) measures motives for strong tie maintenance—(1a) I use the Internet to conserve existing relationships with my family and (1b) I use the Internet to conserve and maintain my relationships with my friends—and weak tie expansion—(2a) I use the Internet to expand my professional and occupational ties and (2b) I use the Internet to meet new people. Although these measures assess intention rather than enacted behavior, they are comparable with measures of tie strength (e.g., communication with supportive family and friends vs. all others) used in this study.
3. I do not mean to suggest that Asians in the United States are not subject to racial prejudices. Furthermore, socio-economic status varies widely across different Asian populations and

within Asian populations. A study by Zeng and Xie (2004) finds that part of this variation is explained by country of education. U.S.-born and U.S.-educated Asians earn the same as Whites, but foreign educated Asians earn approximately 16% less than both groups (Zeng & Xie, 2004). As all Asian participants in this sample were educated in the United States, these participants should not be highly motivated to seek capital outside of existing networks. Note that, despite this rationale, removing Asians from the sample does not change primary findings.

4. There was no statistical difference in the age, gender, race, or employment of those participants who were dropped. Dropped participants were less educated on average than the participants in the total included sample, $t(95) = 3.85$, $p < .001$.
5. Stone and Shiffman (2002) argue that, although burdensome, random sampling is ideal for optimizing representativeness. They argue that study length should vary by study.
6. Participants skipped 3,153 surveys.
7. Because previous theoretical tests of social diversification hypothesis (SDH) specify tests of differences between the Internet and face-to-face communication (Mesch, 2012), all telephone-based and video calls were removed from these analyses, as it was not clear how to classify these instances of communication using the SDH.

References

Almeida, D. M. (2005). Resilience and vulnerability to daily stressors assessed via diary methods. *Current Directions in Psychological Science*, *14*, 64-68.

Aral, S., & Alystyne, M. V. (2011). The diversity-bandwidth trade-off. *American Journal of Sociology*, *117*, 90-171.

Aral, S., Muchnik, L., & Sundararajan, A. (2009). Distinguishing influence-based contagion from homophily-driven diffusion in dynamic networks. *Proceedings of the National Academy of Sciences*, *106*, 21544-21549.

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology*, *54*, 579-616.

Bourdieu, P., & Wacquant, L. (1992). *An invitation to reflexive sociology*. Chicago, IL: University of Chicago Press.

Brown, K., Campbell, S. W., & Ling, R. (2011). Mobile phones bridging the digital divide for teens in the US? *Future Internet*, *3*, 144-158.

Burke, M., Kraut, R., & Marlow, C. (2011). Social capital on Facebook: Differentiating use and users. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 571-580).

DiMaggio, P., & Garip, F. (2012). Network effects and social inequality. *Annual Review of Sociology*, *38*, 93-118. doi:10.1146/annurev.soc.012809.102545

DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). Digital inequality: From unequal access to differentiated use. In K. Neckerman (Ed.), *Social inequality* (pp. 355-400). New York, NY: Russell Sage.

DiTomaso, N. (2013, May 5). How social networks drive black unemployment. *The New York Times*. Retrieved from http://opinionator.blogs.nytimes.com/2013/05/05/how-social-networks-drive-black-unemployment/

Eagle, N., Macy, M., & Claxton, R. (2010). Network diversity and economic development. *Science*, *328*, 1029-1031. doi:10.1126/science.1186605

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of SNSs "friends": Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, *12*. Retrieved from http://jcmc.indiana.edu/vol12/issue4/ellison.html

Feld, S. L. (1981). The focused organization of social ties. *American Journal of Sociology*, *86*, 1015-1035.

Gad, S., Ramakrishnan, N., Hampton, K. N., & Kavanaugh, A. (2012, December). *Bridging the divide in democratic engagement: Studying conversation patterns in advantaged and disadvantaged communities*. 2012 ASE/IEEE International Conference on Social Informatics, Washington, DC.

Gittell, R. J., & Vidal, A. (1998). *Community organizing: Building social capital as a development strategy*. Thousand Oaks, CA: SAGE.

Gonzales, A.L. (2014). Text-based communication influences self-esteem more than face-to-face or cellphone communication. *Computers in Human Behavior*, *39*, 197-203.

Granovetter, M. (1974). *Getting a job*. Cambridge, MA: Harvard University Press.

Hampton, K. N. (2010). Internet use and the concentration of disadvantage: Glocalization and the urban underclass. *American Behavioral Scientist*, *53*, 1111-1132.

Hampton, K. N., Sessions, L. F., & Her, E. J. (2011). Core networks, social isolation, and new media: How Internet and mobile phone use is related to network size and diversity. *Information, Communication & Society*, *14*, 130-155. doi:10.1080/1369118X.2010.513417

Iceland, J., Weinberg, D. H., & Steinmetz, E. (2002). *Racial and ethnic residential segregation in the United States: 1980-2000*. Washington, DC: U.S. Census Bureau.

Kahneman, D. (1999). Objective happiness. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 3-25). New York, NY: Russell Sage.

Kang, J. (2000). Cyber-race. *Harvard Law Review*, *113*, 1130-1208. doi:10.2307/1342340

Kim, D., Subramanian, S. V., & Kawachi, I. (2006). Bonding versus bridging social capital and their associations with self rated health: A multilevel analysis of 40 US communities. *Journal of Epidemiology & Community Health*, *60*, 116-122. doi:10.1136/jech.2005.038281

Kossinets, G., & Watts, D. J. (2009). Origins of homophily in an evolving social network. *American Journal of Sociology*, *115*, 405-450.

Lin, N., Ensel, W., & Vaughn, J. (1981). Social resources and strength of ties: Structural factors in occupational status attainment. *American Sociological Review*, *46*, 393-405.

Link, B. G., & Phalen, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, *35*, 80-94.

Liu, M.-M. (2013). Migrant networks and international migration: Testing weak ties. *Demography*, *50*, 1243-1277.

Marmaros, D., & Sacerdote, B. (2002). Peer and social networks in job search. *European Economic Review*, *46*, 870-879. doi:10.1016/S0014-2921(01)00221-5

Massey, D. (2007). *Categorically unequal: The American stratification system*. New York, NY: Russell Sage.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*, 415-444. doi:10.1146/annurev.soc.27.1.415

Mesch, G. (2012). Minority status and the use of computer-mediated communication: A test of the social diversification hypothesis. *Communication Research*, *39*, 317-337. doi:10.1177/0093650211398865

Mesch, G., Mano, R., & Tsamir, J. (2012). Minority status and health information search: A test of the social diversification hypothesis. *Social Science & Medicine*, *75*, 854-858. doi:10.1016/j.socscimed.2012.03.024

Mossberger, K., Tolbert, C. J., & Hamilton, A. (2012). Measuring digital citizenship: Mobile access and broadband. *International Journal of Communication*, *6*, 2492-2528.

Norris, P. (2004). The bridging and bonding role of online communities. In P. N. Howard & S. Jones (Eds.), *Society online* (pp. 31-41). Thousand Oaks, CA: SAGE.

Pampel, F. C., Krueger, P. M., & Denney, J. T. (2010). Socioeconomic disparities in health behaviors. *Annual Review of Sociology*, *36*, 349-370. doi:10.1146/annurev.soc.012809.102529

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*, 751-783. doi:10.1037/0022-3514.90.5.751

Putnam, R.D. (2000). *Bowling Alone*. New York: Simon & Schuster.

Rabe-Hesketh, S., & Skrondal, A. (2008). *Multi-level and longitudinal modeling using Stata*. College Station, TX: Stata Press.

Rafaeli, E., Cranford, J. A., Green, A. S., Shrout, P. E., & Bolger, N. (2008). The good and bad of relationships: How social hindrance and social support affect relationship feelings in daily life. *Personality and Social Psychology Bulletin*, *34*, 1703-1718.

Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, *26*, 419-435.

Sarason, I. G., Levine, H. M., Basham, R. B., & Sarason, B. (1983). Assessing social support: The Social Support Questionnaire. *Journal of Personality and Social Psychology*, *44*, 127-139. doi:10.1037/0022-3514.44.1.127

Seidel, M.-D., Polzer, J., & Stewart, K. (2000). Friends in high places: The effects of social networks on discrimination in salary negotiations. *Administrative Science Quarterly*, *45*, 1-24.

Shook, N. J., & Fazio, R. H. (2008). Interracial roommate relationships: An experimental field test of the contact hypothesis. *Psychological Science*, *19*, 717-723. doi:10.1111/j.1467-9280.2008.02147.x

Smith, D. T. (2013). African Americans and network disadvantage: Enhancing social capital through participation on social networking sites. *Future Internet*, *5*, 56-66.

Smith, J. A., McPherson, M., & Smith-Lovin, L. (2014). Social distance in the United States: Sex, race, religion, age, and education homophily among confidants, 1985 to 2004. *American Sociological Review*, *79*, 432-456. doi:10.1177/0003122414531776

Stone, A. A., Schwartz, J. E., Neale, J. M., Shiffman, S., Marco, C. A., Hickcox, M., . . .Cruise, L. J. (1998). A comparison of coping assessed by ecological momentary assessment and retrospective recall. *Journal of Personality and Social Psychology*, *74*, 1670-1680.

Stone, A. A., & Shiffman, S. (2002). Capturing momentary, self-report data: A proposal for reporting guidelines. *Annals of Behavioral Medicine*, *24*, 236-243. doi:10.1207/S15324796ABM2403_09

Taylor, P., Kochhar, R., Fry, R., Velasco, G., & Motel, S. (2011). *Wealth gaps rise to record highs between Whites, Blacks and Hispanics*. Washington, DC: Pew Research Center.

U.S. Census Bureau. (2012b). *Detailed years of school completed by people 25 years and over by sex, age groups, race and Hispanic origin: 2012*. Retrieved from http://www.census.gov/hhes/socdemo/education/data/cps/2012/tables.html

Zeng, Z., & Xie, Y. (2004). Asian-Americans' earnings disadvantage reexamined: The role of place and education. *American Journal of Sociology*, *109*, 1075-1108. doi:10.1086/381914

Zickuhr, K., & Smith, A. (2012). *Digital difference*. Washington, DC: Pew Research Center.

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