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# Racial Gaps in Attention to Health Information:

# An ERP Investigation

Allison Earl[a]*, Justin Hepler[b], Dolores Albarracín[c]

[a]Department of Psychology, University of Michigan, Ann Arbor, USA; [b] Department of Psychology, University of Nevada, Reno, USA; [c]Department of Psychology, University of Illinois, Champaign, USA

*Corresponding author. Email: anearl@umich.edu

Allison Earl
University of Michigan
530 Church Street
Ann Arbor, MI, USA 48109
+1 734 763 1133
anearl@umich.edu

Justin Hepler
University of Nevada, Reno
justinhepler@unr.edu

Dolores Albarracín
University of Illinois
630 E Daniel Street
Champaign, IL, USA 61820
dalbarra@illinois.edu

Abstract

Compared to European-Americans, African-Americans have greater probability of becoming infected with HIV, as well as worse outcomes if they do become infected. Furthermore, African-Americans are less likely to pay attention to HIV-prevention information compared to European-Americans. However, the issue of when attentional disengagement from information occurs still remains. One possibility is that African-Americans merely tune out HIV-prevention altogether. In contrast, African-Americans may initially attend to HIV-prevention information before defensive processing and subsequent disengagement occurs. Although both hypotheses predict decreased attention, the implications for increasing attention are very different. To investigate this issue, we measured attention-related Event-Related Potentials in response to a modified flanker task with a community sample of African- and European-Americans. Results suggest that HIV trials capture African-Americans' attention initially (indexed by increased N100 amplitude compared to control trials) before disengagement occurs (indexed by decreased P300 amplitude compared to control trials), suggesting support for the late disengagement hypothesis.

Keywords: Attention, ERP, health information, HIV, N100, P300

**Racial Gaps in Attention to Health Information:**

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Health disparities are differences in the incidence, prevalence, mortality, burden of disease, and other adverse health conditions or outcomes that exist among specific population groups in the United States (National Association of Chronic Disease, 2010). These population groups can be based on gender, age, ethnicity, socioeconomic status, geography, sexual orientation, disability, or special health care needs. In the United States, the problem of health disparities is particularly salient across racial groups. In particular, African-Americans relative to European-Americans suffer disproportionately from stroke, hypertension, cardiovascular disease, diabetes, hepatitis, cancer, tuberculosis, mental disorders, syphilis, and HIV (Centers for Disease Control and Prevention, 2005). Thus, negative health disparities exist for African-Americans relative to European-Americans across wide variety of diseases.

Of these disparities, Human Immunodeficiency Virus (HIV) is one of the worst pandemics of the last twenty years (Centers for Disease Control and Prevention, 2006). Over 30 million people are infected worldwide (UNAIDS, 2010). The human costs of HIV are extraordinary, including an entire generation of over 16 million children who have been orphaned by HIV (UNAIDS, 2012). In some countries, such as Zimbabwe and Botswana, up to 75% of all orphans are children of HIV victims (UNICEF, 2006). The economic costs of HIV are also debilitating, with decreases in Gross Domestic Product (GDP) up to 1.5% annually for countries with high infection rates (Bell, Devarajan, & Gersbach, 2003). Finally, HIV is not just a problem abroad as over one million Americans are believed to be HIV-positive (Centers for Disease Control and Prevention, 2012). In the US, the rate of new HIV infection in African-Americans is eight times that of European-Americans based on population size (Centers for

Disease Control and Prevention, 2014). Clearly HIV infection, especially for African-Americans, is an issue that must be addressed.

*Disparities in Attention to Information as a Predictor of Health Outcomes*

One possible explanation for differences in health outcomes across groups is differences in attention to health information. In particular, recent meta-analytic evidence suggests that African-Americans are less likely to complete HIV-prevention interventions than members of other ethnic groups (Albarracin & Durantini, 2010). Specifically, studies that include samples with higher proportions of African-Americans are less likely to complete HIV-prevention interventions compared to studies that include samples with lower proportions of African-Americans (Albarracin & Durantini, 2010). However, studies that include samples with higher proportions of African-Americans are more likely to induce behavior change compared to studies that include samples with lower proportions of African-Americans (Albarracin & Durantini, 2010). This discrepancy between intervention exposure and behavior change implies that ensuring reception to health messages may effectively reduce HIV risk among African-Americans. Furthermore, these data suggest that efforts must be directed at understanding when and why African-Americans disengage from HIV-prevention information.

Ensuring message reception and attention, however, can be problematic, particularly if HIV-prevention messages elicit fear. In particular, meta-analytic evidence suggests that fear is related to decrements in both learning and behavior change following an HIV-prevention intervention (Earl & Albarracin, 2007). African-Americans compared to European-Americans are over five times more likely to report being very concerned about personally becoming infected with HIV (Kaiser Family Foundation, 2011). In addition, African-Americans are more likely to report knowing someone who is infected with HIV, as well as seeing the negative

outcomes of living with HIV (Gerbert, Sumser, & Maguire, 1991; Herek & Capitanio, 1997; Kaiser Family Foundation, 2011). Thus, the increased perceived threat of HIV for African-Americans may produce disengagement from, rather than attention to, HIV-prevention messages.

Even if social health disparities are paralleled by disparities in attention to health information, the issue of when disengagement from the message occurs still remains. One possibility is that African-Americans merely tune out information about HIV altogether. However, given that fear-inducing stimuli tend to elicit automatic attention, we propose a second possibility. Specifically, African-Americans may initially attend to information about HIV but then disengage from the message after this initial period of automatic attention. These two possibilities represent a difference in early versus late attentional disengagement. A critical test of whether early attentional disengagement occurs is the presence or absence of an alerting response (Posner & Peterson, 1990), which can be assessed via an event related potential (ERP) known as the N100. The N100 has increased amplitude in response to attended (versus unattended) stimuli (Hillyard, Mangun, Woldorff, & Luck, 1995), and an increased N100 supports early-selection theories of attention (Coull, 1998; Mangun & Hillyard, 1995; Pashler, 1998). N100 is an early-onset (peaking approximately 80-110ms post-stimulus presentation), negative-going potential that has a frontal distribution and has been linked to orienting and automatic stimulus processing (Hillyard, Hink, Schwent, & Picton, 1973; Luck, 2005). In addition, the N100 is moderated by threat perceptions. For instance, higher N100 amplitudes are elicited in response to threat compared to control primes (Weinstein, 1995), angry compared to neutral faces (Felmingham, Bryant, & Gordon, 2003), and faces of outgroup compared to ingroup members (Ito & Urland, 2003, 2005; Kubota & Ito, 2007). Overall, observing increased N100 amplitude in response to HIV information would suggest increased initial attention to this

information. Thus, we predict that Africa-Americans will display larger N100 amplitude when presented with HIV information.

If information about HIV elicits an alerting response (as indexed by increased N100 amplitude) for African-Americans, it is still possible that disengagement from information may occur later. For instance, African-Americans may cope with the threat of information about HIV by allocating less attention at the stage of executive control, which can be assessed via an ERP component known as the P300. P300 is a later-onset (peaking approximately 350-650ms post-stimulus presentation), positive-going potential that has a central-parietal distribution and has been linked to context updating and controlled processing of information (Hillyard et al., 1973; Luck, 2005). As a result, P300 is often used as an index of controlled attention allocation (Coull, 1998; Hillyard et al., 1995; Ruiter, Kessels, Jansma, & Brug, 2006). Decreased P300 amplitude following increased N100 amplitude in response to HIV information would imply that individuals are initially alerted to the information but then choose to disengage attention. Thus, we predict that African-Americans will display decreased P300 amplitude when presented with HIV information.

*Overview*

African- and European-American participants were presented with information about a stigmatized health topic (HIV), a non-stigmatized health topic (the flu), and a non-health control topic that included a word matched on length with HIV and flu (a portable "box"). Across several blocks of trials, participants read one paragraph about each of the information types (three paragraphs total) and then completed an orienting task in which the stimuli "HIV", "FLU", and "BOX" were presented (details below and in Figure 1). During the orienting task, continuous electroencephalogram (EEG) recordings were taken, which allowed use to analyze N100 and

P300 responses as measures of attention to HIV and non-HIV stimuli (Hillyard et al., 1973; Luck, 2005).

## *Materials & Methods*

### *Participants and Design*

Participants were 27 clients of the Champaign-Urbana Public Health District (15 African-Americans and 12 European-Americans), who had normal or corrected-to-normal audition and vision. Technical difficulties during data collection prevented recording data from three African-American participants, thus leaving 24 participants (12 African-Americans and 12 European-Americans) in the final sample.[1] Participants were of both genders (14 males and 10 females), and varied in age (range: 21-52, $M_{age} = 31.67$, $SD_{age} = 8.13$) and number of years of education (range: 8-23, $M_{education} = 14.13$, $SD_{education} = 3.54$). Participants were paid $40 for their participation. The Institutional Review Board of the University of Illinois reviewed and approved the protocol, and participants provided informed consent before the study commenced.

The design of the study was a 2 (Racial Group: African-American vs. European-American) X 3 (Information type: HIV vs. FLU vs. BOX). The study also included a 2-level within-subjects method factor (Trial type: Congruent vs. Incongruent) and a 2-level within-subjects counterbalancing condition (Target arrow direction: Right vs. Left), which had no effect on any of the analyses of interest and as such will not be discussed further. Racial Group was a between-subjects factor, whereas Information type was a within-subjects factor. The study measured (a) duration of time spent reading information paragraphs about HIV, the flu, and

[1] Two participants (1 African-American and 1 European-American) self-identified as HIV-positive on the post-test questionnaire. However, excluding these participants did not change the pattern of results. As such, both participants are included in all subsequent analyses.

boxes, (b) reaction times to an orienting task (a modified Eriksen flanker task; Eriksen & Eriksen, 1974), and (c) ERP amplitude in response to the orienting task. The focus of the present report is the analysis of the ERP responses; behavioral analyses are presented in a separate report (Earl, Crause, Vaid, & Albarracin, under review).

In line with the theoretical framework, we predicted that early attention as indexed by N100 amplitude would be highest when HIV information was presented to African-Americans. In contrast, we predicted that executive attention as indexed by P300 amplitude would be lowest when HIV information was presented to African-Americans.

*Procedure*

Participants completed five blocks of trials, each of which were preceded by one paragraph of each information type. Paragraphs were matched on word length and readability.

*HIV paragraphs*. The HIV-prevention paragraphs discussed symptoms, treatment, prevalence, and prevention of HIV. The information contained in the HIV paragraphs was culled primarily from informational pamphlets distributed by the Centers for Disease Control and the World Health Organization. A sample HIV paragraph read: "*Human Immunodeficiency Virus (HIV) is the virus that causes Acquired Immune Deficiency Syndrome (AIDS). HIV infects and destroys white blood cells. White blood cells are cells of the immune system that are vital for fighting and preventing infections.*"

*Flu paragraphs*. The flu-prevention paragraphs discussed symptoms, treatment, prevalence, and prevention of the flu. The information contained in the flu paragraphs was culled primarily from informational pamphlets distributed by the Centers for Disease Control and the World Health Organization. A sample flu paragraph read: *"The flu is a highly contagious*

*respiratory infection caused by the influenza virus. Unlike the "stomach flu," influenza mainly targets the respiratory system. As such, the flu primarily affects the nose, throat, and lungs. It can cause mild to severe illness, and at times can lead to death."*

*Box paragraphs*. The box paragraphs discussed types, uses, and shipping of boxes. The information contained in the box paragraphs was culled primarily from the Wikipedia entry "box" (http://en.wikipedia.org/wiki/Box). A sample box paragraph read: *"A box is a container, case, or receptacle, usually rectangular, of wood, metal, cardboard, etc., and often with a lid or removable cover. A box can come in all shapes and sizes, and is particularly useful for storing or organizing objects or information."*

*Orienting task*. Participants completed an orienting task (a modified version of the Eriksen Flanker task; Eriksen & Eriksen, 1974), in which they were presented with a series of trials that displayed a fixation mark to alert them to the start of a trial followed by an orienting task that remained on screen until participants entered a response using a button response box. The duration of the fixation was jittered between 800-1200 milliseconds to reduce anticipatory responding. The orienting task consisted of a target arrow that pointed left (<) or right (>), "flanking" arrows on both sides of the target arrow that were either pointing in the same direction (e.g., <<< for <) or the opposite direction (e.g., >>< for <), and one of the three stimulus words (HIV, FLU, and BOX, presented in all capital letters) on the outside of the flanking arrows. Thus, a congruent trial in which HIV was presented would appear as follows: HIV < < < HIV. An incongruent trial in which FLU was presented would appear as follows: FLU < > < FLU. Trials appeared in white type on a black screen, and the middle arrow was centered on the screen. Participants' task was to press the left button on a response box if the target arrow pointed left, and the right button if the target arrow pointed right. The trial remained

on the screen until participants pressed a button, at which point the fixation cross would re-appear. Participants completed 5 blocks of 36 trials each (180 total trials), and they were told to respond only to the middle arrow. Each block contained three presentations each of every possible stimulus combination (i.e., left vs. right target combined with congruent vs. incongruent flankers combined with HIV vs. FLU vs. BOX stimuli) presented in random order. Before completing the main blocks of trials, participants were given a practice block to familiarize themselves with the task. To prevent habituation to the stimulus words, the practice block used the words DOG and CAT. To minimize the presence of artifacts in the ERP data participants were instructed to avoid eye blinks and other body movements as much as possible during each block of trials.

*EEG recording and processing*. Before completing the flanker task, participants were equipped with an EEG cap, 32 scalp electrodes (all impedances kept below 5 kΩ), and five non-scalp electrodes (left and right mastoids for EEG channel referencing, left and right outer canthi to detect horizontal eye movements, and below the left eye to detect blinks) using the BioSemi Active Two system digitized at 1024 Hz. EEG data were re-referenced offline to the average of the two mastoid channels and filtered with a 0.1-30 Hz bandpass filter. Data were epoched -100 ms to +800 ms relative to the onset of the orienting task. Artifacts were rejected in a semi-autonomous manner, with a criterion of 75 microvolts change over any 200ms window within an epoch; any epoch with such an artifact was excluded from analysis. On average, 77% of trials were retained in the final analyses ($M$ = 137.79, $SD$ = 33.71). After removing artifacts, epochs were re-filtered with a 0.01-15 Hz bandpass filter. For each participant, N100 was calculated at Fz on each trial using a bottom-to-peak analysis, which was conducted by first identifying the most negative peak between 80-120 ms and then subtracting out the most positive base preceding

the peak. P300 was calculated at Pz on each trial using a bottom-to-peak analysis, which was conducted by first identifying the most positive peak between 325-425 ms and then subtracting out the most negative base preceding the peak. In both cases, the time windows for selecting the peak were derived by calculating the average peak latency for all participants and then specifying a rounded range one standard deviation above and below the mean.

*Survey*. After the flanker task, participants were disconnected from the EEG and then completed a questionnaire containing demographic measures, including gender, age, and number of years of education.

## *Results*

*Preliminary analyses*. We first tested to see if there was systematic variation in the number of trials included in the final ERP set as a function of our variables of interest. However, there were no systematic differences in the number of trials included in the analyses as a function of information type, race, or the interaction between the two (all *p*s > .27). Next, we tested to see if any of the other demographic measures (gender, age, and number of years of education) influenced the primary analyses with race and information type on N100 and P300 amplitude. However, inclusion or exclusion of these covariates did not alter the pattern of means with race and information type in any of the analyses presented. As such, all models presented below are presented without covariates.

*N100*. Because increased amplitude of the N100 component is associated with orienting attention to threatening compared to control stimuli (Hillyard et al., 1973; Luck, 2005), we hypothesized that N100 amplitude would be greatest for African-Americans compared to European-Americans in response to HIV trials. A repeated measures analysis of variance (RM-

ANOVA) included Information type (HIV vs. FLU vs. BOX) as a within-subjects factor and Racial group (African-Americans vs. European-Americans) as a between-subjects factor predicting N100 amplitude at Fz. There was a main effect of race, such that African-Americans compared to European-Americans showed less negativity in response to all information types ($M_{\text{African-Americans}}$ = -3.15, $SD_{\text{African-Americans}}$ = 2.27, $M_{\text{European-Americans}}$ = -5.10, $SD_{\text{European-Americans}}$ = 2.27; $F(1,22) = 8.86$, $p$ = .007, Cohen's $d$ = 0.86). However, in line with our hypotheses, there was an information by race interaction ($F(1,22) = 5.04$, $p$ = .04, $\eta_p^2$= .19; see Figure 1). Decomposing the interaction, the effect of information type on N100 amplitude remained marginally significant for African-Americans, with the partial eta squared suggesting a medium-to-large effect ($M_{\text{HIV}}$ = -3.82 $SD_{\text{HIV}}$ = 2.49, $M_{\text{FLU}}$ = -2.81, $SD_{\text{FLU}}$ = 3.04, $M_{\text{BOX}}$ = -2.82, $SD_{\text{BOX}}$ = 2.79; $F(2,21)$= 2.71, $p$ = .09, $\eta_p^2$= .21), such that African-Americans were significantly more likely to display an alerting response to HIV compared to FLU (95% confidence interval for the difference [-1.96, -0.06], $p$ = .04, Cohen's $d$ = 0.36). In addition, although the difference for HIV compared to BOX did not reach conventional levels of significance, the Cohen's $d$ effect size suggests a small-to-medium effect (95% confidence interval for the difference [-2.27, 0.27], $p$ = .12, Cohen's $d$ = 0.38). However, there was no difference in alerting response to BOX versus FLU (95% confidence interval for the difference [-1.30, 1.27], $p$ = .98, Cohen's $d$ = 0.00). In contrast, the main effect of information type on N100 amplitude for European-Americans did not reach significance ($M_{\text{HIV}}$ = -4.82, $SD_{\text{HIV}}$ = 2.49, $M_{\text{FLU}}$ = -4.73, $SD_{\text{FLU}}$ = 3.04, $M_{\text{BOX}}$ = -5.76, $SD_{\text{BOX}}$ = 2.79; $F(2,21)$= 1.45, $p$ = .26, $\eta_p^2$= .12), nor did any of the specific contrasts, (all $p$s > .11).

*P300*. Because increased amplitude of the P300 component is associated with executive control of attention to stimuli (Hillyard et al., 1973; Luck, 2005), we hypothesized that if African-Americans disengage from information about HIV at a later processing stage, this

should result in decreased amplitude of the P300 component for HIV compared to either control health information or non-health control information. We analyzed P300 amplitudes at Pz with an RM-ANOVA with Information type (HIV vs. FLU vs. BOX) as a within-subjects factor and Racial group (African-Americans vs. European-Americans) as a between-subjects factor. There was a main effect of information such that participants of both races showed increased positivity to BOX compared to FLU and HIV ($M_{HIV} = 4.98$, $SD_{HIV} = 4.29$, $M_{FLU} = 4.78$, $SD_{FLU} = 4.76$, $M_{BOX} = 5.82$, $SD_{BOX} = 4.04$; $F(1,22)= 7.69$, $p = .01$, $\eta_p^2 = .26$), There was also a marginal main effect of race, such that African-Americans compared to European-Americans showed less positivity in response to all information types ($M_{African\text{-}Americans} = 3.62$, $SD_{African\text{-}Americans} = 5.92$, $M_{European\text{-}Americans} = 6.77$, $SD_{European\text{-}Americans} = 5.92$; $F(1,22) = 3.40$, $p = .08$, $\eta_p^2 = .13$). However, in line with our hypotheses, there was an information by race interaction ($F(1,22) = 5.28$, $p = .03$, $\eta_p^2 = .19$; see Figure 2). Decomposing the interaction, the effect of information type on P300 amplitude remained significant for African-Americans ($M_{HIV} = 3.64$ $SD_{HIV} = 6.06$, $M_{FLU} = 2.47$, $SD_{FLU} = 6.74$, $M_{BOX} = 4.74$, $SD_{BOX} = 5.71$; $F(2,21)= 5.77$, $p = .01$, $\eta_p^2 = .36$), such that African-Americans were significantly more likely to display increased P300 amplitude to BOX compared to both HIV (95% confidence interval for the difference [0.21, 1.99], $p = .02$, Cohen's $d = 0.19$) and FLU (95% confidence interval for the difference [0.76, 3.78], $p = .01$, Cohen's $d = 0.36$). There were no differences in P300 to HIV versus FLU (95% confidence interval for the difference [-0.27, 2.61], $p = .12$, Cohen's $d = 0.18$). In contrast, the main effect of information type on P300 amplitude for European-Americans was non-significant ($M_{HIV} = 6.32$, $SD_{HIV} = 6.06$, $M_{FLU} = 7.09$, $SD_{FLU} = 6.74$, $M_{BOX} = 6.89$, $SD_{BOX} = 5.71$; $F(2,21)= 1.20$, $p = .32$, $\eta_p^2 = .10$), nor were any of the specific contrasts, (all $p$s $> .19$).

*Supplementary analyses*. To test the hypothesis that alerting response predicts disengagement to HIV trials for African-Americans, we conducted supplementary analyses

regressing P300 amplitude on N100 amplitude for HIV trials, controlling for N100 response to FLU and BOX trials. In line with expectations, the relation between N100 and P300 for HIV trials was negative for African-Americans ($\beta = -0.80$, $t(11) = 2.38$, $p = .045$), yet positive for European-Americans ($\beta = 0.82$, $t(11) = 2.44$, $p = .04$), suggesting that initially orienting attention to HIV trials predicts later disengagement for African-Americans but continued engagement for European-Americans.

*Discussion*

Taken together, these data suggest that African-Americans were more likely to display threat in response to HIV information, as indexed by increased N100 amplitude for HIV trials compared to FLU and BOX. Furthermore, African-Americans were less likely to show sustained attention to HIV or FLU trials compared to BOX trials, as indexed by decreased P300 amplitude. Furthermore, increased threat response to HIV trials predicted decreased sustained attention to HIV trials for African-Americans. In contrast, European-Americans did not show differential attention on either the early or late ERP components to the orienting task as a function of information type (HIV, FLU, or BOX). Furthermore, increased threat response to HIV trails predicted increased sustained attention to HIV trials for European-Americans. These results parallel the behavioral results presented in another report, where African-Americans spent less time reading HIV versus flu or box paragraphs yet reading time for European-Americans did not vary as a function of information type. Furthermore, in the other report, African-Americans were marginally faster to respond to the HIV compared to control trials, suggesting decreased attention capture to the word HIV, yet European-Americans were significantly slower to respond to the HIV compared to control trials, suggesting greater attention capture on HIV trials.

One of the major questions posed for this study was to track the time-course of attention to information about stigmatized health issues. One possibility is that information about HIV initially captures attention (as indexed by increased N100 amplitude) before disengagement occurs (as indexed by decreased P300 amplitude) for African-Americans. In contrast, African-Americans may simply tune out information about stigmatized health issues altogether (decreased N100 and P300 amplitude). Results of the analyses of N100 amplitude suggest that HIV information does capture attention for both African-Americans and European-Americans. However, there is decreased executive attention (as indexed by decreased P300 amplitude) in response to health information (both HIV and flu) compared to non-health information (box) for African-Americans. Taken together, these findings offer preliminary support for the hypothesis of late disengagement of attention for African-Americans in response to information about HIV.

*Limitations and Future Directions*

This study provides an initial attempt at using ERP to understand attention to health information. As such, there are several important limitations of this study and ideas for future directions. There are several differences between samples besides just racial group membership that may influence these differences. For instance, even though all participants were selected from the same population (clients of the Champaign-Urbana Public Health District), in this sample, European-Americans compared to African-Americans tended to be more educated (more years of schooling completed). In an attempt to control for these differences, all analyses were conducted including this variable as a covariate. However, future studies should take differences in samples into consideration, including taking additional efforts to ensure that the samples are more evenly matched on these dimensions. Perhaps these differences between samples may be ameliorated, in part, by simplifying the messages to facilitate comprehension by all audiences.

On a related note, this study did not include measures of attention or working memory capacity apart from performance on the tasks of interest. In the future, additional measures of attention or working memory capacity (e.g., an OSPAN or NBACK task) may provide further insight into the processes of interest. At the very least, these measures might serve as useful covariates to reduce between-subjects variability. Furthermore, the sample size in this study is relatively small (n = 24), and future work should include recruitment of larger samples.

In addition, there are several features of the study itself that could be modified in future efforts. First, accuracy rates were very high (on average 98% of trials were accurate). However, there was no time limit for participants to respond to the flanker trials. Therefore, future efforts may better address conflict across information type by limiting the amount of time participants have to respond to the trials. In this study, participants were instructed to respond as quickly and accurately as possible. However, future work may instead amplify the desire for speed or include a cut-off response window as a way of increased response conflict. Second, the orienting task used in this study (a modified flanker task) is useful for assessing attention capture, but perhaps other paradigms (e.g., a Posner cueing task) would be better suited to test the notion of attention disengagement.

Moving forward, one important future direction of this work is to consider how to best keep African-Americans engaged with HIV-prevention information. For instance, what beliefs and emotions are triggering disengagement from, rather than attention to, HIV information? Once these active ingredients are isolated, perhaps targeted meta-interventions, or scripted introductions to a pre-existing intervention program, including a brochure or video, designed to increase enrollment in the program (Albarracin, Durantini, Earl, Gunnoe, & Leeper, 2008), could be designed with these beliefs in mind.

Finally, one assumption about intervention research in general is that the removal of barriers should, in turn, increase the target behavior. However, in the case of attention to information about threatening health issues (e.g., HIV), removing barriers (e.g., reducing fear) may not be enough to increase attention. For instance, the removal of barriers without additional motivating factors (e.g., improving health for the self or close others) may be necessary but not sufficient to change behavior. In this case, fear-reduction interventions may be more effective if coupled with interventions designed to increase approach-oriented emotions.

Overall, the issue of health disparities is particularly salient among members of disenfranchised groups such as African-Americans. However, this is a problem that is solvable. By better understanding the processes underlying attention to information about stigmatized health issues by members of disenfranchised groups, there is hope that we can reach the audiences for whom health-promotion messages are designed, and ultimately, improve health outcomes for all.

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## *Conflicts of Interest*

The authors declare that they have no conflict of interest.

*Ethical standards*

This study was approved by the Institutional Review Board of the University of Illinois and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Furthermore, all participants gave their informed consent prior to their inclusion in the study.

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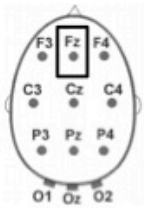
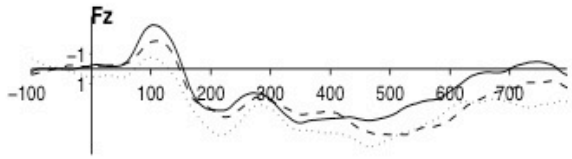
*Figure 1*. N100 response as a function of information type and racial group.

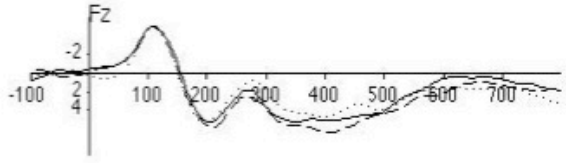
*Figure 2*. P300 response as a function of information type and racial group.




**African-American**
**N = 12**

**European-American**
**N = 12**

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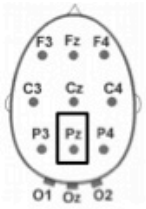


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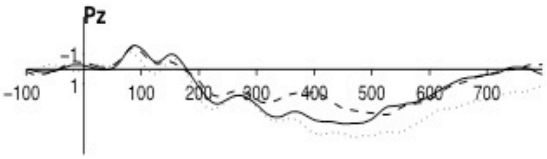


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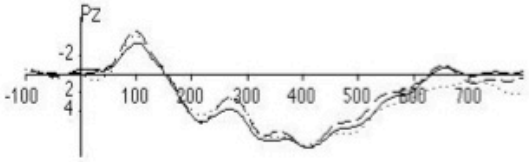


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