TAILORING A FRUIT AND VEGETABLE INTERVENTION ON ETHNIC IDENTITY: RESULTS OF A RANDOMIZED STUDY

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Abstract

Objective—Many targeted health interventions have been developed and tested with African American (AA) populations; however, AAs are a highly heterogeneous group. One characteristic that varies across AAs is Ethnic Identity (EI). Despite the recognition that AAs are heterogeneous with regard to EI, little research has been conducted on how to incorporate EI into the design of health messages and programs.

Design—This randomized trial tested whether tailoring a print-based fruit and vegetable (F & V) intervention based on individual EI would enhance program impact beyond that of social cognitive tailoring alone. AA adults were recruited from two integrated healthcare delivery systems, one based in the Detroit Metro area and the other in the Atlanta Metro area, and then randomized to receive three newsletters focused on F & V behavior change over three months. One set of newsletters was tailored only on demographic, behavioral, and social cognitive variables (control condition) whereas the other (experimental condition) was additionally tailored on EI.

Main Outcome Measures—The primary outcome for the study was F & V intake, which was assessed at baseline and three months later using the composite of two brief self-report frequency measures.

Results—A total of 560 eligible participants were enrolled, of which 468 provided complete 3-month follow-up data. The experimental group increased their daily mean F & V intake by 1.1 servings compared to .8 servings in the control group (p = .13). Several variables were found to interact with intervention group. For instance, Afrocentric experimental group participants showed a 1.4 increase in F & V servings per day compared to a .43 servings per day increase among Afrocentric controls (p < .05).

Conclusions—Although the overall between-group effects were not significant, this study confirms that AAs are a highly diverse population and that tailoring dietary messages on ethnic identity may improve intervention impact for some AA subgroups.

Numerous health interventions have been developed and tested for African Americans (AAs) (Baskin, Resnicow, & Campbell, 2001; Campbell et al., 1999; DiIorio et al., 2000; Resnicow, Braithwaite, Ahluwalia, & Baranowski, 1999; Resnicow et al., 2004; Resnicow et al., 2002; K. Resnicow et al., 2001; Resnicow, Yaroch et al., 2000). Almost all of these have been "targeted" interventions, whereby all participants receive identical intervention

messages and materials. Such interventions generally define a "Black" audience using cultural, behavioral and psychological characteristics common at the "group" level. These group-targeted interventions have generally been more effective in changing behavior than untargeted, general audience health messages (Kreuter, Strecher, & Glassman, 1999; Resnicow, Braithwaite, Ahluwalia, & DiIorio, 2001; Resnicow et al., 2005). However, group-targeted materials generally have failed to account for individual diversity within the Black population.

Tailored interventions, on the other hand, utilize individual-level data to customize message content based on person-level variation in psychologic, social, and behavioral factors (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003; Kreuter et al., 1999; Strecher, 1999). Individually-tailored interventions have been used to modify a wide range of health behaviors (Brug, Oenema, & Campbell, 2003; Noar, Benac, & Harris, 2007) across a variety of populations (Campbell et al., 1999; Campbell et al., 2004; M.W. Kreuter et al., 2005). In the few tailoring studies with AAs, messages have generally been customized using constructs from the Transtheoretical Model (TTM), Social Cognitive Theory (SCT), and Social Support Theory (SST) (Campbell et al., 1999; Campbell et al., 2004; M.W. Kreuter et al., 2005). In one prior study, messages were tailored on cultural constructs (religiosity, collectivism, racial pride, and time orientation) and some positive effects were observed (M.W. Kreuter et al., 2005; M.W. Kreuter et al., 2005). However, tailoring on individual Ethnic Identity (EI) has not been explored.

EI involves the extent to which individuals identify with and gravitate to their racial/ethnic group. EI includes many elements such as racial/ethnic pride, affinity for in-group culture (e.g., food, media, and language), attitudes toward majority culture, involvement with in-group members, experience with and attitudes regarding racism, attitudes toward intermarriage, and the importance placed on preserving one's culture and aiding others of similar backgrounds (K Resnicow et al., 1999; K Resnicow, R Braithwaite et al., 2001). EI appears to be highly variable across AAs (Cross, 1991; J. E. Helms, 1990; Parham & Helms, 1985; Sellers, 1993). For some AAs, their African and/or AA culture and heritage play a central role in their personal identity and daily psychosocial functioning, whereas for others, ethnicity and race may only be peripheral elements of self (Sellers, Chavous, & Cooke, 1998; Sellers, Rowley, Chavous, Shelton, & Smith, 1997). Some AAs define themselves in relation to Whites and/or majority culture, while others do not view the world through a "race-tinted" lens.

This study was designed to test whether individually tailoring a print-based fruit and vegetable (F & V) behavior change intervention on Ethnic Identity would enhance program impact beyond that of "usual" tailoring on TTM, SCT, and similar constructs. The focus on F & V intake was due to AAs' higher rates of diet-related illnesses (National Center for Health Statistics, 2006), lower F &V intake (Kant, Graubard, & Kumanyika, 2007; Serdula et al., 2004), and under-representation in prior tailored dietary intervention studies. In addition, dietary intake, due to its strong relation to culture, represented an ideal first health behavior with which to test the impact of ethnic tailoring.

A secondary aim of the study was to explore possible audience characteristics that may moderate response to the two interventions. Specifically, we examined whether there were ethnic identity subgroups that were more or less likely to respond to the EI-tailored intervention.

RESEARCH DESIGN AND METHODS

Participants were recruited from the memberships of two integrated healthcare delivery systems, one based in the Detroit Metro area and the other in the Atlanta Metro area. Both

healthcare systems were asked to provide randomly selected lists of AA adults ages 21 to 70. Only the Detroit healthcare system had race indicated in their electronic records. Therefore, the Georgia study sample was randomly selected from healthcare system members who attended medical offices where members were primarily AA and who had home addresses in Census blocks in which 80% or more of the residents were AA.

Invitations to participate in the study were mailed to 2018 health plan members. The letter contained a $2 pre-incentive and listed a toll-free number that allowed members to proactively opt out of the study. Health plan members who did not opt out were phoned beginning seven days after the invitation letters were mailed to verify their eligibility, obtain consent, and complete their baseline surveys. Unresolved cases were called a minimum of 14 times during an 8-week period after the invitation letters were sent. Eligibility criteria included self-identifying as Black or African American, living at least half of one's lifetime in the U.S., being between 21 and 70 years of age, not currently hospitalized or living in skilled care facilities, the absence of mental or physical conditions that would inhibit or be endangered by participation in the study, and consuming fewer than ten servings of F & V per day. Individuals who identified as bi-racial or bi-ethnic were excluded, given the complexity of tailoring for this audience segment. Interviews were completed with 625 health plan members, which represents 31% of those who were sent recruitment letters. Of these, 560 respondents answered enough survey questions for the tailoring system to produce a personalized newsletter. Those respondents who did not complete the requisite survey questions received the control version of the newsletter series and were not contacted for follow-up. Due to the sensitive nature of the survey, only AA interviewers were employed. All participants who enrolled and completed the baseline survey received a thank you letter containing a $5 bill.

A follow-up phone survey was administered approximately three months post-baseline to measure changes in F & V intake and other key variables. The follow-up survey also included questions about the perceived personal relevance of the newsletters and the number and amount of newsletters received and read. All participants who completed the follow-up survey received a choice of a $15 gift card to a local grocery or retail store. If no contact was made with participants (because of non-working numbers or no contact), a letter was mailed to the participant asking him or her to make contact study staff and provide a current phone number and preferred contact times. Complete follow-up interviews were conducted with 468 participants, which represented 83.6% of eligible newsletter recipients. The study was approved by Human Subjects Committees from the University of Michigan and the two participating integrated healthcare delivery sites.

Measures

Newsletter Preference—At baseline, we queried what type of newsletter participants would most like to receive. Choices included a newsletter written for: Black people in America, AAs and their connections to Africa, Black and White Americans, people of many racial and cultural backgrounds such as Latinos and Asian Americans, and Americans without any references to Black culture. These responses were designed to loosely correspond to the Black American, Afrocentric, Bicultural, Multicultural, and Assimilated EI types, respectively. As discussed below, newsletter preference was used as part of the EI classification algorithm as well as a moderator variable.

Ethnic Identity—The Black Identity Classification Scale (BICS) comprises new items as well as items culled from prior measures such as the Cross Racial Identity Scale (Cross, 1991; J.E. Helms & Parham, 1990; Vandiver, Cross, Worrell, & Fhagen-Smith, 2002), the Multidimensional Inventory of Black Identity (Rowley, Sellers, Chavous, & Smith, 1998;

Sellers et al., 1998; Sellers et al., 1997), and the Survey of Black Life (Resnicow & Ross, 1997; Resnicow, Soler, Braithwaite, Selassie, & Smith, 1999). The BICS allowed us to assign each participant to one of 16 Ethnic Identity types (See Table 1). The 16 types were based on various combinations of five core types:

- **Assimilated**: The Assimilated person has low racial salience and places little importance on being Black or being a member of any particular racial or ethnic group. The Assimilated person is more likely to identify as "American" or in terms of social roles such as "mother", "Marine", "Christian" or "engineer" rather than Black or African American.

- **Black American**: The Black American individual has high racial salience, is proud of his or her racial heritage, and believes in educating oneself and one's children about Black American culture and history. The Black American is aware of his or her Black Identity and primarily attends to Black media sources and mainly associates with other Black individuals.

- **Afrocentric**: Similar to the Black American type, the Afrocentric person has high racial salience. However, the Afrocentric individual also feels a strong connection to Africa. The Afrocentric individual is likely to celebrate Kwanzaa and be knowledgeable about African culture and spiritual beliefs.

- **Bicultural**: The Bicultural individual is proud of his or her ability to succeed in both the Black and White worlds, yet sees the separations between the two. The Bicultural individual has high racial salience, a positive affirmation of race, and perceives the world in a Black/White duality.

- **Multicultural**: The Multicultural person has high racial salience and appreciates the many ethnic groups and cultures that exist in the world. Although race is important, this person has an international orientation and supports human rights, women's rights, and other struggles around the world.

The BICS also measures a related dimension of EI, Cultural Mistrust (CM) (Terrell & Terrell, 1981) with items adapted from prior measures (Resnicow & Ross, 1997; K. Resnicow et al., 1999; Terrell & Terrell, 1981). A sample CM item is "The United States government is trying to make things better for Blacks (reverse coded)". The BICS incorporates CM as a subtype of the Black American and Afrocentric identity types.

A total of 93 BICS items were pretested for comprehension, clarity, and potential offensiveness in a series of four focus groups with 32 AA healthcare system members from Atlanta and Detroit. Those items remaining after the focus groups were pretested by telephone with 21 AA volunteers from the University of Michigan and partnering healthcare delivery system sites. The instrument was then administered to 306 AA adults recruited from the Detroit healthcare system. Results from a rotated factor analysis as well as other psychometric properties (e.g., alpha, item-total correlations) were used to help cull the final items for the scale. Additional information about the development and psychometrics of the BICS can be found elsewhere (Davis et al., under review) as well as from the first author.

The final BICS measure contains 31, 7-point "Strongly Disagree"/"Strongly Agree" items and one 0-10 racial salience question. The core items comprise six subscales: Afrocentric, Black American, Bicultural, Multicultural, Racial Salience, and Cultural Mistrust. The final internal consistency coefficients for the core subscales using the baseline sample (n = 560) were 0.74 for the Black American subscale, 0.80 for the Afrocentric subscale, 0.72 for the Bicultural subscale, 0.67 for the Multicultural subscale, 0.80 for the Racial Salience subscale, and 0.37 for the Cultural Mistrust scale. Factor Structure for the items used in the baseline survey can be found in Appendix A.

At 3-month follow-up, we included a subset of 13 EI items from the full baseline measure to explore scale stability. These items were selected based on their high factor loadings in an earlier psychometric pilot study. Using this subset of 13 items at post-test and the full baseline subscales, test-retest correlation coefficients between baseline and follow-up were 0.60 for the Black American subscale, 0.60 for the Afrocentric subscale, 0.32 for the Bicultural subscale, 0.53 for the Multicultural subscale, 0.46 for the Racial Salience subscale, and 0.51 for the Cultural Mistrust subscale. Alphas for the partial scales at posttest were 0.57 for the Black American subscale, 0.67 for the Afrocentric subscale, 0.78 for the Bicultural subscale, 0.61 for the Multicultural subscale, 0.63 for the Racial Salience subscale, and 0.57 for the Cultural Mistrust scale.

A three-stage algorithm was used to classify respondents into tailoring categories. First, participants with a score below the mean on the BICS racial salience subscale, a score of five or less on the 0-10 racial salience item, and a preference for a newsletter targeting "Americans, without any reference to Black culture" were typed as Assimilated. Second, respondents not classified as Assimilated whose scores were above the 75th percentile for up to two EI types were classified as single or dual identity types comprising any combination of the Black American, Afrocentric, Bicultural, or Multicultural identity types with a possible Cultural Mistrust subtype. If more than two scales were above the 75th percentile, we used the top two Z scores to type the participant. Third, any respondents who remained unclassified were typed using the relative rank of their BICS subscale scores and/or their stated newsletter preference. Participants who were typed using the first and second classification methods are considered to have strongly matched identity types, whereas participants classified using the third method are considered weakly matched. The BICS algorithm allowed for classification of all participants with complete questionnaires. The full classification algorithm is available from the first author. The distribution of the 16 BICS types at baseline are shown in Table 1.

Fruit and Vegetable Intake—The primary outcome for the study was servings of fruit and vegetables consumed per day, which was assessed using two brief frequency measures. The first measure (referred to as the long form) queried intake of fruit, 100% fruit or vegetable juice, beans, potatoes other than French fries, vegetables, and salads over the past week. The second measure (labeled short form) assessed usual daily intake of fruit, 100% fruit or vegetable juice, and vegetables. Validity of similar versions of the two frequency measures can be found elsewhere (Greene et al., 2008; Peterson et al., 2008; Resnicow, Odom et al., 2000). In these prior studies, correlations of these measures with multiple 24hr recalls have been in the range of 0.31 to 0.50. Correlations with serum carotenoids have been in the range of .22 to .29. The two measures tend to provide higher point estimates in servings per day than 24hour recalls (Greene et al., 2008; Peterson et al., 2008; Resnicow, Odom et al., 2000). The two measures were averaged to form a composite index of fruit and vegetable intake, which was used as the primary outcome variable for the study. The composite measure included elements of both recent and chronic intake and appears to provide a more valid estimate of true intake than using either measure alone (Resnicow, Odom et al., 2000). The correlation of the two measures was .62 at baseline and .51 at 3-month follow-up, which suggests they tap different components of true intake. The study was powered to detect an overall between-group difference of .5 to .6 daily servings of fruit and vegetables.

Process Variables—The perceived personal relevance of the intervention was assessed by summing two items scaled 1 ("not at all") to 4 ("completely"): "How much do you feel that the newsletter(s) (was/were) written for you?" and "How well do you feel that the newsletter(s) fit your ethnic and cultural background?" The amount of newsletters read was

assessed with a single item: "Which of the following statements best describes how much of the newsletter(s) you read?" Responses included none, some, most, and all.

Intervention

One-third of the sample was randomly assigned to the control group, and two-thirds were randomly allocated to the experimental group. The 2:1 intervention to control randomization was done to ensure that a sufficient number of intervention participants would receive each of the 16 EI newsletter types. Participants in both groups received three newsletters by mail that were 12, 8, and 8 pages in length, respectively. The newsletters were delivered approximately once a month over three months and focused on increasing fruit and vegetable intake. Each newsletter mailing included two recipe cards with small bags of spices that corresponded to the recipes and either a magnetized refrigerator notepad or a magnet with fruit and vegetable serving size information. Newsletter text for both groups contained intermittent use of the participant's name and tailoring on fruit and vegetable intake as well as socio-behavioral variables, which consisted of constructs that have been frequently used in previous tailored interventions such as fruit and vegetable preferences, dietary limitations, social roles for shopping and cooking, barriers to eating fruit and vegetables, outcome expectations, and demographics including health status, healthcare system affiliation, gender, marital status, children in the home, and employment status.

The control group newsletters targeted a general Black American audience with a slight Afrocentric focus. This type was selected because the Afrocentric/Black American identity type was the most prevalent in our pilot study, and provided the most rigorous test of the experimental intervention. In contrast, experimental newsletters contained tailored messages designed for each of the 16 EI types. Table 2 contains examples of specific tailored messages from the experimental newsletters. These examples came from an introductory article in the first newsletter that described the health benefits of eating more fruit and vegetables. Additional samples of tailored text are available from the first author.

Draft newsletter text and layout designs were pretested in focus groups with AA members of the two participating integrated healthcare systems. Messages were further refined by experts in Black identity theory, the study team, and staff from the two participating healthcare systems. The target reading level, as determined by electronic readability programs, was approximately sixth grade.

Graphic Tailoring

To allow for tailoring of graphics, over 2000 photographs depicting eating and social scenes for the main six EI subtypes were taken specifically for the project. These images, as well as supplemental images from stock photography sources, were used to tailor the graphics by EI type, gender, age, marital status, and children living in the home, if applicable. The Black American newsletters featured images of almost exclusively Black Americans, while the Assimilated newsletters primarily featured images of Whites or individuals of other cultures with ethnically indistinct clothing, hair, and jewelry. Participants with a dual Afrocentric EI type received Afrocentric images mixed with images from their second EI type. The Bicultural newsletters showed Blacks, Whites, and Black and White individuals interacting. The Multicultural newsletters displayed characters from Black, White, Afrocentric, Hispanic, and Asian backgrounds. Care was taken to hold all other factors of the photos constant, including scene background, camera angle, framing, lighting, etc.

The Control Group received untailored, ethnically neutral graphics. This was accomplished by generally featuring images without people or other racial or ethnic cues. For example, where the experimental Group newsletter contained a graphic of people playing tennis

(varying ethnicity by EI type), the Control Group newsletters showed only a tennis racquet and ball.

Statistical Analyses

The primary model for testing between-group effects was ANCOVA using difference scores as the dependent variables while adjusting for potential confounds of age, income, marital status, site (Detroit/Atlanta), and gender. An identical model was utilized for follow-up only process measures. Within-group tests were based on paired t-tests. Cases missing data at follow-up were dropped from analyses. Three individuals reporting implausible fruit and vegetable intake values, which was set at greater than 13 servings per day on the composite fruit and vegetable measure, were also excluded from analyses. Servings of fruits and vegetables were log transformed to normalize their distributions. All reported significance levels are based on the transformed values.

A priori, we explored several potential moderators of intervention impact. We predicted that experimental group participants who received a newsletter tailored for the type that they said they preferred would show greater increases in F & V consumption than those participants whose stated newsletter preference did not match the type of newsletter that they received. We also hypothesized that participants with a strong EI match (described earlier) would respond more favorably to the experimental intervention than participants with a weak match. Finally, although we proposed no specific hypotheses, we also explored the moderating impact of age, gender, income, and education as well as key EI types. Although each of the 16 EI types were represented in both the experimental and control groups, several of the EI types had fewer than total 20 participants. As a result, the moderator analyses aggregate participants by core identity types such as those with an Afrocentric component versus those without, or those with a Cultural Mistrust subtype versus those without, etc.

RESULTS

Sample description

A total of 560 eligible AA participants were enrolled, of whom 468 (83.6%) provided three-month follow-up data. As shown in Table 3, the final cohort sample was predominantly female (73%) with a mean age of 49 years. Most (60%) worked full time, 39% were married, 60% earned at least $40,000 or more per year, and 69% had at least some college education. Mean fruit and vegetable intake at baseline was 3.6 servings per day.

The 92 participants lost to follow-up did not differ from the 468 cohort members with regard to baseline fruit and vegetable intake, age, marital status, employment status, income, and most EI types. However, dropouts were significantly more likely to be male, of lower educational attainment, and Afrocentric. With the exception of marital status, dropouts did not differ significantly between study groups for any of the variables contained in Table 3. Experimental group dropouts were significantly more likely to be married (53%), than control drop outs, 25% (p < .05). The dropout rate was not significantly different between the experimental and control groups (18% and 13%, respectively; data not shown).

At baseline, participants in the two study groups did not differ significantly on any of the variables listed in Table 3. In addition, the two groups recalled receiving similar numbers of newsletters. In the experimental group, 25% reported receiving two newsletters and 61% reported receiving three newsletters. The corresponding rates in the control group were 26% and 66%.

Primary Outcome

As shown in Table 4, experimental group members increased their daily mean F & V intake by 1.1 servings per day compared to .8 servings in the control group between baseline and 3-month follow up. This equates to an effect size of .11 standard deviation units. This difference was not statistically significant, p = .13. However, the changes within each group were significant (p < .01; Table 4). The standardized effects for the within group changes were .50 and .36 for the intervention and control groups respectively.

Moderator Effects

As shown in Table 5, several baseline variables were found to interact with intervention group. For those variables that moderated intervention response, we stratified the sample on that variable and examined changes in F &V.

Experimental group participants with an Afrocentric EI showed a 1.4 servings per day increase compared to .43 servings among their control counterparts. This difference was statistically significant, p < .05 and equates to a standardized effect size of .42 servings. Conversely, there were no between-group differences among those not classified as Afrocentric (n=338). And, among individuals with a strong EI match, experimental group members increased 1.3 servings compared to .71 among controls, p = .07. For those with weak EI matches, the changes were identical, .89 and .87, respectively, between the two study groups.

We also explored intervention effects according to participants' preferred type of newsletter as indicated on the baseline survey. (Table 6). Among individuals preferring a Black American newsletter, experimental group participants showed a 1.1 serving increase compared to .5 for controls. This difference was statistically significant, p < .05. For individuals preferring Afrocentric, Assimilated, Bicultural and Multicultural newsletters no significant between-group differences were observed. The former analyses only accounted for the type of newsletter preferred. We also examined differences in F & V change for those whose preferred newsletter type matched the newsletter type they actually received. As shown in Table 6, considering only those whose preferences matched what they received, the only significant difference was observed for the Black American type.

Process Measures

Overall, perceived personal relevance did not differ between the two study groups. However, this association was moderated by amount of the newsletters read. A similar percentage of experimental (73%) and control group (75%) participants reported reading most or all of their newsletters. Among participants in the experimental group, there was a significant correlation (p = .001) between the amount of newsletters read and perceived personal relevance, r = .28. This correlation was weaker, r = .13, and nonsignificant among controls.

DISCUSSION

This study was designed to test whether tailoring a F & V print intervention on EI would enhance program impact beyond that of social cognitive tailoring alone. Using a questionnaire designed for this study we assigned each experimental group member into one of 16 EI categories. Overall, the group that received three F & V newsletters tailored to these 16 EI types reported an increase in their daily mean F & V intake by 1.1 servings compared to .8 servings in the control group. This difference was not statistically significant (p = .13). The within-group changes in F & V intake were significant, however, and were as large or larger than those found in prior studies of AAs using arguably more intensive

interventions such as one-on-one counseling (Campbell et al., 1999; Resnicow et al., 2004; Resnicow et al., 2005; Resnicow, Jackson, Wang, Dudley, & Baranowski, 2001). Our overall changes across the two conditions are also consistent with the effects on F & V intake observed in several prior tailored interventions conducted with other populations (Brug et al., 2003; Brug, Steenhuis, van Assema, & de Vries, 1996; de Vries & Brug, 1999; Kroeze, 2006).

In the one prior study that tailored messages on EI, Kreuter et al (M.W. Kreuter et al., 2005) found a significant increase among intervention versus comparison subjects in F & V intake at 18-month follow-up but not 6-month follow up. It is possible therefore, that had we followed our cohort for longer than 3 months, a significant intervention effect might have been observed. In the Kreuter study the intervention dose was six newsletters compared to three in our study, and thus, insufficient dose is another possible explanation for our findings.

Two other reasons for the overall null effects between groups include 1) the intensity of the background tailoring used in both the control and experimental groups and, 2) our decision to culturally target the control group. The control group newsletters, which were targeted for a general Black audience, were individually tailored on several constructs previously shown to impact F & V intake such as barriers, outcome expectations, and F & V preferences, dietary limitations, shopping and cooking behavior, health status, marital status, and employment status (Brug et al., 2003; Noar et al., 2007). The study was designed to test the impact of adding EI tailoring to the background tailoring used in the control group. Thus, the background tailoring used in the control and experimental groups may have led to such a large change in F & V intake, that there was little additional change possible for the experimental group.

Several baseline variables were found to interact with intervention group. Experimental group participants classified as Afrocentric at baseline (about 27% of the Experimental group) showed a 1.4 increase in F & V servings per day compared to a .43 servings per day increase among Afrocentric controls. Conversely, there were no between-group differences among those not classified as Afrocentric (n=338). Among participants characterized as both Afrocentric and Cultural Mistrust, F & V increased 1.3 servings in the experimental group compared to a decrease of .7 servings in the control group (p = .07). Thus, the tailoring appeared to be more effective for individuals from some EI subgroups. Further, the impact of the intervention appeared even stronger for those individuals receiving a strong EI match, suggesting that more precise classification of EI may be associated with greater impact of EI tailoring.

In addition to being the group with the strongest intervention response, Afrocentric individuals were also the most likely to drop out. We examined demographic variables among Afrocentric participants who did and did not drop out and found that Afrocentric dropouts were significantly (p < .05) more likely to be unemployed (48% vs. 32%, respectively) and male (58% vs. 34%, respectively) than those remaining in the cohort. It may be that Afrocentric dropouts did not read their newsletters, so there was no opportunity to build rapport with these participants, or perhaps the Afrocentric content and format was not a good match for this subgroup, which may have spurred their drop out. The Afrocentric subgroup, as well as males of low employment status, may merit unique intervention and retention strategies.

The fact that a simple measure of newsletter preference appeared to moderate the intervention effect has potentially important implications. A brief preference measure such as this may be more likely to be adopted by health care systems and other potential users

than the longer EI classification scale. Whether an indication of newsletter preference provides sufficient information to generate tailored messaging merits examination. We assumed a detailed measure of EI would be needed to classify participants in EI groups, however, if valid, a shorter preference-based measure could have broader applicability.

The study has limitations. First, the primary outcome of fruit and vegetable intake was based on self-report. Prior versions of the instruments used here have been validated against 24-hour recalls and serum carotenoids amongst AAs (Resnicow et al., 2005; Resnicow, Odom et al., 2000). Nonetheless, differential social desirability bias on the part of individuals in the experimental group cannot be entirely ruled out and remains a potential alternative interpretation for our findings. Reliability of several key scales used to classify participants into EI categories was low, which may have limited our ability to accurately identify tailoring subgroups and therefore our ability to deliver appropriately tailored messages. Improving our EI measures will likely enhance the impact of EI tailoring. The sample was entirely AA and insured, so there may be limited generalizability to other ethnic groups as well as AAs with different health insurance and/or socioeconomic status. Finally, generalizability is further limited because only 31% of those approached participated in the study. This study suggests that tailoring dietary messages to AA ethnic identity can improve intervention impact beyond group targeting at least for some EI types. The study also provides evidence that tailored dietary interventions can be successfully implemented in a managed care setting, and despite initial concerns by our HMO partners about potential averse member reaction to the EI tailoring, few negative reactions were reported. Studies to improve on the measurement and intervention methods used in this study merit further examination.

APPENDIX A: Rotated Factor Loadings and Eigenvalues for Final BIC Survey Items

	Rotated Item Factor Loading					
	1	2	3	4	5	6
Factor 1: Race Centrality (Eigenvalue = 7.6)						
1. Being Black is an important part of my self-image.	.72					
2. Many things that make me happy are connected to the fact that I am Black.	.72					
3. Being Black has a lot to do with how I feel about myself.	.69					
4. Many things that are important to me are connected to my Black identity.	.68					
5. Both in my public and private thoughts, race is an important part of who I am	.58					
6. I have a strong sense of belonging to the Black community.	.53					
7. It is important to be involved in the Black community.	.37					
Factor 2: Afrocentric Items (Eigenvalue = 2.8)						
8. It is important to me to celebrate Kwanzaa		.68				
9. Black people should give their children African names.		.66				
10. I feel a strong emotional connection to Africa.		.63				
11. I am involved in Black political activities		.61				
12. I believe that it is important for African Americans to learn about spiritual beliefs in Africa.		.57				
13. It is important for African Americans to get back to their African roots.		.37				
14. It is important to learn about African culture.		.31				
Factor 3: Multicultural (Eigenvalue = 2.0)						
15. I respect the cultural traditions of many groups, e.g., Native Americans, Whites, Latinos....			.68			
16. Care deeply about the needs of other groups such as Native Americans, Whites, Latinos, and Asian Americans.			.60			
17. Feel strongly human rights issues in the Middle East and Tibet.			.54			
18. Feel strongly about American social issues such as women's rights, the environment, and animal rights.			.42			
Factor 4: ProBlack (Eigenvalue = 1.6)						
19. When I listen to the radio, I usually listen to Black radio shows.				.73		
20. When I read magazines, I read mostly Black magazines such as Jet and Ebony.				.68		
21. When I watch television, I usually watch Black television shows.				.66		
22. Most of my friends are Black.				.58		
23. I think of myself as African American more than American.				.43		
24. A thorough knowledge of Black history is very important for Blacks today				.25		
Factor 5: BiCultural (Eigenvalue = 1.3)						
25. I feel comfortable in both worlds.					.84	

	Rotated Item Factor Loading
26. I feel at ease with Whites and Blacks.	.81
27. I feel comfortable interacting with both Blacks and Whites	.68
28. I am proud of my ability to succeed in both the Black and White worlds.	.59
Factor 6: Mistrust (Eigenvalue = 1.2)	
29. Many White politicians deliberately pass laws designed to block the progress of Blacks.	.62
30. The United States government is trying to make things better for Blacks. (Reverse-code)	.62
31. When I think about race relations in America, I get angry.	.55

* Wording of some items abbreviated in order to fit into table. Contact First Author for final complete set of items

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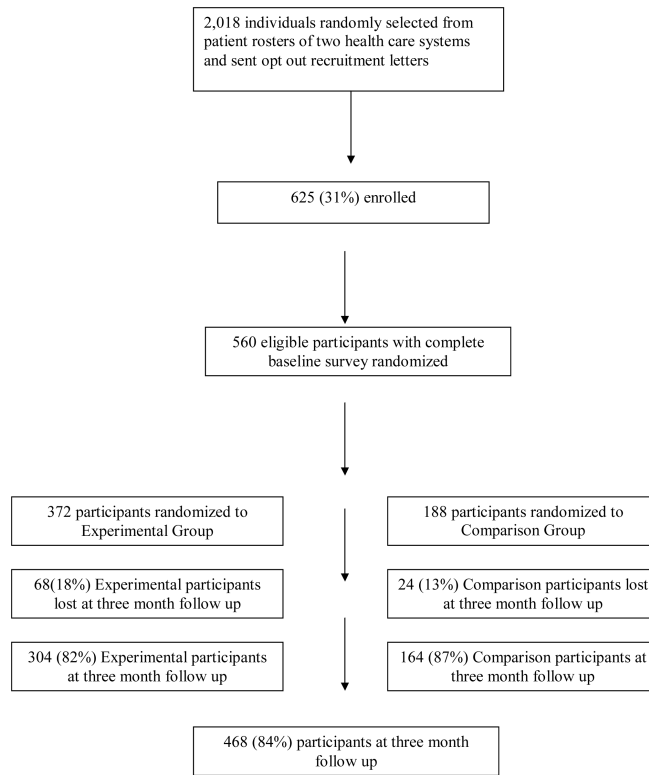
Figure 1.
Subject Flow

Table 1

Distribution of Ethnic Identity Types at Baseline

Type	% (n)
1. Assimilated	10.4% (58)
2. Black American	8.8% (49)
3. Black American with Cultural Mistrust	1.1% (6)
4. Bicultural	8.0% (45)
5. Multicultural	1.6% (9)
6. Bicultural/Multicultural	11.6% (65)
7. Black American/Bicultural	13.9% (78)
8. Black American/Bicultural with Cultural Mistrust	3.4% (19)
9. Black American/Multicultural	8.9% (50)
10. Black American/Multicultural with Cultural Mistrust	2.0% (11)
11. Afrocentric/Black American	15.2% (85)
12. Afrocentric/Black American with Cultural Mistrust	4.6% (26)
13. Afrocentric/Bicultural	2.9% (16)
14. Afrocentric/Bicultural with Cultural Mistrust	0.5% (3)
15. Afrocentric/Multicultural	6.4% (36)
16. Afrocentric/Multicultural with Cultural Mistrust	0.7% (4)

Table 2

Sample Newsletter Tailoring of Messages and Graphics

EI Type or Study Group	Sample Newsletter Message	Sample Graphics (Tailored to Match Participant's Gender)
Black American	You may already know that Black Americans have a higher risk of diabetes, heart disease, high blood pressure, and cancer than people from other ethnic backgrounds.	1st graphic: Headshot of a Black American man or woman 2nd graphic: Two Black men or Black women playing tennis
Bicultural	You may already know that Black Americans have a higher risk of diabetes, heart disease, high blood pressure, and cancer than Whites.	1st graphic: Headshot of a Black American man or woman 2nd graphic: A Black person and a White person playing tennis
Multicultural	You may already know that African Americans have a higher risk of diabetes, heart disease, high blood pressure, and cancer than people from other ethnic backgrounds.	1st graphic: Headshot of a Black American man or woman 2nd graphic: A Black person and an Asian person playing tennis
Assimilated	You may already know that Americans have a higher risk of diabetes, heart disease, high blood pressure, and cancer if they don't eat a healthy diet.	1st graphic: Headshot of an Assimilated-looking Black man or woman 2nd graphic: Two White men or White women playing tennis
Afrocentric/Black American	Have you ever wondered why Africans often have lower rates of obesity, diabetes, high blood pressure, and cancer than African Americans?	1st graphic: Headshot of an Afrocentric man or woman 2nd graphic: Two Black men or Black women playing tennis
Control Group	Have you ever wondered why Africans often have lower rates of obesity, diabetes, high blood pressure, and cancer than African Americans?	1st graphic: Picture of a movie screen with the words "This is just for you" 2nd graphic: A tennis racquet and ball with no people

Table 3

Comparison of Cohort and Drop Outs (n=560)

	Cohort (n=468)	Drop Outs (n=92)
Age	48.7 (21, 70)	47.9 (21, 69)
Gender (% Female)*	72.9	59.8
Education (%)*		
< HS	1.7	6.5
HS	29.7	34.8
Some College	33.6	22.8
College or higher	35.0	35.9
Employment Status (%)		
Full Time	59.8	64.1
Part Time	6.0	1.1
Not Working	34.2	34.8
Marital Status (%)		
Married	38.7	45.6
Unmarried	61.3	54.4
Income (%)		
< $20	9.3	5.2
$20-40	31.3	35.1
$40-80	48.8	54.6
$80-100	10.7	5.2
>$100	0	0
F & V Intake (mean & sd)	3.6 (1.89)	3.5 (1.82)
Ethnic Identity		
% Afrocentric *	27.8	43.5
% Black American	59.2	51.1
% BIC	40.2	41.3
%/MUL	15.7	19.0
% Assimilated	11.1	6.5
% Cultural Mistrust	12.4	12.0

Cohort and Dropouts significantly different, p < .05

BIC/MUL = Bicultural/Multicultural

sd = Standard Deviation'

HS = High School

Table 4

Baseline and Follow-up F & V intake (n=468)

	Control (n=164)		Experimental (n=304)	
	Baseline	3 Month Follow-up	Baseline	3 Month Follow-up
F & V Intake (mean/sd)	3.8(2.05)	4.6 (2.06)[*]	3.5 (1.80)	4.6 (2.03)[*]

P values based on log transformed values.

sd = Standard Deviation

[*] Post-pre change in F & V intake within group significant p < .01.

Table 5

Change in F & V intake by Baseline Ethnic Identity Variable (n=468)

	Control MEAN Δ (n=164)	Experimental MEAN Δ (n=304)	Effect Size	Interaction with Tx group p value
Afrocentric Type				
Yes (n=130)	.43	1.4[**]	.42	.01
No (n=338)	.97	.93	.02	
Cultural Mistrust Type				
Yes (n=58)	.35	.87	.23	.08
No (n=410)	.88	1.1	.09	
Afrocentric and Cultural Mistrust Type				
Yes (n=29)	-0.7	1.3[*]	.68	.001
No (n= 439)	.92	1.0	.06	
Classification				
Strong (n=179)	.71	1.3[*]	.26	.06
Weak (n=289)	.87	.89	.01	

Tx= Treatment

CM= Cultural Mistrust

Δ = Change

Effect Size = Group mean difference/pooled standard deviation

[**] Pre post change in F & V intake within YES group between experimental and controls significant, p < .05.

[*] Pre post change in F & V intake within YES group between experimental and controls, p < 10

Table 6

Change in F & V intake by Baseline Newsletter Preference (n=468)

	Control MEAN Δ	Experimental MEAN Δ	Effect Size
Baseline Newsletter Preference (n=468)			
Black American (n=211)	.50	1.1 [**]	.26
Afrocentric (n=40)	.68	1.4	.32
Bicultural (n=129)	1.1	.71	.18
Multicultural (n=34)	2.0	.88	.51
Assimilated (n=54)	.70	1.8	.45
Baseline Newsletter Preference and Actual Type of Newsletter Received[^] (n=367)			
Black American (n=183)	.50	1.1 [*]	.28
Afrocentric (n=23)	.68	1.7	.41
Bicultural (n=100)	1.1	.71	.19
Multicultural (n=20)	2.0	1.4	.28
Assimilated (n=41)	.70	1.8	.47

Δ = change

Effect Size = Group mean difference/pooled standard deviation

[**] Pre post change in F & V intake between group significant p < .05.

[*] Pre post change in F & V intake between group borderline significant p < . 10.

[^] Matching of preference and newsletter for experimental group only. All controls are included.