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Measuring the Processes of Change for Increasing Blood Donation in Black Adults

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Abstract

BACKGROUND—Blacks have significantly lower blood donation (BD) rates than Whites. Many views, experiences, and behaviors associated with BD are unique to Black culture. Evidence suggests that culturally tailored health promotion programs help with increasing Black BD. To be effective, tailored interventions should be based on valid and reliable measures. The Transtheoretical Model's (TTM) Processes of Change (POC) construct provides an assessment of participants' covert and overt activities and experiences in BD. This study describes development and validation of POC for increasing BD tailored to Blacks.

STUDY DESIGN AND METHODS—Cross-sectional measure development with online survey dissemination was used in 566 Blacks in Northeastern US. Factor analytic structural modeling procedures were used to examine validity of the POC measure. BD POC were examined in participants representing a range of BD history and intentions (non-donors, sometimes donors, regular donors) based on an established algorithm.

RESULTS—Confirmatory analyses replicated the theoretically expected structure of POC scales which is a ten-factor, fully correlated best fit model. Expected POC patterns by SOC based on theoretical and empirical predictions were confirmed. The range of effect sizes for 10 POC were $\eta^2 = .04-.25$; indicating that TTM POC are strong strategies in BD decision making for Blacks and can be applied to interventions to increase BD for a minority population.

CONCLUSION—POC measure was internally and externally valid in a sample of Blacks. Interventions can utilize the POC measure to guide stage matched interventions to encourage use of relevant experiential and behavioral strategies to increase blood donation.

Keywords

Blood donation; Black Adults; Transtheoretical Model; Processes of Change; Validation

INTRODUCTION

It is estimated that 41% of the total US population is eligible to donate blood (1) yet only 3-5% of Americans are donors and of those, approximately 87% are White and only 6% are Black (2). Though there is regional variation, estimates show that Blacks are donating at far lower rates than Whites and at lower rates than their representation in the population (1, 2, 3, 4). This disparity is all the more important because of the particular need for blood donation

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within the Black population as a result of a higher incidence sickle cell disease (SCD) (3, 5). Therefore a demand exists for efforts to increase the donation of blood products from Blacks in part to address transfusion needs of patients with Sickle Cell Disease. Efforts to increase a behavior such as blood donation should be guided by a model of behavior change such as the Transtheoretical or Stages of Change Model (TTM). Application of the TTM to blood donation requires development of measures of the key elements of the model. Additional focus is necessary to ensure that the model and related measures are valid for considering the needs of underrepresented groups. This paper describes the development of key TTM measures, the Processes of Change for blood donation, tailored to the needs of Black adults. These measures can be used to individually tailor interventions to the entire range of readiness to donate blood, from non-donors to regular donors.

Despite the clear need to increase the representation of Blacks in the blood donor pool, there is a paucity of theory driven studies specifically targeting minorities in the field of blood donation, investigating underlying reasons for the donation disparity or suggesting intervention strategies to increase donation. Many thoughts, experiences, and behaviors associated with blood donation are related to Black culture and could thus influence blood donation behavior. In a review of culturally specific considerations among Black culture related to blood donation activity, several barriers are discussed (7). Blacks report greater medical mistrust (6) which may relate to lower donation rates. Other reasons that contribute to lower donation rates among Blacks include negative interactions between Black donors and staff at the donation sites, Blacks' tendency to not view donating blood as similar to other volunteer activities, being unaware of the need for blood in their culture, and being distrustful of claims that highlight the need for Black blood donors (7). In addition, Blacks may have different motivators for giving blood. For example, Blacks are more likely than whites to report reasons for giving blood as getting tested for disease and receiving a reward in return for donating (7). In order to promote blood donation behavior in Blacks, combining a theory base with an understanding of culturally relevant motivators and barriers is crucial.

While it is useful to target interventions based on demographic variables such as gender, race, and ethnicity, interventions are likely to have greater impact if they focus on theoretically-based dynamic variables related to blood donation. To date, some culturally-tailored interventions to increase blood donation within the Black community have been developed with the focus on dynamic variables (8). A community based intervention was developed based on three dynamic factors impacting blood donation decision making (awareness of need, convenience, and faith-based support from church leaders) (9). The intervention included a 5 minute scripted information session to increase awareness and was then followed by a church-sponsored blood drive at 13 churches (9). Results indicated a significant increase in first-time donors compared to the rate of donors in the surrounding area (9). Another culturally relevant intervention to increase awareness included a video highlighting the need for Black blood donors to help children with SCD was mailed to 5000 households in a predominantly black community (8). Results indicated a significant increase in first-time Black donors at corresponding local blood drives (8). Finally, the American Red Cross Southern Region developed the "Partners for Life" program in which patients with SCD were matched to a designated pool of repeat Black donors (10) however, effectiveness was limited to alloimmunization (3). The aforementioned culturally tailored interventions demonstrate utility in incorporating specific motivators and barriers towards blood donation behavior in potential Black donors. However, an empirically established decision making framework for behavior change may provide synergistic effects when paired with factors unique to Black culture related to blood donation. In other words, culturally specific information offered in conjunction with empirically established health behavior change constructs can lead to a comprehensive method of addressing blood donation behavior among Blacks.

The Transtheoretical Model (TTM) explains motivation and intentional behavior change based on thoughts, experiences, and behaviors (11-13). The TTM describes the relationship between four key constructs including Stages of Change, Decisional Balance, Self Efficacy, and Processes of Change. This model has been applied to over forty eight health behaviors in various cultures and ethnicities, including Blacks, for content areas including exercise, and blood and organ donation (14, 15). The four main constructs of the TTM are dynamic variables that can be used to describe and influence the “when” (Stage of Change), “why” (Decisional Balance and Self Efficacy), and “how” (Processes of Change) of changing a behavior such as becoming a blood donor. Stage of Change or “readiness” for change is most often a categorical variable. The stages of change are typically defined as (12) Precontemplation (not thinking about change in the next 6 months), Contemplation (planning to change in the next 6 months), Preparation (planning to change in the next 30 days), Action (changed within the last 30 days), and Maintenance (sustained change for past 6 months) (11-13, 16). Decisional balance refers to the weighing of the pros and the cons of changing a specific behavior. Situational Self Efficacy reflects the level of confidence an individual has to engage in a new behavior or to maintain a behavior in a variety of challenging situations (17).

The Processes of Change (POC) represent overt and covert activities in which individuals engage as they change a behavior. These change processes represent independent variables that can be targeted to help increase the value of the pros, decrease the value of the cons and increase self-efficacy to help individuals progress through the stages of change (12, 18-21). The POC are composed of two constructs, experiential and behavioral POC. Constructs are not manifest or readily observable, meaning that we cannot see or touch many of the phenomena that we are interested in. Therefore, multiple item scales, or a set of manifest observations, are necessary to measure latent constructs. Experiential POC are thoughts and feelings used to engage in behavior change and include Consciousness Raising (increased awareness about the behavior), Dramatic Relief (increased emotional experiences so to reduce the affect to increase behavior), Environmental Reevaluation (how behavior effect's one's social environment), Self Reevaluation (viewing self-image with and without behavior change), and Social Liberation (increase in social opportunities/ alternatives with behavior change). Behavioral processes consist of activities such as making commitments and acting to promote change. The behavioral POC include Self Liberation (increase commitment to change and recommitment to act on that change), Reinforcement Management (provides consequences for taking steps towards a healthy behavior), Helping Relationships (increasing caring, trust, openness, acceptance, and social support for behavior change), Counter Conditioning (learning healthier behaviors that can substitute for problem behaviors), and Stimulus Control (removing cues for unhealthy habits and adding prompts for healthier alternatives). Each is theoretically unique with respect to their mechanism of action within behavior change, although empirically the POC are highly intercorrelated (22-26). The TTM postulates that use of the processes of change varies by stage of change with experiential processes being more important for progress in early stages and behavioral processes more important in later stages. Table 1 presents the theoretically expected relationships between Stage of Change and POC.

In previous TTM literature, two patterns regarding the relations between Stage of Change and POC have emerged. In some health behaviors, such as smoking cessation (12, 21, 27) the experiential processes had more of an impact on the earlier Stages of Change (Precontemplation - Preparation), and the behavioral processes were utilized more frequently in the later stages (Preparation - Maintenance). However, in other health behaviors, such as engaging in healthy diet, fruit and vegetable consumption, and exercise (28, 29) both experiential processes and behavioral processes consistently increased through the Stage of Change. Differences in usage of POC may be due to the type of behavior (e.g.

quitting smoking is a cessation behavior and healthy diet and fruit and vegetable intake are acquisition behaviors) or sample characteristics. In order to effectively individually tailor interventions, stage matched feedback of POC should be given (30). Thus, it is necessary to understand the pattern of usage of POC by stage that may be unique to blood donation in Blacks.

Only two prior studies have used the TTM as a framework to understand blood donation behavior. The first study to investigate the POC in blood donation found initial support for using the experiential and behavioral processes within this content area (14). Indeed this was the important first step towards understanding POC related to blood donation behavior decision making that utilized both qualitative and quantitative methods to demonstrate initial validity of the TTM to blood donation behavior. Support was found for the higher-order two factor model such that experiential POC were associated with earlier Stages of Change and behavioral POC were associated with later Stages of Change (14). This pattern is consistent with acquisition health behaviors such as healthy diet and fruit and vegetable intake. More recently, Burditt et al., (15) demonstrated empirical support for the application of Stages of Change, Decisional Balance, and Self Efficacy in regard to blood donation behavior in a sample of Black adults (15, 31). Finally, there is a need to validate the POC measure in this minority population in order to better understand potential cultural differences in POC usage.

There is no previous research investigating the TTM POC of blood donation behavior in a Black sample. The current study builds on previous research which developed measures of stage of change, decisional balance, and self-efficacy for blood donation in a Black sample (15) by developing measures of the processes of change for blood donation among Black adults. This study extends the literature on blood donation by (a) developing a POC measure of blood donation validated in a sample of Black Adults (b) conducting tests of external validation by examining patterns of POC across SOC; and (c) producing measures of a of theoretically driven strategies that can be utilized in interventions to increase motivation to donate blood for Black adults.

MATERIALS AND METHODS

Measure Development

A sequential approach to measurement development was used in this study. This procedure included item development and refinement using focus groups and expert reviews followed by structural equation modeling analyses to refine the POC scales and external validation with existing TTM measures (32-34). As this was an effort to build a POC model for blood donation, Confirmatory Factor Analysis (CFA) using Structural Equation Modeling (SEM) was used as the primary model development analysis. SEM requires that the conceptualizations of a theory's constructs be especially strong, with clearly defined and testable hypotheses as to how the constructs relate to one another. The POC model has been tested numerous times with other health behaviors (21, 28, 29, 31). The testing of various models against one another is an additional asset of CFA that is rarely practiced with other statistical techniques, and can further the understanding of how well a data set supports theoretical hypotheses. Ultimately, the retained model should be the one that fits the data best, both conceptually and empirically (34).

Item Development

A review of the literature, expert consultation on TTM and blood donation, focus groups, and cognitive interviews were conducted and integrated into item development representing the processes of change measure for blood donation. Six focus groups (Total N = 29) of

Blacks from the NYC Metropolitan area were conducted at the NYBC. Participants varied in their experience and willingness to donate blood including “never donors” with no history of donating blood, “super donors” who donate blood regularly, and “lapsed donors” who have a history of donating blood at least once, but have not donated in the previous 12 months. Participants were recruited via advertisements placed in the New York Metropolitan Area. Focus groups were led by Black staff and the major goal of these focus groups was to identify key concerns and issues that Blacks had about blood donation decision making. Responses were recorded via audiotape. In addition, we conducted key informant interviews at a major metropolitan blood center with staff who manage blood donation efforts with minority populations. We aimed to identify items and develop the TTM POC measure to represent factors that were important to a Black population regarding blood donation decision making. The focus groups followed a specific protocol to discuss open-ended experiences, attitudes, and concerns about blood donation. Additionally, specific questions were asked for each TTM construct (Stage of Change, Decisional Balance, Self Efficacy, and Processes of Change). For example, to elicit responses for Dramatic Relief POC (i.e., catharsis; emotional experience; increase depth of feeling and emotions concerning blood donation) the moderator asked “sometimes emotional experiences can motivate people to start donating blood. Can you think of some examples of this type of experience?” Responses to this question included but were not limited to “hearing people's personal stories is inspiring” and “something happens to someone in my family.” Expert panel groups were held to translate the concerns raised by focus group participants into Dramatic Relief items such as “I am moved by stories of people whose lives are saved by blood donation” and “It is upsetting to think that there might not be enough blood if someone in my family needed it.” This process was repeated for all ten POC categories.

Design and Recruitment

This study was cross-sectional in design and consisted of a survey administered at one time-point via the internet of a convenience sample. The Institutional Review Boards at the University of Rhode Island and at NYBC approved all study procedures. The recruitment goal was to yield a pool of Black adults ages 18-75 who were eligible to donate blood. Recruitment was intended to ensure that the sample would reflect the complete range of the behavior from never to regular donors and the complete range of intent to donate from none to strong intent. To this end, two sources of participant recruitment were utilized. An online survey company was used to recruit 400 Black participants in the Northeast region of the US with emphasis on New York and New Jersey. Individuals were excluded from participation if they reported having any of the following pre-existing conditions that could limit their eligibility to donate blood; type I or type II diabetes, anemia, or hypertension. Recruitment via the online survey company was anticipated to yield more participants with less donation history and less intent to donate in the future. The remainder of the sample, (N=150) was recruited by email from the NYBC donor database of Black adults who had donated blood at least twice in the previous year.

Incentives were given upon completion of the survey and varied depending on the source of study recruitment. Participants recruited via the online survey sampling company were provided points for one entry into a quarterly contest to win \$25,000. The odds of winning were dependent on how many surveys are completed in any given quarter but were approximately 1:1.6 million. Every respondent that completed the survey received an incentive of 500 points (the equivalent of \$5.00) which can be redeemed any time after the survey has been completed and can be used to purchase either gift cards or the value of those points can be donated to charity. Individuals between the ages of 18-24 were additionally incentivized with \$3 dollars in points to ensure representation from that age group. All

participants recruited by NYBC via their donor database received approximately \$4 worth of points, equivalent to the points earned for one blood donation.

Measures

Processes of Change—An initial pool of 76 items reflected the 10 POC scales. Participants were asked to rate the frequency in which they engaged in a variety of behaviors, thoughts, and feelings that are associated with readiness to donate blood in the past month. Participants responded on a five point scale ranging from “Never” to “Frequently” (22-26) (Table 2).

Stage of Change—A fourteen question algorithm was utilized to classify participants into four mutually exclusive categories based on past blood donation behavior and future intention to donate (15). Participants were categorized into Precontemplation if they reported no intention to donate blood in the next six months. Contemplation was defined as intention to donate blood in the next six months. Preparation was defined as no donations in the past twelve months and intention to donate within the next 30 days or when next eligible. Action was defined as previous donation (2 times) within the past year and intention to donate in the next 30 days or when next eligible. Action and Maintenance are grouped together for this study because base rates of regular donors in the general population are typically quite low and prior development work suggested that there was minimal difference between these two stages of change.

Decisional Balance—Decisional balance included twelve items designed to assess how a person values the benefits and consequences of blood donation (15). Six items were used to reflect the Pros of Blood Donation (e.g., I may save someone's life) and three items represented the Eligibility cons (e.g., being informed of being ineligible to donate) and three items represented the Physical cons (e.g., worried about pain from the needle). Ratings were based on a 5-point scale that described how important each item was in their decision to donate blood. Responses ranged from 1 = “not at all important” to 5 = “extremely important.” The internal consistency was good for the pros scale ($\alpha = .82$) and adequate for both cons scales ($\alpha = .74$ Eligibility Cons; $\alpha = .72$ Physical Cons).

Self Efficacy—Eight items were designed to assess an individual's confidence in their ability to donate blood in the face of situations that may present challenges or obstacles to engaging in the behavior (e.g. when I am feeling tired) (15). Their ratings were based on a 5-point scale. Responses ranged from 1 = “not at all confident” to 5 = “extremely confident”.

Demographics: Single items were used to assess participants' age, gender, race, ethnicity, and level of education.

Analysis Strategy: An iterative set of analyses was conducted utilizing structural equation measurement modeling. The aims of these analyses were to: 1) provide estimates of the factor loadings and 2) estimate internal consistency for each component using Cronbach's alpha. Item selection was an iterative process, in which items with poor loadings ($< .40$) were removed, and analyses were repeated. Final item selection was also determined on the basis of item clarity, lack of redundancy, and conceptual breadth. Once the final items were chosen, multiple measurement models were compared also using structural equation modeling. Three models were tested; the null model (specifies no factors), the two-factor, ten subscale, higher order model (experiential and behavioral constructs), and the 10-factor (all 10 POC) fully correlated model.

In order to determine the model of best fit, four fit indices were used; the likelihood ratio chi-square statistic, goodness of fit index (GFI), the comparative fit index (CFI), and the average absolute standardized residual statistic (AASR). Traditionally, values of .80-.89 on the GFI and CFI indicate adequate to marginal fit, while values of .90 and above indicate good to excellent fit. For the AASR, values below .06 indicate excellent fit. More conservative criteria state that an acceptable GFI and CFI should be at least .90 while .95 and above indicate excellent fit. Factor loadings were assessed and retained above the adequate value of .40.

External Validation

The TTM hypothesizes that individuals in different Stages of Change will differ significantly on their scores for the Processes of Change subscales (35). Multivariate Analysis of Variance (MANOVA) tests were conducted on all POC variables by Stage of Change. In order to facilitate comparison in the magnitude of differences in scale scores among the different subscales and between the results of this study and previous studies examining TTM scales, raw scores were converted to T-scores (Mean = 50, standard deviation [SD] = 10). Correlations were examined to determine the relationship between each Process of Change subscale and other TTM variables, including Pros, Cons, and Self Efficacy.

RESULTS

Sample

The participants were 566 Black Adults residing in the Northeast region of the United States. The participants were predominantly female (64.1 %), and ages ranged from 18-75 with a mean of 38 (SD = 13.24). The majority (64.3%) of the participants reported a history of blood donation. Reported education levels showed that 16.8% of participants completed a high school degree or equivalency, 37.8% reported some college or associates degree, 28.1% graduated from college, and 14.3% reported professional training post college.

Processes of change

The ten-factor fully correlated model fit the data best, $\chi^2(360) = 1706.40$, CFI = .90, GFI = .82, and AASR = .04. Factor loadings ranged from .65 to .92 and coefficient alphas ranged from .74 to .91 (See Table 2). Table 3 shows the fit indices for the models that were evaluated. Only the first two models were nested and can be compared directly. The third model considered was the hierarchical model (i.e., experiential and behavioral processes) that has been supported in prior studies with other health behaviors but had inadequate model fit in this sample.

External validation phase

Stage of change—All 566 participants were categorized into one of the four mutually exclusive stages of change categories. The distribution by stage for the entire sample was: Precontemplation, 42.9% (n= 243), Contemplation, 12% (n= 68), Preparation, 11.1% (n= 63), Action/Maintenance, 33.9% (N= 192).

POC and Stage of Change—Multivariate Analysis of Variance (MANOVA) found a significant main effect for Stage of Change, Wilk's $\Lambda=.50$ $F(6, 1623.8) = 13.73$, $p < .001$, multivariate $\eta^2=.20$. These results showed that use of the ten Processes of Change subscales differed significantly by Stage of Change. Follow-up ANOVA values are as follows; Consciousness Raising $F(3,562) = 8.35$, $p < .001$, $\eta^2=.04$; Dramatic Relief $F(3,562) = 10.83$, $p < .001$, $\eta^2=.05$; Environmental Reevaluation $F(3, 562) = 31.48$, $p < .001$, $\eta^2=.14$; Self

Reevaluation $F(3,562) = 66.35, p < .001, \eta^2 = .26$; and Social Liberation $F(3,562) = 11.59, p < .001, \eta^2 = .06$, Reinforcement Management $F(3, 562) = 20.59, p < .001, \eta^2 = .10$; Counter Conditioning $F(3,562) = 13.22, p < .001, \eta^2 = .07$; Stimulus Control $F(3,562) = 39.02, p < .001, \eta^2 = .17$; Helping Relationships $F(3,562) = 4.84, p < .001, \eta^2 = .03$; and Self Liberation $F(3,562) = 72.93, p < .01, \eta^2 = .28$. Figures 1, 2 and Table 4 show the POC comparisons by stage.

POC, Decisional Balance and Self Efficacy—To examine the relations between the POC, Decisional Balance and Self Efficacy scales, experiential POC and behavioral POC were summed to create two higher order constructs. The correlations among the POC factors, Decisional Balance, and Self Efficacy were then examined. The experiential and behavioral processes were positively correlated with one another, Pros, Eligibility Cons, and with Self Efficacy (Table 5).

DISCUSSION

To our knowledge, this is the first study to develop a culturally tailored measure related to blood donation for a Black population using the TTM Processes of Change. The goal of this study was to develop measures of theoretically driven strategies that can be used in interventions to increase blood donation behavior in Blacks. The POC measure has good factor structure, good internal consistency (i.e., alphas ranged from high .92 for Self Reevaluation, to a lower but adequate .76 for Helping Relationships) and demonstrates patterns of relations with other TTM constructs that are consistent with those relationships in other TTM content applications (36). This study fits well within the context of current research in the field of blood donation by providing theoretically based and empirically supported behavioral and experiential strategies to increase blood donation in Blacks.

The measure development process included a confirmatory factor analytic approach and supported the hypothesized correlated ten factor structure for the POC measure. A confirmatory factor analytic approach was used to impose a ten-factor structure that is theoretically based in order to demonstrate flexibility in applying POC to intervention development. The confirmatory analytic approach was used to encourage future interventionists to choose from the range of POC strategies offered in order to meet the unique needs of the sample and type of intervention. Furthermore, the POC strategies can easily be applied across various intervention mediums (i.e., computer/ internet based, telephone, in-person, pamphlets, etc.).

Processes of Change by Stage

Based on previous TTM research, it was expected that the experiential processes would be used more frequently in the earlier stages of change and that the behavioral processes would be used more frequently in the latter Stages of Change. Consistent with prior research on the TTM, participants in Precontemplation used 8 out of the 10 processes less frequently than participants in all other stages thus employing fewer methods towards behavior change (24, 37, 38). Usage of two behavioral processes, Counter Conditioning and Helping Relationships, peaked in the Preparation stage. Individuals preparing to donate blood were more likely to utilize strategies such as countering thoughts about being afraid of donating blood with the reminder that blood donation is a safe process (Counter Conditioning) or talking to a someone about their thoughts and feelings about donating (Helping Relationships) more so than participants in other stages. By understanding what strategies are most used in specific stages can help direct theoretically based interventions or clinical personnel to implement or encourage the use of appropriate POC strategies to increase readiness to donate blood. For example, when blood centers send reminders about upcoming blood donation appointments (those in Precontemplation stage) an anecdotal story can also

be provided about someone whose life was saved by blood donation (Dramatic Relief). Dramatic Relief is a POC that can be applied to those in Precontemplation to help potential donors feel inspired by stories of blood donation

While MANOVA results found that use of all 10 POC varied significantly by SOC, use of three processes, Self Reevaluation ($\eta^2=.26$), Self Liberation ($\eta^2=.28$), and Stimulus Control ($\eta^2=.17$) demonstrated the largest effects. Participants in Precontemplation reported using the Self Reevaluation strategy much less often than those further along in the stages. Additionally, participants in Action reported using Self Reevaluation, Self Liberation, and Stimulus Control strategies the most often, suggesting use of these strategies are associated with more frequent blood donation. Thus, efforts to increase the use of these strategies may be particularly helpful to help participants progress toward blood donation. For example, Self Reevaluation was the most endorsed experiential POC for those in action (those who donated blood in the past year and are planning to donate at next possible opportunity). Providing Self Reevaluation strategies (e.g., think about how being a blood donor is consistent with your belief that you should help others) to those not thinking about donating blood may help increase readiness to donate blood. Future interventions can apply these POC strategies by providing stage-matched, tailored feedback such as; “although you are not yet ready to make the decision to donate blood, it may be helpful to start thinking about how you would feel if you were a blood donor. Many Blacks find it helpful to think of themselves as someone who is doing the right thing for others.” POC offer theoretically based, reliable, and externally valid strategies to increase blood donation in Blacks.

POC by Decisional Balance and Self Efficacy

The experiential and behavioral constructs were positively correlated with Pros and Self Efficacy. Thus, interventions that increase usage of experiential and behavioral POC strategies should expect that Pros and Self Efficacy will increase concurrently. Both behavioral and experiential POC for blood donation were positively related to eligibility concerns (e.g. Eligibility Cons). Additionally, concerns regarding eligibility were positively related to the benefits of donating blood. Therefore, it may be the case that although individuals have concerns about their eligibility to donate blood, the perceived benefits for donating blood outweigh these concerns. Scores on both behavioral and experiential POC were not related to scores on the concerns for physiological reactions related to blood donation (e.g. Physical Cons) further supporting results of prior studies in which the negative concerns of behaviors are less influential in behavior change (39, 40).

Cultural Validation

To the best of our knowledge, this is the first study to develop and assess the validity of the POC measure related to blood donation in a Black sample. A major goal of this study was to develop a valid and reliable POC measure that included statements that reflect the public health need for an increase in Black blood donors. During the development process, items were written to reflect elements of blood donation that were considered potentially important for a Black audience (i.e. “I think about how donating blood will help people in my community”). More general items reflecting how donating blood can help others (non-specific to race) such as “I think that the world would be a better place if more people were blood donors,” and “I view myself as a Good Samaritan because I donate blood”, were included in initial data collection. However, these items were not included in the final measures due to low factor loadings which indicate less applicability. Items more specific to culture (i.e. “I am aware that my community supports people becoming blood donors”) were stronger empirically and were retained in the final item set. This result has a number of feasible explanations. As previously suggested (15), culture-specific items were relevant to understand how Blacks make the decision to donate blood. This study provides important

data about behavioral and experiential components that are associated with blood donation behavior in Blacks. These results also further support applying theoretically based strategies towards a culturally specific important area of health behavior change.

This study is consistent with intervention components used in a previous church based intervention with Blacks (9). A culturally tailored intervention was administered in a church environment and yielded significant increases in blood donation behavior (9). The three factors addressed in this church study were awareness of need, convenience, and faith-based support from church leaders (9). These three factors are consistent with POC such as Environmental Reevaluation (“I think about how donating blood would help people in my community”), Social Liberation (“I have noticed that there are more opportunities to donate blood in my community”), and Reinforcement Management (“People in my life praise me for donating blood”), thus providing further external validity in that the POC are relevant to other samples. In another intervention study, a video highlighting the need for Black blood donors to help children with SCD was administered and emotional appeal was likely related to the increase in first-time Black blood donors at corresponding local blood drives (8). Elements of this intervention are consistent with Dramatic Relief, a POC that emphasizes emotional awareness of a need for change (i.e., I get upset when I hear stories of people whose lives are saved by blood donation). Dramatic Relief can be used to motivate donors to donate again by reminding them of the emotions they felt when hearing the emotionally moving stories. These studies support the validity of POC for increasing blood donation in Blacks, but reflect only a few of the many potential ways to integrate POC into existing culturally tailored interventions to increase blood donation behavior in Blacks. The current study expands upon the aforementioned intervention studies by utilizing a more complete model of behavior change (TTM) and a wider range of strategies that can be used with entire populations of eligible black donors, at every stage of readiness to donate blood.

Limitations

The study design was cross-sectional and the sample was one of convenience for measure development purposes. Longitudinal studies will be necessary to fully examine the pattern of use of blood donation POC. Second, the participant sample was recruited from the Northeastern geographic region of the United States only, with an emphasis on New York and New Jersey. Further evaluation of the POC scales outside the Northeast region will be necessary to ensure the study results are generalizable. Third, the participants in the study were more educated than the general population and were required to have computer/internet access for participation. Thus, future research must address the applicability of the POC and TTM measures of blood donation in more representative samples, particularly when considering potential interventions to increase blood donation for a broader black adult population. Additionally, the incentive strategies for the two sources of participant recruitment (SSI and NYBC) were not equivalent. However, as we recruited a convenience sample and as our results were consistent with previous TTM applications in other content areas, the differences in incentives likely had minimal impact on the results. Finally, our study did not conceptualize a separate Maintenance stage of change for blood donation from Action stage. This decision was in part due to the base rate of blood donation behavior being so low that this group would be small in number and not representative of the rest of the population of blood donors. The decision to collapse Maintenance and Action stages was also due to the nature of blood donation behavior. Being in Maintenance still requires an active decision making process unlike other health behaviors (i.e., smoking cessation where Maintenance equals quit for 6months or more). However, future studies may choose to gather more information about donors that have donated more than twice per year for several years to evaluate the necessity of discriminating a “maintenance” stage for blood donation.

Conclusions/ Future Directions

The results of the present study have important theoretical and applied implications for the field of blood donation. Blood donation rates need to increase in the Black community to address a specific need for treating SCD. Interventions to increase blood donation need to be theory driven and also culturally tailored. This study developed ten strategies (both experiential and behavioral) that can be utilized through interventions in efforts to help increase blood donation in this important demographic.

Interventions can utilize the POC measure validated in this study to guide stage matched interventions to encourage use of relevant experiential and behavioral strategies to increase blood donation. Currently, the TTM is being used to develop computer-based interventions that are tailored at the individual level (36) for diverse populations, in diverse settings, via a multitude of communication channels. These expert systems interventions use validated assessment instruments such as the one developed here to provide tailored individualized feedback in the form of printed reports, telephone recordings, or real-time interactive and multimedia feedback on internet connected devices (e.g., computers, smartphones). This feedback is based on each individual's combination of responses on questions regarding Stage of Change, Pros and Cons, Self Efficacy, and POC. Data demonstrates these individually tailored messages result in positive behavior change (30). Incorporating POC in interventions can provide stage-matched, valid, and reliable strategies to increase blood donation for Blacks. In addition, the POC strategies can also be used in existing culturally tailored interventions and complement group level interventions.

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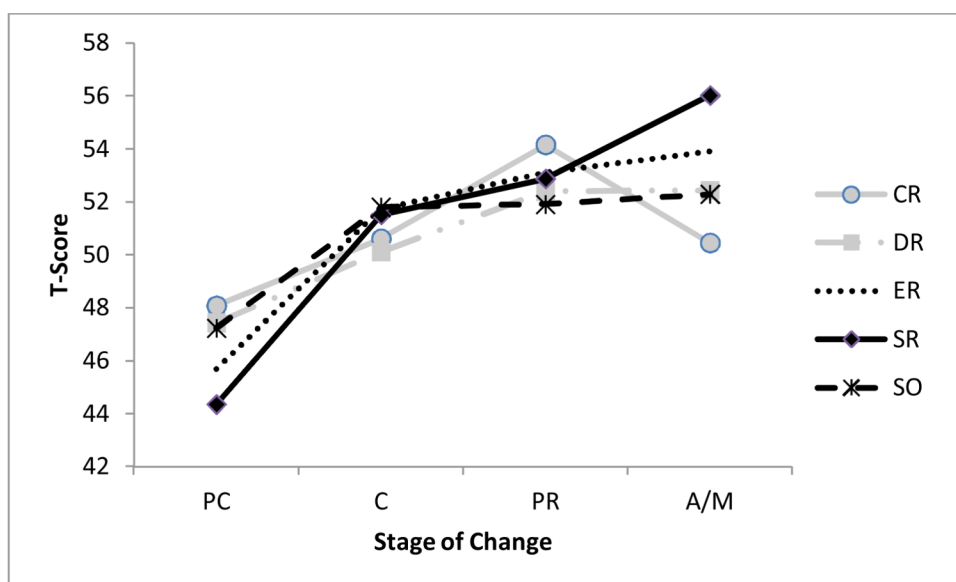
References

1. James AB, Hillyer CD, Shaz BH. Demographic differences in estimated blood donor eligibility prevalence in the united states. *Transfusion*. 2011
2. Murphy EL, Shaz B, Hillyer CD, Carey P, Custer BS, Hirschler N, Fang J, Schreiber GB, NHLBI Retrovirus Epidemiology in Blood Donors Study-II (REDS-II). Minority and foreign-born representation among US blood donors: Demographics and donation frequency for 2006. *Transfusion*. Oct; 2009 49(10):2221–8. [PubMed: 19555415]
3. Shaz B, Hillyer C. Minority donation in the united states: Challenges and needs. *Curr Opin Hematol* [Internet]. 2010; 17(6):544–9. Available from: <http://0-www.ncbi.nlm.nih.gov/helin.uri.edu/pmc/articles/PMC3082202/pdf/nihms-287536.pdf>.
4. Shaz BH, James AB, Hillyer KL, Schreiber GB, Hillyer CD. Demographic patterns of blood donors and donations in a large metropolitan area. *Journal of National Medical Association*. 2011; 103(4): 351–7.
5. Shaz B, Zimring J, Demmonds D, Hillyer C. Blood donation and blood transfusion: Special considerations for african americans. *Transfus Med Rev* [Internet]. 2008; 22(3):202–14. Available from: <http://0-www.sciencedirect.com/helin.uri.edu/science/article/pii/S088779630800014X>.
6. James AB, Demmonds DG, Schreiber GB, Hillyer CD, Shaz BH. Contribution of attitudinal factors to blood donation in african american church attendees. *Transfusion*. 2011; 51(1):158–65. [PubMed: 20840534]
7. Shaz B, James A, Hillyer K, Schreiber G, Hillyer C. Demographic variations in blood donor deferrals in a major metropolitan area 881..887. *Transfusion* [Internet]. 2010; 50:881–7.
8. Price C, Boyd J, Watkins A, Fleming F, DeBaun M. Mailing of a sickle cell disease educational packet increases blood donors within an african american community. *Transfusion* [Internet]. 2006;

46(8):1388. Available from: <http://0-web.ebscohost.com.helin.uri.edu/src/pdf?sid=6bcf0ca4-bbf8-4239-8818-b89944f4dff6%40sessionmgr111&vid=2&hid=123>.

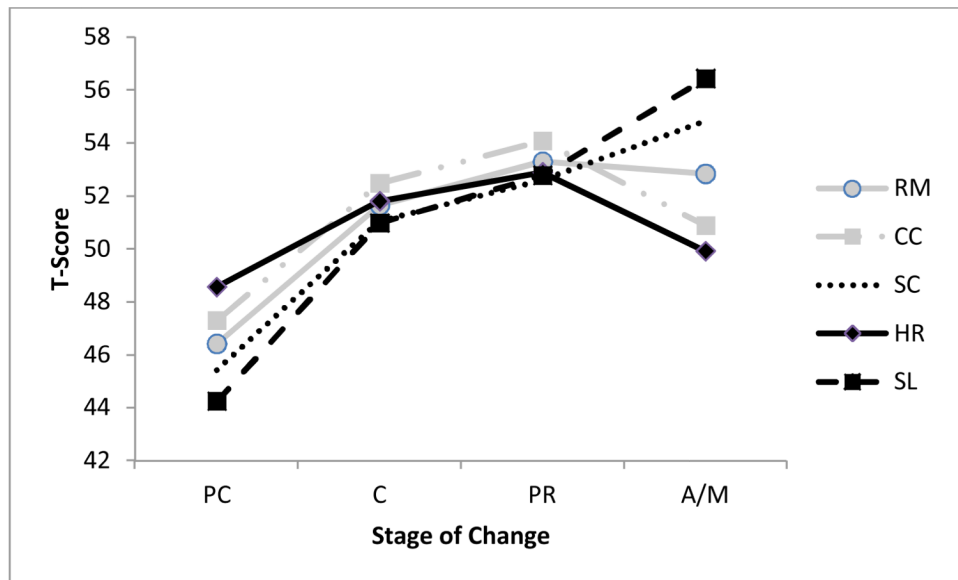
9. Price CCL. The sickle cell sabbath: A community program increases first-time blood donors in the african american faith community. *Transfusion* (Philadelphia, Pa.). 2009; 49(3):519–23. -03.
10. Hillyer KL, Hare VW, Josephson CD, Harris SB, Hillyer CD. Partners for life: The transfusion program for patients with sickle cell disease offered at the american red cross blood services, southern region, atlanta, georgia. *Immunohematology*. 2006; 22(3):108–11. [PubMed: 17105357]
11. Prochaska JO, Diclemente CC. Stages and processes of self-change of smoking: Toward an integrative model of change. *J Consult Clin Psychol*. 1983; 51(3):390–5. 06//. [PubMed: 6863699]
12. Prochaska JO, Diclemente CC. Stages of change in the modification of problem behaviors. *Prog Behav Modif*. 1992; 28:183–218. [PubMed: 1620663]
13. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot*. 1997; 12(1):38–48. 09//. [PubMed: 10170434]
14. Cunningham DM. Setting standards for donor family care. *EDTNA ERCA J*. 1998; 24(2):16–8. 04//. [PubMed: 10392058]
15. Burditt C, Robbins ML, Paiva A, Velicer WF, Koblin B, Kessler D. Motivation for blood donation among african americans: Developing measures for stage of change, decisional balance, and self-efficacy constructs. *J Behav Med*. Oct; 2009 32(5):429–42. [PubMed: 19365718]
16. Prochaska, J.; Redding, C.; Evers, K. The transtheoretical model of change. In: Glanz, K.; Rimer, B.; Viswanath, K., editors. *Health behavior and health education: theory, research and practice*. [Internet]. 4th ed.. Jossey- Bass Inc.; San Francisco: 2008. p. 170-222. Available from: <http://books.google.com/books?id=1xuGerZCfbsC&printsec=frontcover#v=onepage&q&f=false> [12 January 2012]
17. Velicer WF, Diclemente CC, Rossi JS, Prochaska JO. Relapse situations and self-efficacy: An integrative model. *Addict Behav*. 1990; 15(3):271–83. [PubMed: 2378287]
18. Diclemente CC, Prochaska JO. Self-change and therapy change of smoking behavior: A comparison of processes of change in cessation and maintenance. *Addict Behav*. 1982; 7(2):133–42. [PubMed: 7102444]
19. Prochaska J, Norcross J. Psychotherapists' perspective on treating themselves and their clients for psychic distress. *Professional Psychology: Research and Practice* [Internet]. 1983; 14(5):642–55.
20. Prochaska, JO.; Diclemente, CC. Common processes of self-change in smoking, weight control, and psychological distress. In: Shiffman, S.; Wills, T., editors. *Coping and substance use*. Academic Press; New York: 1985. p. 345-63.
21. Prochaska JO, Velicer WF, Diclemente CC, Fava J. Measuring processes of change: Applications to the cessation of smoking. *J Consult Clin Psychol*. 1988; 56(4):520–8. 08//. [PubMed: 3198809]
22. Bock BC, Marcus BH, King TK, Borrelli B, Roberts MR. Exercise effects on withdrawal and mood among women attempting smoking cessation. *Addict Behav*. 1999; 24(3):399–410. 05//. [PubMed: 10400278]
23. Clark MM, Marcus BH, Pera V, Niaura RS. Changes in eating inventory scores following obesity treatment. *Int J Eat Disord*. 1994; 15(4):401–5. 05//. [PubMed: 8032355]
24. DeVita MA, Vukmir R, Snyder JV, Graziano C. Procuring organs from a non-heart-beating cadaver: A case report. *Kennedy Inst Ethics J*. 1993; 3(4):371–85. 12//. [PubMed: 10130754]
25. Diclemente CC, Hughes SO. Stages of change profiles in outpatient alcoholism treatment. *J Subst Abuse*. 1990; 2(2):217–35. [PubMed: 2136111]
26. Donovan DM, Kadden RM, Diclemente CC, Carroll KM, Longabaugh R, Zweben A, Rychtarik R. Issues in the selection and development of therapies in alcoholism treatment matching research. *J Stud Alcohol Suppl*. 1994; 12:138–48. 12//. [PubMed: 7722990]
27. Prochaska JO, Diclemente CC. Self change processes, self efficacy and decisional balance across five stages of smoking cessation. *Prog Clin Biol Res*. 1984; 156:131–40. [PubMed: 6473420]
28. Rosen CS. Is the sequencing of change processes by stage consistent across health problems? A meta-analysis. *Health Psychol*. 2000; 19(6):593–604. 11//. [PubMed: 11129363]
29. Oliveira M, Anderson J, Auld G, Kendall P. Validation of a tool to measure processes of change for fruit and vegetable consumption among male college students. *Journal of Nutrition Education*

- and Behavior [Internet]. 2005; 37(1):2–11. Available from: <http://0-www.sciencedirect.com/helin.uri.edu/science/article/pii/S1499404606602534>.
30. Prochaska JO, Diclemente CC, Norcross JC. In search of how people change. applications to addictive behaviors. *Am Psychol*. 1992; 47(9):1102–14. 09//. [PubMed: 1329589]
 31. Ferguson E, Chandler S. A stage model of blood donor behaviour: Assessing volunteer behavior. *Health Psychology* [Internet]. 2005; 10(3):359–72. Available from: [http://www.nsph.gr/Files/FileManager/Psihologia_ygeias/Notes/1h_imeras/Ferguson%20&%20Chandler%20\(Stages%20&%20Blood\).pdf](http://www.nsph.gr/Files/FileManager/Psihologia_ygeias/Notes/1h_imeras/Ferguson%20&%20Chandler%20(Stages%20&%20Blood).pdf).
 32. Jackson D. A sequential system for personality scale development. *Current topics in clinical and community psychology*. 1970; 2:61–96.
 33. Jackson D. The dynamics of structured personality tests. *Psychological review*. 1971; 78:229–48.
 34. Noar SM. The role of structural equation modeling in scale development. *Structural Equation Modeling: A Multidisciplinary Journal*. 2003; 10(4):622–47. 10/01; 2012/07.
 35. Weber F, Canbay AE. Attitudes of physicians and nursing staff members toward organ donation in an urban area of germany. *Transplant Proc*. 1999; 31(5):2179–80. 08//. [PubMed: 10456007]
 36. Velicer WF, Prochaska JO, Redding CA. Tailored communications for smoking cessation: Past successes and future directions. *Drug and alcohol review*. 2006; 25:49–57. [PubMed: 16492577]
 37. Cohen SJ, Halvorson HW, Gosselink CA. Changing physician behavior to improve disease prevention. *Prev Med*. 1994; 23:284–91. [PubMed: 8078848]
 38. Diclemente CC. Prevention and harm reduction for chemical dependency: A process perspective. *Clin Psychol Rev*. 1999; 19(4):473–86. 06//. [PubMed: 10429846]
 39. Hall K, Rossi J. Meta-analytic examination of the strong and weak principles across 48 health behaviors. *Prev Med* [Internet]. 2008; 46(3):266–74. Available from: <http://0-www.sciencedirect.com/helin.uri.edu/science/article/pii/S0091743507004860>.
 40. Prochaska JO, Velicer WF, Rossi JS, Goldstein MG, Marcus BH, Rakowski W, Fiore C, Harlow LL, Redding CA, Rosenbloom D. Stages of change and decisional balance for 12 problem behaviors. *Health Psychol*. 1994; 13(1):39–46. 01//. [PubMed: 8168470]



Note: CR = Consciousness Raising, DR = Dramatic Relief, ER = Environmental Reevaluation, SR = Self Reevaluation, SO = Social Liberation.

Figure 1.
Experiential Processes of Change by Stages of Change



Note: RM = Reinforcement Management, CC = Counter Conditioning, SC = Stimulus Control, HR = Helping Relationships, SL = Self Liberation.

Figure 2.
Behavioral Processes of Change by Stages of Change

Table 1

Processes of Change Listed Under the Stages in Which They Are Emphasized Most in Theory (Prochaska How People Change, p. 685)

Precontemplation	Contemplation	Preparation	Action
Consciousness Raising			
Dramatic Relief			
Environmental Reevaluation			
	Self Reevaluation		
		Self Liberation	
			Counter Conditioning
			Helping relationship
			Social Liberation
			Stimulus Control
			Reinforcement Management

Table 2

Results of Principal Components Analyses and Coefficient Alpha's for Experiential and Behavioral Processes of Change.

Processes of Change	Factor Loadings
Experiential Processes	
Consciousness Raising ($\alpha=.79$)	
I look for information about how to become a blood donor.	0.72
I learn about the steps involved in donating blood by getting information from people who are blood donors.	0.80
I think about TV and radio messages about donating blood.	0.74
Dramatic Relief ($\alpha=.83$)	
I feel inspired by individual who saved lives by donating blood.	0.79
I get upset when I hear stories of people whose lives are saved by blood donation.	0.72
I am moved by stories of people whose lives are saved by blood donation.	0.84
Environmental Reevaluation ($\alpha=.88$)	
I think that I could be someone who saves lives by donating blood.	0.84
I realize that people who donate blood set a good example for others.	0.83
I think about how donating blood would help people in my community.	0.86
Self-Reevaluation ($\alpha=.91$)	
I think that being a blood donor supports my view of myself as a caring person.	0.81
Being a blood donor makes me feel good about myself.	0.92
Being a blood donor is consistent with my belief that I should help others.	0.92
Social Liberation ($\alpha=.81$)	
I have noticed that there are more opportunities to donate blood in my community.	0.73
I notice that more and more companies and businesses sponsor blood drives.	0.84
I am aware that my community supports people becoming blood donors.	0.73
Behavioral Processes	
Self Liberation ($\alpha=.82$)	
I feel committed to donating blood.	0.78
I know I have the strength it takes to be a blood donor.	0.85
I tell myself I can be a blood donor even if others disagree with my decision.	0.86
Reinforcement Management ($\alpha=.82$)	
People in my life praise me for donating blood.	0.86
I am respected by others for being a blood donor.	0.77
I reward myself in some way for donating blood.	0.72
Helping Relationships ($\alpha=.74$)	
I talk to someone about my thoughts and feelings about blood donation	0.66
I have someone who will come with me when I donate blood.	0.65
There are people close to me that encourage me to donate blood.	0.78

Processes of Change	Factor Loadings
Counter Conditioning ($\alpha=.86$)	
When tempted to reconsider being a blood donor, I focus on the good that would come out of it.	0.79
When I am afraid of donating blood, I remind myself that it is a safe process.	0.80
When I am reluctant to donate blood, I remember that it saves lives.	0.86
Stimulus Control ($\alpha=.80$)	
I make sure I know when blood drives are scheduled at nearby locations.	0.79
I keep information on blood donation around to remind me of my reasons for donating blood.	0.80
I schedule regular times to donate blood.	0.68

Table 3

Fit indices for tested Processes of Change confirmatory models

	χ^2 (<i>df</i>)	GFI	CFI	AASR
Model 1: null mode	19540.50 (780)	-	-	-
Model 2: Ten Factor model	4041.89(695)	.69	.82	.06
Model 3: Two higher order factor model	3822.80(404)	.70	.74	.11

N= 273, χ^2 chi square, *df* degrees of freedom, GFI goodness of fit index, CFI comparative fit index, AASR average absolute standardized residual statistic, $p < .001$.

Table 4**Group Comparisons on Each of the Processes of Change**

Process	Comparisons of stage-of-change groups
Consciousness Raising	PC < P, PC < AM
Dramatic Relief	PC < P, PC < AM
Social Liberation	PC < All
Self Liberation	PC < All, AM > All
Self Reevaluation	PC < All, AM > All
Environmental Reevaluation	PC < All
Counter Conditioning	PC < All, P < AM
Stimulus Control	PC < All, AM > All
Reinforcement Management	PC < All
Helping Relationships	PC < All

Note. PC = Precontemplation, C = Contemplation, P = Preparation, AM = Action/ Maintenance, All = All other stages of change; $p < .05$, using Tukey tests.

Table 5

Correlations between Processes of Change and other TTM constructs

	Behavioral Processes	Pros	Physical Cons	Eligibility Cons	Self-Efficacy
Experiential Processes	.896**	.455**	-.028	.145**	.277**
Behavioral Processes	--	.376**	-.003	.170**	.305**
Pros		--	-.148**	.150**	.377**
Physical Cons			--	.297**	-.102*
Eligibility Cons				--	-.034
Self-Efficacy					--

** p < 0.01 level (2-tailed)

* p < 0.05 (2-tailed).