Trauma-Informed Strategies for Preventing Type 2 Diabetes in Black Teens

Jerome Taylor, PhD; Eugene Tull, DrPH; Lenall Thomas, PhD; & Kaniqua Robinson, PhD

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Background

Our research team has suggested that *Post-Traumatic Cultural Disorder*—the internalization of racist stereotypes about blacks by blacks—is the consequence of more than 400 years of historical and ongoing oppression. In a factor analytic study of racist stereotypes internalized by blacks, two hierarchically structured dimensions were identified. At the lower level was the presumption that blacks are *mentally defective* intellectually, morally, and emotionally and *physically gifted* athletically, sexually, and rhythmically. These factors were organized by a higher order factor labelled *blacks are animals*. Altogether, these presumptions are consistent with latent constructions of blacks as 'animals' which 'explains' why they are 'mentally defective' and 'physically gifted' (Taylor & Kouyaté, 2013). We have found that this stereotype when internalized by blacks is linked to multiple indicators of type 2 diabetes net effects of SES (Butler, Tull, et al., 2002; Chambers, Tull, Fraser, *et al.,* 2004; Cort, Gwebu, Tull *et al.,* 2013; Cort, Gwebu, Tull ES, *et al.,* 1999, 2013).

Using implicit attitude measures of racial stereotypes, a series of six studies conducted over six years at Stanford and other universities indicate that the ape-black association is unconsciously present even among bright white, black, Asian, and Latino college students who have minimum conscious knowledge of the historical ape-black association (Goff, Eberhardt, Williams, & Jackson, 2008). On this measure of implicit attitudes using samples of White, Asian, Latino, Hispanic, Asian American, African American, and mixed-race Americans, it would appear that even our intellectually gifted have not outlived or outwitted our 400 year history of racial oppression in America or similarly groundless confabulations on black life dating back to at least the 15th Century. Not surprisingly, there is evidence from neuroimaging studies that members of highly stigmatized groups may be so dehumanized that they are not even encoded in the brain as social beings (Harris & Fiske, 2006). Indeed, based on millions of participants who have taken the racial implicit attitudes test through online centers located at Harvard, Washington, other universities, and from their own homes, *nearly 80 percent of white and almost 50 percent of black adults identify with pro-white and anti-black attitudes* (Banaji & Heiphetz, 2010; Banaji & Greenwald, 2013)—even among those who self-identified themselves as political activists or bias free. These proportions are not are far removed from pro-white and anti-black attitudes reported in doll studies of black and white children during the late '30s in America (Clark & Clark, 1939) and in more recent studies in South Africa (Shutts, Kinzler, *et al,* 2011).

Extrapolations, based on population statistics reported in our 2018 Census, suggest that nearly 7 of 10 persons black *and* white encountered on the street, in the halls of congress, in our academic academies, or even among friends as well as enemies believe consciously or unselfconsciously that blacks are mentally defective and physically gifted. Together we are heirs *and* progenitors of PTCD which may be explained in part by Cudd's (2006) argument that the oppressed, without benefit of culturally grounded anchorage, may be persuaded to participate in their own oppression PTCD→IR (Internalized Racism).

Specific Aims

Guided by results of studies just reviewed, this research is designed to evaluate the extent to which internalized racism—our marker for Post-Traumatic Cultural Disorder—initiates the chain of processes identified in Exhibit 1 that will inform our approach to formulating trauma-informed interventions that promote the health of black teens at risk of type 2 diabetes:

Exhibit 1: PTCD → IR → (DS → UL → HRD)

PTCD (Post-Traumatic Cultural Disorder); IR (Internalized Racism); DS (Dysphoric Symptoms); UL (Unhealthy Lifestyle—Dietary Selection and Physical Activity); HRD (Heightened Risk of Type 2 Diabetes)

1. **IR→DS (Internalized Racism, Dysphoric Symptoms)**

We have found consistently positive associations between internalized racism and dysphoric symptoms--**D**epression, **A**nxiety, **S**tress, and **H**ostility or **DASH**) in 10 states in America, 7 nations in the Caribbean, and 4 countries in Africa (Taylor & Jackson, 1990; Taylor, Henderson, & Jackson, 1990a; 1990b). In general, then, it seems possible that internalized racism increases the burden of mental health challenges among persons of African descent including pre-teens, teens, and adults. Theoretically, it is important to note that structural equation models indicate that the direction of effect is from internalized racism to dysphoric symptoms rather than the other way around from dysphoric symptoms to internalized racism (Taylor, Tull, Rogers, & Thomas, under review), thus confirming our stipulation **IR→DS.**

2. **DS→UL (Dysphoric Symptoms, Unhealthy Lifestyles)**

Depression and Diet. More than 300 million people worldwide have been diagnosed with depression, which is a leading cause of disability and disease burden. All observational studies that considered the Mediterranean diet as the exposure variable and depression as the main outcome or as one of the outcome variables were included in this systematic review and meta-analysis. Two authors independently screened 3,229 publications. A total of 14 observational studies were included in the meta-analysis. The studies in the meta-analysis included a total of 56,043 participants. When 9 effect sizes from 9 cross-sectional studies were combined, a significant inverse association was found between depressive symptoms and low adherence to the Mediterranean diet (Shafiei, Salari-Moghaddam, & Larijani, 2019; Moghaddam, Saneei, & Larijani, 2019).

Stress/Anxiety and Diet. Adolescence is a critical period for brain maturation. Disturbances to the central nervous system at this time affect structure, function and behavioral outputs in ways that can have long-lasting effects. Hippocampal neurogenesis occurs during development and continues throughout life. In adulthood, integration of these new cells into the hippocampus is important for emotional behavior, cognitive function and neural plasticity. As evidence continues to mount that stress and anxiety during adolescence affects maturation of the hippocampus (Hueston, Cryan, & Nolan, 2017), we note as well that stress also directly affects consumption of high-caloric foods (Ulrich-Lai, Fulton, Wilson, *et al.* (2015) and lower levels of physical activity (Stults-Kolehmainen & Sinha, 2014;).

Anger and Diet. Hackett & Steptoe (2017) reported results of two large-scaled studies which investigated links between anger and subsequent development of type 2 diabetes. In the first involving 11,615 participants, trait anger was associated with an increased risk of future type 2 diabetes. A later study of 5,598 individuals also found that this characteristic significantly increased subsequent risk of type 2 diabetes.

3. UL → HRD (Unhealthy Lifestyles, Heightened Risk of Type 2 Diabetes). Empirical linkages between unhealthy lifestyles and heightened risk of type 2 diabetes have extensively evaluated in the literature.

Role of Diet. Dominguez (2015) evaluated the effects of dietary practices in more than 17,000 participants. He reported compelling evidence that participants whose lifestyle was inversely related to Mediterranean dietary preferences were dramatically more likely to be diagnosed with type 2 diabetes over the nine-year period of observation reported in this research.

Role of Physical Activity. Although results of empirical studies are mixed on the impact of physical activity on type 2 diabetes (Collerg, Sigal, Fernhall *et al*. 2010), Mokhlesi, *et. al.* (2019) found in a sample of

12,987 Americans that physical inactivity was associated with heightened risk of type 2 diabetes (significant Odds Ratio of 5.7 which was larger than all remaining predictors including smoking and drinking). These relationships held after adjusting for socioeconomic standing.

Following Exhibit 1 in relation to studies just reviewed, our trauma-informed theory requires that we evaluate four intervention questions which inform our section on Methods:

1) Is it possible to reduce levels of internalized racism?
2) Is it possible to reduce dysphoric symptoms by reducing levels of internalized racism?
3) Is it possible to improve dietary habits and physical activity by reducing dysphoric symptoms?
4) Is it possible to decrease risk of type 2 diabetes in a high-risk sample of black pre-teens and teens via processes stipulated in 1) through 3)?

Following Exhibit 1, our trauma-informed intervention is designed to reduce cascading negative effects of PTCD by:

((↓IR) → (↓DS) → (↓UL)) → (↓HRD).

IR Internalized Racism; DS Dysphoric Symptoms;
UL Unhealthy Lifestyles; HRD Heightened Risk of Type 2 Diabetes

Methods

Participants

Using the *Pre-Diabetic Risk Inventory* administered to a sample of 300 13-to-16 year old black male students in Pittsburgh, we will identify the 200 students at highest risk of pre-diabetes. One hundred of these students will be assigned randomly to Control and Experimental conditions. To maximize participation, participants in each group will receive a stipend for each period of assessment, $50.00 for Pre and $50.00 for Post, with the total check $100 paid at Post to incentivize assessment participation for both periods of assessment.

Design

In this longitudinal design with intervention (0 to 47 weeks) and post-intervention follow-up (52-72 weeks):

Conditions	**Y01 Intervention Cycle: Assessments Administered before and after each Cycle for both Conditions**			**Y02 Post-Intervention Cycle: Only Assessments are Administered**
	0-15 Weeks	**16-31 Weeks**	**32-47 Weeks**	**Weeks**
Experimental				52, 67, 72 For all Experimental and Control Conditions
FL I	X			
FL III		X		
FL IV			X	
Control	X	X	X	

Experimental Conditions: Three trauma-informed interventions are expressly designed to reduce levels of internalized racism.

- **Level I (15 hours):** Helps students interpret media segments and daily experiences through the lens of seven values (Love and Respect, Interpersonal Skills, Learning Orientation, Self-Confidence, Self-Persistence, Self-Esteem, and Self-Reliance) which in samples of pre-teens and teens have consistently reduced levels of internalized racism, dysphoric symptoms, and delinquent behaviors while accelerating the attainment of achievement proficiencies in reading, math, and science (Taylor & Kouyate, 2004; Taylor, Jackson-Lowman, Lewis, *et. al.,* 1999; Taylor, Turner & Lewis (1999); and Taylor, Turner, Underwood *et al*.,1994)**.**
- **Level II (15 hours):** Helps students become proficient in recognizing, evaluating, combatting, and overcoming nine types of racial discrimination that otherwise unsettle and undermine their social health—in particular young people internalizing high levels of internalized racism are more likely to commit heinous crimes against other blacks (Terrell & Taylor, 1980).
- **Level III (15 hours):** Embracing and celebrating historical proverbs, icons, and values conveyed through instruction and artistic performances and dramatizations that celebrate the emergence of more adaptive cultural ways of being (Taylor & Robinson revision, 2020).

Controls Condition: No hours of intervention: Tested Pre and Post for each Intervention Cycle and at three points following intervention—Weeks 52, 67, 72.

Measures

To what extent do Experimental and Control participants vary Pre-to-Post intervention on each of the following six measures which in studies we've summarized are linked to type 2 diabetes:

1. *Internalized racism*. The Internalized Racism Inventory, introduced initially as the NAD Inventory (Taylor and Grundy,1996), is based on attributes identified in our confirmatory factor analysis summarized in the first paragraph under Background (Taylor & Kouyaté, 2013). Used previously with middle school, high school, and college students and in adult samples ranging in age from 25 through 65, black participants are asked to identify on a 0-to-8 point scale (Not in the Least Like to Entirely Like) the number best representing their honest opinion about blacks: (A—*hard-headed, dumb, silly, stupid, dangerous, immature, wild, destructive, unstable, impulsive*) vs. (B—*mature, honest, attentive, logical, intelligent, truthful, smart, responsible, thoughtful, brilliant*). Construct and predictive validity along with internal reliabilities $\geq$.75 are summarized in studies cited in this section. We reverse the polarity of the component B and add it to the straight sum of A to provide an overall estimate of internalized racism.
2. *Dysphoric symptoms* or subjective expressions of depression, anxiety, and hostility were found by members of our team as 'second-line' indicators of 'first-line' markers of Post-Traumatic Cultural Disorders—internalized racism. These second-line indicators were consistently found in survey and interview research collected over a period of five years in socioeconomically challenged black neighborhoods and communities (Fapohunda & Taylor, 2014). We have developed, implemented, and revised item sets reflecting each of the three second-line indicator—depression, anxiety, and hostility. Internal reliabilities on these inventories have been .78 or higher (Taylor & Tomasic, 1996). For stress, we have used the familiar and extensively used Perceived Stress Inventory by Cohen, Kamarck, and Mermelstein (1983) which will be utilized in this study to estimate subjectively perceived state of stress.

3. *Unhealthy Lifestyles*
   3.1. *Diet.* This 24-item inventory is based on results of national and international research and policy recommendations which consistently acknowledges examples of 12 healthy dietary habits (consumption of rice, yams, sweet potatoes, fruits, nuts, beans, fish, corn, green beans, cabbage, spinach, grapes) and 12 examples of unhealthy dietary habits (consumption of hamburger, sugary drinks, candy bars, pretzels, salt, pizza, white bread, fried chicken, sweetened breakfast cereals, French fries, pastries). It so happens that the twelve positive items map convincingly onto the North, South, East, and West African Diets. We will use the straight sum of Unhealthy Diet items and the Reversed Sum of Healthy Diet items. We will add straight and reversed sums to estimate our construct of Healthy Diets (based on Guo & Warden *et al.,* 2004).
   3.2. *Activity*. We will use physical activity guidelines stipulated by The American Diabetic Association (Colberg, *et al.,* 2010) in developing a checklist of items of physical activity which will be completed before and after each intervention cycle and during the period of follow-up (*cf.* page 3 of this application).
4. *Insulin resistance* IR will be estimated using the homeostasis model assessment (HOMA) which is highly correlated with the standard clamp technique for measuring insulin resistance.
5. *Body mass index* BMI is universally expressed as the body mass (weight in kg) over the square of body height (meters), that is, kg/m^2. We also will use waist circumference as a complementary indicator of body mass.
6. *Blood pressure* BP systolic and diastolic will be measured with a standard sphygmomanometer, with subjects resting for 5 minutes prior to the readings.

Analyses

We start off with 100 participants for our Experimental Condition and l00 for our Control Condition. For each condition, each evaluated three times during the intervention period and three times during the follow-up period, we expect our stipend policy will net no fewer than 75 participants available for each period—Intervention and Follow-Up. These expected numbers exceed the rule of thumb for multiple linear modeling which would require about 18 participants per period or 18 x 3 or 54 for Intervention and likewise for Follow-Up (*cf.,* MacCallum, Browne, & Sugawara, 1996). To fully evaluate all elements of our trauma-informed theory, answers to the following four questions will be evaluated:

1) I*s it possible to reduce levels of internalized racism?* Using a general linear model GLM, we will specify internalized racism as dependent variable, and the three Intervention and three Control condition as our grouping strategy under GLM. We then will evaluate whether our Experimental condition has lower internalized racism scores than our Control condition across the three periods of intervention and then across the three periods of follow-up.
2) *Is it possible to reduce dysphoric symptoms by reducing levels of internalized racism?* Again, using a general linear statistical model GLM, we would specify depressive symptoms as dependent variable, internalized racism as predictor variable, and the three Intervention and three Control conditions as our grouping strategy under GLM. In this manner we will be positioned to evaluate our hypothesis that depressive symptoms will be lower for our Experimental condition than for our Control condition during

the periods of intervention and then under the periods of post-intervention. These analytic procedures will be replicated for the remaining symptoms of anxiety, stress, and hostility.

3) *Is it possible to improve dietary habits and physical activity by reducing dysphoric symptoms?* Answer to this question will be analogous to GLM applications analogous to those already described.
4) *Is it possible to decrease risk of type 2 diabetes in a high-risk sample of black pre-teens and teens via processes stipulated in 1) through 3)?* Answer to this question will be analogous to GLM applications analogous to those already described.

Expected Benefits:

1. Introduces a trauma-informed method for countering effects of systemic racism on type 2 diabetes
2. Identifies experimental gradations that may counter systemic effects of racism on type 2 diabetes
3. Clarifies why conventional treatments alone may be less effective than trauma-informed approaches in reducing health risks of type 2 diabetes
4. Identifies possible reasons why conventional treatments of type 2 diabetes tend to be short-lived
5. Provides a trauma-informed template for evaluating racial disparities that could be applied to a range of additional physical health disparities, *e.g.,* cardiovascular disparities
6. Provides a trauma-informed template might be useful in evaluating racial disparities in mental and social health domains
7. Offers theoretical reasons why liberation from dehumanizing stereotypes about blacks may enable positive outcomes across multiple health domains
8. Offers an empirically-grounded contribution to claims that racism is a public health problem which enables disparities of a disarmingly wide range—from police violence to COVID-19 disparities
9. Offers culturally-informed remedies responsive to the groundswell of local, national, and global calls for relief from the historical and ongoing scourge of systemic racism (Williams, 2018)
10. Provides preliminary data that can be leveraged into R01 applications which would include an evaluation of our method vs. alternative methods for reducing negative effects of type 2 diabetes.

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