Application for the Promoting Health and Reducing Health Disparities Grant

Reducing Health Disparities of Type 2 Diabetes in Boston's Hispanic Youth Population

By Katherine Church

Description of the Applicant:

The Chronic Disease and Prevention Control (CDPC) division of the Boston Public Health Commission takes a lead role in the Commission's initiatives to reduce the overall burden of chronic disease and address disparities in outcomes, treatment, and related services. The CDPC serves the city of Boston to improve the public health system across the continuum of preventing, screening and early detection; and controlling and treating chronic disease. The leadership structure supporting the functionality of the CDPC includes the over-arching leader in command, the Commissioner, with10 commission members supporting the leadership roles and taking on public health initiatives e.g. programs, projects, advocacy efforts, and policy change in order to fulfill the CDPC mission statement and goals.

The current areas of focus of the Chronic Disease and Prevention Control include: 1) Promoting policy, environmental; and systems changes that build healthier communities, support healthy behaviors, and improve health outcomes. 2) Increasing public awareness about the benefits of and resources for healthier lifestyles. 3) Providing direct services, resources, and education for high-risk populations. 4) Supporting implementation of evidence-based practices. 5) Improving access to and coordination of treatment and community supports. And 6) providing leadership and building partnerships for a coordinated citywide approach.

The program area for which the CDPC is seeking the Attorney General Office grant funding is the Healthy Eating and Active Living program. This program promotes and supports Healthy Eating and Active Living for all Boston residents through environmental, policy, and systems changes that favor and support: Healthier Choices (“Make the healthy choice the easy choice”); increased public awareness about the benefits of and resources for healthier eating and regular

physical activity; and education and direct services/support programs for high-risk populations. Some of the best practices from previous programs and lessons learned include experience from the Boston Collaborative for Food and Fitness. Their achievements improved
Boston school food systems, the Boston community food environments, and active living (increasing residents' physical activity). The successful strategies utilized were youth leadership, empowerment of community leadership, and neighborhood coalitions. The most significant lesson was that success lies in proper funding of a program, reaching a large proportion of the target population through their own active involvement to improve sustainability, and active engagement and community participation to understand issues more fully and increase likelihood of success. The extensive prior experience of the CDPC combined with proper funding from the AGO will be fundamental to its ability to take on the chronic disease of type 2 diabetes mellitus (T2DM) in Boston youth and reduce the health disparity of the Hispanic youth population's disease prevalence.

According to Healthy People Healthy Communities, Massachusetts youth have some of the best access to health care in the nation; however, they are still facing some of the worst type 2 diabetes health outcomes. In particular, as recent as 2007, the Massachusetts Hispanic population had an increased risk for type 2 diabetes mellitus across the life course, had increased incidence of endocrine diabetes mellitus hospitalizations compared to white non-Hispanic residents, and were more often hospitalized for diabetes complications than white non-Hispanics (MASSCHIP 2010). According to the 2007 Behavioral Risk Factor Surveillance Survey (BRFSS), the 18-24 year old Hispanic population in Massachusetts is also less likely to achieve the minimum suggested physical activity of 30 minutes per day, five days per week, and is more likely to be

overweight or obese compared to the 18-24 year old white non-Hispanic population (MASSCHIP 2010) (Appendix A).

Part of these disparities may be explained by differences in the built environment of Hispanic Massachusetts residents at multiple levels of the environment; including youths' schools, neighborhoods, and communities. For example, studies on "place" or neighborhood at the community level indicate a relationship between place and obesity through availability of grocery stores with affordable, fresh produce versus cheap soda and processed foods (of high glycemic load), access to parks or walkability of a neighborhood, and perceived safety (1,2). In addition, school policies or budgets surrounding nutrition and physical education curriculum affect what students learn regarding risk factors for diabetes. Finally, the disparity of T2DM in certain populations is affected at the national level of policy affecting the school environment; for example, federal funding by the USDA constitutes what is considered a "nutritious" meal for school free lunch programs (3).

Organization change models and theories are used to make changes in policy, culture, and other environmental conditions at the organizational level; and to enable the adoption and implementation of programs in organizations. These theories can be adapted to the built environment of Boston education or schools to promote health at the level of the institutional environment (4). Specifically, the intervention will employ the evidence-based Stage Theory of Organizational Change by Beyer and Trice (1978) to change school environments of Boston public middle schools to reduce T2DM through the fundamental structure of the school (including policy, funding, etc.) and acceptance of the program by school leadership and the community. School administration and teachers will act as leaders; students and the community

will assist them in developing the program to the schools' specific needs, and they will all take a role in learning about the process of implementation in order to sustain the intervention program within their school (See Appendix B and C).

This will be combined with the most successful individual level theory of behavior change for adolescents: the Social Cognitive Theory (SCT) of Albert Bandura. The major determinants of behavior change in the SCT are outcome expectations, self-efficacy, behavioral capability, and perceived behavior of others and environment (4). Utilizing it within the program will increase self efficacy related to decreasing T2DM and knowledge to promote healthy behaviors that counter the disease. And the combination of the organizational level (the school) theory of change with the individual (or student) theory of behavior change synergistically enhances the success of the program.

The intervention's target health behaviors to reduce disparities of T2DM are the following: 1) reducing Boston public middle school students' intake of high glycemic load food and beverages and 2) increasing their physical activity. The methods to do this include 1) decreasing availability (and thus consumption) of high glycemic load foods and beverages by replacing vending machines with healthier low GL options 2) improving current obesity prevention efforts in the Boston Public Schools regarding policy requiring curriculum of nutrition and physical education a) T2DM focused material and b) methods to increase self-efficacy of students to perform health behaviors 3) increasing physical activity by maintaining a) the availability of after-school sports and b) required PE completion through alternative PE choices or PE classes on school property.

The intervention will target Boston public middle schools with a large Hispanic population to reach this high T2DM-risk group, and thus reduce disparities. The intervention will begin with an educational presentation at a city-wide school board meeting. To raise awareness of the health disparity it will be incorporate the needs assessment of Hispanic youth in Boston middle schools, and to indicate evidence supporting the intervention activities and strategies it will describe the intervention theories of cause and effect. The presentation will target senior-level leadership (principals, Boston school district board, etc.) so that they may lead the adoption of an innovative idea (as early adopters according to the Diffusion of Innovation Theory), i.e. the intervention to reduce type 2 diabetes mellitus in targeted at-risk schools (4)(5).

The intervention materials will be required in both English and Spanish, and will be adapted to the unique aspects of each school through community participation at the presentation and student focus groups (4) (See Appendix D for sample lesson plan). These adaptations will address Boston Hispanic youth's cultural needs, their school's resources, and their school's surrounding neighborhood resources. The curriculum will include physical activity and nutrition information and exercises to promote self-efficacy to reduce T2DM (6). The self efficacy activities will include cognitive and behavioral skill building exercises that enable students to change target behaviors by practicing skills that strengthen perceived competence in employing new behaviors effectively, and by receiving positive reinforcement by teachers and school administration for exhibiting healthy goal behaviors. The lesson plans will focus on setting goals, identifying obstacles, and mobilizing existing supports (according to the determinants of behavior change in the SCT). To do this, each intervention lesson plan will be designed to

include a focus on a new skill utilizing engaging methods for adolescents e.g. demonstrations, debates, case studies, group projects, games, or student presentations (6).

In order to implement the intervention lesson plans, teachers and sports staff (coaches) involved in physical activity and/or nutrition will require a training on how to teach T2DM educational and self-efficacy curriculum. During the training, teachers/coaches will be thoroughly trained to implement the protocols (directions) of the lesson plans to enhance correct implementation e.g. fidelity (4) in order to reduce threats to internal validity of the program (7).

Social-cognitive theory points to the importance of social and environmental factors that influence both psychosocial and behavioral risk factors (6). Thus, for the organizational level of schools to incorporate self-efficacy and lesson plans geared toward T2DM prevention, it is also important to promote serving of healthy food and absence of unhealthy T2DM risk food/beverages. This is why the activities associated with removing vending machines are also an important component of the intervention. The main avenue that this will occur is through contracts with vending companies. A school or district staff member who already has this role will need to work with the interventionist, T2DM nutrition specialist, and senior-level staff in researching companies that offer T2DM friendly choices, and then contracts will need to be created or revised to include the new company.

There is a need for this program because current Boston Public School initiatives do not include a call to action to prevent type 2 diabetes. There is a lack of permanent programs within Boston public schools that aim at self-efficacy of students and to change social structure of schools to prevent type 2 diabetes (8) In addition, there are sparse permanently placed, alternative recreation opportunities like martial arts, yoga, or other activities that would encourage all types

of athletic abilities or sport preferences to achieve the recommended amount of physical activity. Existing programs also tend to focus on adults, neighborhood, and community programs to reduce adult incidence of disease (8-10), and not on youth. In addition, the current Boston youth zone (health education website targeting Boston youth) lacks information on type 2 diabetes (8); leaving out a disease that affects many in the city. Thus, the grant would fund a program that ultimately provides an opportunity for the Boston Public Health Commission to target minority youth more effectively in an area of need (1-3). Specifically, the CDPC can use this as an opportunity to further serve the Boston adolescent population, and help to reduce the disparities of T2DM prevalence in Hispanic youth.

The target goals of the proposed Boston public school-based type 2 diabetes mellitus prevention program include: 1) Reduce incidence of pre-diabetic and T2DM diagnoses in Boston public school graduates 10% by December 2012.

This will be achieved through the program goals to: 1) Increase student knowledge by 25% of T2DM and how to prevent it with healthy diet and exercise habits at end of year 1 of program. 2) Increase student self-efficacy by 25% to practice healthy eating and exercise habits by end of year one of program. 3) Maintain or increase necessary funding for target middle schools to include physical education classes, sports teams, and recreation after-school programs. 4) Eliminate 50% of soda vending machines in target middle schools by December 2012.

This intervention will begin with a formative evaluation to determine what resources are specifically available to each Boston middle school targeted in the intervention, what would be feasible for this school to adopt, what is the current school culture/acceptance of health education and physical activity programs, what has worked in the past and/or future, and what are the

cultural norms regarding intervention efforts in each school. This would most effectively be accomplished through student focus groups, teacher focus groups, key informant interviews with school administration, presentation question/answer period open to comments and suggestions at community/school board meeting, and through a pilot testing of bilingual materials and cultural competency of materials. This evaluation stage will be important in setting up the program for success by decreasing risk for failure based on improper knowledge of school environment and assessment of student and staff needs (7).

During the intervention, it will also be important to conduct a process evaluation in order to monitor the fidelity, or correct implementation of the program such that later the success or failures of the program can be attributed to the effects of the program and not problems of implementation. The methods for measuring the fidelity include the teacher checklists included in their curriculum binders, attendance records for student participation on program days, and a protocol checklist for teacher/coach (7). To determine the impact of the program, or to measure its effects, there will also be an impact evaluation. This will be done using a random sample of middle school students in the target Boston public middle schools utilizing a student physical activity questionnaire measuring self-efficacy and knowledge, students diet questionnaire measuring self-efficacy and knowledge, and measuring each intervention schools' pre-program number of vending machines, number at end of year one, number at end of year two (post-program). The main outcome, incidence of pre-diabetes or T2DM will be measured by accessing student health records and assessing diagnosis status for individuals.

The current grant will not be used to supplant any current programs. However, there will be partnership with programs that have funding already in place including the Boston REACH

coalition. Boston REACH has earned an outstanding reputation in the local public health community for its work in raising awareness of racial and ethnic health disparities, educating the public about health issues that affect the minority communities in Boston; and for its credible partnerships with community members, policymakers, faith-based leaders, and academic institutions. The coalition includes community members and groups, health care providers, business and faith leaders, and academic partners. With new funding as a Center of Excellence in the Elimination of Disparities (CEED), the coalition would be an excellent partnership for the CDPD by supporting the intervention through community advocacy to attend the presentation and provide information to CDPC on what the target schools need, and by helping to permanently change school policy according to intervention protocol (9)(7).

Throughout the intervention the community, mayor, and school administration will be encouraged to work together on specific needs and resources available to the targeted Boston Public Middle Schools to increase the cooperation necessary to maintain program policy. In addition, partnerships with Boston REACH coalition, Mayor Menino's Boston Youth Zone, and Boston Collaborative for Food and Fitness should be encouraged to solidify its place within the adolescent wellness community and public health efforts by the state. After the grant period, funding may be necessary for sustainability, so beginning a partnership with the W Kellogg Foundation may be strategic for promoting future funding. They have a shared mission to support children, families, and communities; and create a healthy environment that will help high-risk children to achieve success so that they become future contributors to the larger community and society. Finally, according to the Stage Theory of Organizational Change, the correct implementation of the intervention will result in its incorporation into school structure

(e.g. through the training of teachers, renewable vending machine contracts with companies); as well as the involvement of students, teachers, and community members that will increase their efforts to maintain the program in the future, greatly improve the interventions' chances of success and maintenance over time (4).

H. Budget:

Item	*Cost*	*Quantity*	*Total* *Year 1- 2011*	*Year 2-2012*
Psychologist specializing in self-efficacy training for teacher/coaches training workshops (hourly)	$50.00/hr	3 hours x 15 schools x 2 years (second year only new employees)	$2,250.00	$2,250.00
Nutritionist specializing in T2DM Time to lead workshop during pre school-year training To adjust current curriculum To research healthy T2DM vending companies	$40.00/hr	3 hours x 15 school trainings x 2 years (second year only new employees) Year 1 only: 10 hours x 1 month 40 hours x 1 month	$1,800.00 $400.00 $1,600.00	$1,800.00
Staff bonus for obtaining healthy vending company contract	$250.00	For 1 staff member Year 1 only	$250.00	

Additional food and drinks for those attending 15 middle school trainings: Coffee/Tea Juice Fruit platter Vegetable platter Cheese and crackers Mixed nuts	 $10.00 $10.00 $30.00 $20.00 $30.00 $25.00	=$125 x 15 school-year trainings x 2 years	$1,875.00	$1,875.00
CDPC Program Administration to be distributed amongst staff according to hours worked on this intervention	$25,000.00	Years 1 and 2	$25,000.00	$25,000.00
Lesson Plans	$.10/copy for 100 pages	X 200 teachers* Year 1 X 15 teachers** Year 2	$2,000.00	$150.00
Copy of city curriculum policy for binders	$.10/copy for 10 pages	X 200 teachers* Year 1 X 15 teachers** Year 2	$200.00	$15.00
Binders	$2.00/binder	X 200 teachers* Year 1 X 15 teachers** Year 2	$400.00	$30.00
Blank notes paper	100 sheets in 1pack @ $5.00/pack	x 200 binders*- 10 sheets per binder (100 sheet packs) at $5/pack Year 1 X 15 binders** Year 2	$100.00 (20 packs)	$10.00 (2 packs)
Research analyst contract (will create and distribute surveys, analyze data)	Annual sum	Adjusted second year to reflect less constructive work of surveys once created	$85,000.00	$85,000.00

Total by Year	**$120, 875.00**	**$116,130**
Grand Total 2 Yr Intervention Budget	**=$237,005**	

*Based on equation: 15 Middle schools in city with approximately 3 PE teachers, 6 coaches, and 4 health teachers per school = 195 or approximately 200 teachers in total county
**Estimate for average number of possible new hires in district of PE or health teachers/coaches

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(5) National Cancer Institute. Theory at a Glance: A Guide for Health Promotion Practice. 2nd ed. Washington D.C.: U.S. Department of Health and Human Services; 2005.
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(9) Boston Public Health Commission. Boston Reach Coalition. 2010; Available at: http://www.bphc.org/programs/healthequitysocialjustice/bostonreach/Pages/Home.aspx.
(10) Boston Public Health Commission. Healthy Eating and Active living. 2010; Available at: http://www.bphc.org/programs/cib/chronicdisease/heal/Pages/Home.aspx.

Appendix A:

Massachusetts Hospitalizations 2005 MASSCHIP*		
	Endocrine Diabetes Mellitus Hospitalizations	Diabetes Complications
White non-Hispanic	0.13%	0.11%

Hispanic	0.28%	0.16%

* Percents based on 2000 Census Data for Massachusetts Population White non-Hispanic n=5,198,359; Hispanic n=428729

Massachusetts 2007
MASSCHIP DATA

	Had or have Diabetes BRFFS % of all respondents							
	18-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
White Non-Hispanic	1.5%	1.1%	1.9%	2.0%	3.5%	5.4%	6.5%	10%
Hispanic	1.8%	1.7%	2.6%	4.7%	8.2%	18.4%	16.7%	21.1%

	18-24 Year Olds had Regular Physical Activity (30 min 5x + week) BRFSS
White Non-Hispanic	61.4%
Hispanic	57.4%

	18-24 Year Olds Obese, BMI >30 BRFSS
White Non-Hispanic	14.3%
Hispanic	14.4%

	18-24 Year Olds Overweight BMI>25 BRFSS
White Non-Hispanic	35.7 %
Hispanic	44.1 %

Appendix C: Matrix Depicting Intervention Methods and Strategies

Determinants and PO	Methods	Strategies
Increase positive attitudes of leadership to change middle school environments within county	Consciousness Information Cues to Action Organizational Advocacy	**Presentation**: Provide school staff with consciousness-raising statistics on T2DM and then provide intervention as solution. Ask for volunteers/student leaders to be on special interest task force to help implement and evaluate program.
Increase outcome expectations in middle school and county-level leadership that changes will prevent T2DM	Information Persuasion	**Presentation**: Show evidence that increasing physical activity and reducing high GL foods /beverages will decrease risk for T2DM to motivate participation and commitment to program. **Formative research** within middle schools what demographic students are to develop culturally competent curriculum and healthy food/beverage replacements in vending machines?
Behavioral capability of health or nutrition staff to reduce student consumption of high glycemic load food s and beverages	Training for Implementation-Skill Building Reinforcement	Provide **training** with catered food and fun activities for midlevel leaders on how to incorporate curriculum that will improve self-efficacy of students

		(skill-building) to consume less high GL foods/beverages.
Behavioral capability of school PE staff and coaches to increase physical activity	Training for Implementation-Skill Building Reinforcement	Provide **training** for midlevel leaders in sports/PE with catered food and fun activities on how to incorporate curriculum that will improve self-efficacy of students to increase physical activity.
Curriculum on decreasing risk for T2DM in health and PE courses permanently	Training for Implementation	Current and new teachers education on this mandatory and specialized T2DM curriculum component
Replace SSB and processed food in vending machines with healthy (low GL) foods and beverages	Technical Assistance Negotiation Persuasion	**Bid** in community to healthy snack and beverage companies Ask for financially reasonable price by "**selling**" that it's for student health (philanthropic appeal).
Fully implemented Wellness policy incorporating intervention proposals	Technical Assistance	**Provide** necessary resources and materials needed by middle schools **Adaptations** to current policy and programs with new T2DM pieces
Fully funded and budgeted T2DM intervention	Negotiation	**Ensure** portion of **funding** in annual budget be **allocated** to after school sports with local school board.

Appendix D: Sample of 5 Type 2 Diabetes Mellitus Intervention Lesson Plans (4,6)

Sequence	**Skill**	**Activity**	**Homework**
Week 1	Stress Reduction	In groups, brainstorming healthy ways to reduce stress outside of eating comfort food. Ex maybe going for a run	Ask parents how they can help implement the stress reduction activities at home

Week 2	Increase self-efficacy to eat healthy or be more active	Perform skits in groups on someone who learns how to be confident and teachers their friends to be confident too in reading nutrition facts, choosing healthier choices, how to begin playing a new sport, how to fit in a new physical activity you love alone or with friends	Find a buddy in the home who will either commit to getting physical activity together 3x a week or to make healthier choices
Week 3	Social Problem Solving	Media literacy activity to discover ways unhealthy food companies' advertising targets youth	Go home and watch commercials and analyze your favorite and the way they target kids to make them think eating unhealthy foods is beneficial
Week 4	Reducing Perceived Barriers to healthy food and physical activity	Write a creative story about a character and all the things that get in their way of eating more fruits and vegetables. Go over strategies to overcoming such barriers.	At home, practice overcoming 1 of the perceived barriers and share with class at next meeting how you did it.
Week 5	Goal Setting	Ways to reduce inactivity and ways to incorporate fun physical activity	Keep diary of days you achieved goals, and on days you didn't why/why not for discussion next class