APPLE: Development of a Lifestyle Program for South Asian Immigrant Women

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Objectives: This paper describes the development and preliminary evaluation of an innovative 12-month group-based lifestyle intervention for South Asian immigrant women. **Methods:** We developed a 2-phase intervention based on Situated Learning Theory. Phase 1 involves creating community among participants, providing education, and supporting behavior change through goal-setting and improved health practices. Phase 2 is designed as a maintenance phase in which participants take over leadership of the groups. Twenty-eight participants were enrolled in a feasibility study. **Results:** Women described a number of cultural and social barriers to participation and weight gain. Despite these impediments, program satisfaction and retention in the program were high. Body weight was reduced by 5.8% during Phase 1. Barriers to implementation were encountered in Phase 2. **Conclusions:** We argue that SLT has potential for shaping new models of health interventions.

***Key words*: Situated Learning Theory; lifestyle interventions; immigrant health; South Asian immigrants; culturally tailored interventions**
***Health Behavior & Policy Review.* 2016;3(1):33-42**
DOI: http://dx.doi.org/10.14485/HBPR.3.1.4

Immigrants from developing societies are direct 'victims' of the "nutrition transition," a global and historical shift in dietary patterns. As urban lifestyles become more prevalent, rates of physical activity decline and diets shifts from high nutrition, low-calorie food to low-nutrition high-calorie processed food. Immigration to the developed world can accelerate this process, resulting in astronomical weight gain for many immigrants in the first years after immigration.[1,2]

South Asian immigrants from India, Pakistan and Bangladesh, the fastest growing immigrant group in the United States, are a case in point.[3] Obesity is prevalent in immigrant communities and associated with high rates of diabetes, heart disease, and hypertension.[4-7] South Asians' diets shift dramatically following immigration.[8,9] Whereas families continue to prepare traditional dishes, they also consume higher quantities of high-fat ingredients such as butter and red meat, cheap and readily available in the West.[9]

Socio-cultural factors play a role in women's obesity, which is more prevalent than obesity among men. Traditional gender norms may constrain women's ability to engage in physical activity. Research among Bangladeshi women in the Bronx, New York found them to have the lowest activity levels of any group in the city.[7] Traditional gender roles also impact mental health, with consequences for obesity. South Asian societies rank among the least woman-friendly in the world.[10,11] Across North India, a married woman resides in

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the household of her husband's parents, where she is treated as a low status outsider.[11-14] Following immigration, oppressive gender roles often persist.[15-18] Isolation, marginalization, and domestic conflict are common experiences among women and are associated with psychological distress and depression.[7,16,19] Depression, in turn, has been linked to weight gain and obesity.[20]

Intervention Approaches

The creation of low cost, sustainable interventions that reduce obesity or prevent weight gain in new immigrant groups is a major public health priority.[21] Research suggests that successful programs should include several notable features. First, they should be *structured and intensive*. The Diabetes Prevention Program, one of the largest, best-known and most rigorously tested lifestyle interventions, was conducted with over 3000 participants with pre-diabetes. Over half of participants achieved the program goal of 7% weight loss. Features of the DPP thought to contribute to its success included intensive contact, clearly defined weight loss and physical activity goals, tailored strategies, and self-monitoring.[22] Overall, interventions that are more intensive[23] and that make modifications to the environment[24] are more successful than those that do not.

Second, lifestyle and weight loss programs for non-majority communities require *cultural adaptation*.[21,25-27] Theoretical frameworks for cultural adaptation include the distinction between 'surface' and 'deep' structural modification. Surface structure modifications include the adaptation of symbolic and linguistic forms, such as translated materials and culturally-matched images. "Deep structural' adaptations reflect and build on group values and behaviors.[27] Deep structure adaptations include the preparation of diet plans and nutrition guides that reflect cultural patterns of cooking and eating[21,26] as well as the design of intervention components to address cultural barriers and facilitators to behavior change.[28,29]

For South Asian women, a core 'deep structure' barrier to successful participation in lifestyle programs is low social status, along with isolation, marginalization, and low self-esteem. This barrier was noted in the 2 previous lifestyle interventions implemented with South Asian women. One study identified a lack of comfort with decision making and goal setting, whereas another found that women's lack of decision-making autonomy interfered with their ability to make lifestyle changes.[30,31] Poor retention and relatively low rates of weight loss were noted in these studies.[30,31]

Third, successful community based programs must be *sustainable over the long term*. The literature shows that intensive, structured weight loss programs can help individuals lose weight successfully. Unfortunately, most participants quickly regain lost weight following the end of the intervention. Few can maintain weight loss without ongoing engagement.[32-34] The question is how to develop cost-effective weight loss programs that can provide opportunities for long-term participation. Researchers have noted the need for new ideas and theories in this area.[24]

Situated Learning Theory

The problem of regain following weight loss is receiving increasing attention among researchers and public health advocates. Though a variety of physiological mechanisms for weight regain have been identified,[35] this phenomenon also may be understood as an example of a much broader problem – the lack of long term effects across many types of health interventions.[36] Though health interventions often succeed in the short term, most individuals return to baseline over time. The effect is seen in interventions as diverse as condom use interventions, diabetes self-monitoring programs, and even psychotherapy. Put simply, once the patient-participant is no longer actively engaged in the intervention, learning decays.[37-40]

During the 1980s, sociologists Wenger and Lave conducted a series of field studies in learning settings. They developed a theoretical framework, "Situated Learning Theory," that can help illuminate the problem of learning decay. Situated Learning Theory conceptualizes learning (and by extension, behavior change) *as a function of social participation*. According to the theory, meaningful and lasting learning occurs through participation in real life, informal settings – in the context of a community identified with a particular domain of expertise. Though observation, modeling, and practice,[41,42] learners engage in a social process that involves the gradual transformation of 'apprentices' into expert practitioners. Wenger and Lave

call these groups Communities of Practice (CoPs). Members of CoPs develop specialized skills and vocabularies to represent knowledge. They collaborate to expand their collective skills and expertise. Arguably, members of CoPs are intrinsically motivated to remember what they have learned because they actively use learning to maintain participation in the community.

Most applications of Situated Learning Theory have involved the development of CoPs among groups of professionals with the goal of improving skills, motivations, morale, or adherence to best practices. However, SLT has further potential as a framework for the development of health interventions. If a health intervention could develop a CoP among participants – an organic community with a life of its own – learning acquired in the intervention might be sustainable. Though we know of no studies that have used SLT to design health interventions explicitly, 12-step programs are a naturally occurring CoP.[43] Weight Watchers, a successful commercially available program,[44] also shares some features of CoPs.

The APPLE Program

APPLE "Activating People to Pursue Lifestyle Change through Empowerment" was developed as collaboration between researchers and physicians at Albert Einstein College of Medicine, one of the core centers for the national Diabetes Prevention Program, and staff members at a community based organization in the Bronx. The program drew heavily on curriculum materials from the DPP.

The program was implemented in Westchester Square, a low-income, multi-ethnic inner city neighborhood in the Bronx, New York that is home to a large Bangladeshi population. Two theoretical frameworks were used to adapt the program. The first is a 'cultural adaption' framework that was used to generate program adaptations at surface and deep structure levels. The second framework is the Situated Learning Theory, which seeks to enhance learning and reinforce behavior change by developing a community of learners who would gradually acquire an identity as lifestyle change experts. We hypothesized that the SLT approach, with its emphasis on group identity, learning through practice, peer support, and respect for participant agency, would be suitable for addressing deep structure socio-cultural barriers to behavior change.

We established an APPLE "Community of Practice," incorporating 3 dimensions of a CoP described by Wenger: (1) *mutual engagement* of members; (2) a *joint enterprise* or set of goals, and (3) *shared repertoire* that includes strategies, resources, shared narratives, and jargon or vocabulary.

APPLE encourages mutual engagement by assigning a 'bondhu' (friend) partner to each participant, by the use of peer health workers as group leaders, and by building social networks within the group. Participants are required to engage in one-on-one contacts outside the group meetings, for example by engaging in 'supportive listening' with their bondhu partners, and by participating in group activities (walking groups, outreach activities).

A sense of a joint enterprise is developed by fostering participatory learning.[45] Through dialogue women develop an understanding of the 'problem' (obesity among women in their community') at multiple levels – structural forces (immigration, poverty, patriarchy, etc.), psychosocial issues (boredom, loneliness), and behavior (physical inactivity, cooking and eating). The group leaders, women from the community, use a popular education approach to teaching group members. Leaders disseminate information regarding the causes and impact of obesity, and current best practices in weight loss and weight loss maintenance. Along the lines proposed by Werner and Bower,[46] they encourage dialogue and co-learning among participants, and avoid lecturing. Each group establishes individual and group goals for healthy eating and weight loss, develops individual and collective accountability plans, and revises these at various points throughout the program. Women provide support to each other through structured supportive listening sessions and goal setting meetings with their bondhu.

Finally, APPLE participants develop a shared repertoire of strategies and expertise. Five strategies are highlighted in the APPLE program: (1) increasing physical activity; (2) reducing portion sizes; (3) adjusting cooking techniques; (4) increasing vegetable consumption, and (5) eliminating junk food. Group members devise strategies for achieving goals in these domains. For example, one groups created negotiation scripts to use with family members in

conversations about meal preparation and menus. To increase the strength of each group's shared repertoire of skills, the groups conduct community outreach, distributing pamphlets and information about nutrition created in the group, and educational workshops. This encourages participants to see themselves as experts with access to a bank of skills, resources, and strategies.

In keeping with SLT, the goal of the program was to develop an independent community of experts. In the original plan for the program, 6 months of staff-led meetings were provided; the second 6 months of the intervention was envisioned as a participant-led phase. Training on group facilitation and leadership skills was provided with the goal that would lead themselves during the second 6 months of the project year.

METHODS

Recruitment and Training of Staff

In the first phase of the project, we recruited and trained 4 community health workers for the APPLE project. One of the authors trained the health workers using participatory learning theory.[46] The training program models an egalitarian teaching style that the workers would use in their own groups.

The training went well overall, but a few conflicts arose among the workers. Workers sometimes voiced a critical or superior attitude towards other women. Becoming health workers increased their social status. One member of the author team worked intensively with the workers to emphasize the underlying empowerment and equality message of the program. For example, she presented a list of good practices in group facilitation. These included:

- *Asking questions instead of giving the answers*
- *Avoiding criticism*
- *Helping participants find solutions to problems without telling them what to do*
- *Encouraging everyone to participate*
- *Avoiding responding to questions you don't know the answer to – wait and look them up after class*
- *Having fun and showing interest in what participants are saying*

Recruitment

A convenience sample was recruited for this formative evaluation study. Fliers were distributed in the Westchester Square and Parkchester neighborhoods and were shared with community members attending WSP's programs. Information about the study also was shared through word of mouth. Participants were recruited in cohorts of 8-10 participants per group. Each participated in an informed consent process. Inclusion criteria included: being a woman between the ages of 18 and 65; having a BMI ≥ 25; and being fluent in Bengali and able to read simple passages in Bengali. We did not exclude participants on the basis of health conditions, but urged all participants to consult their physicians before starting the program.

Intervention

We developed a 6-month, 16-session program and a detailed manual to accompany it. We adapted the DPP curriculum, including core messages like "Keys to Healthy Eating Out," "Talking Back to Negative Thoughts," "Making Social Cues Work for You." We developed new messages and materials specifically tailored to Bangladeshi culture. For example, the curriculum focused intensively on cooking and eating with the family and 'managing' family reactions to change. Calorie counts for South Asian snacks, healthy versions of traditional recipes, and hands-on instruction in low-fat cooking techniques were created.

The learning phase. The first phase of the project is an 8-week learning/experimentation phase. During this phase, project staff members work to build cohesiveness in the group and to help foster relational ties. Participants came to an agreement regarding rules of conduct, such as speech conduct (interrupting, criticizing, etc), attendance and absence, and decision-making. Concerns about confidentiality were a major theme in early group discussions. Participants were required to sign a confidentially agreement.[47] Each participant was assigned a '*bondhu*' (friend) within the group. Each pair was required to spend time together outside of the session, to provide listening and emotional support, and to help each other realize goals. Bondhu pairs practiced new behaviors together, such as healthy cooking and fast walking. At the end of each month of the Learning Phase, each partici-

pant with perfect attendance during the month was awarded a $25 honorarium.

Detailed information about lifestyle change also was provided in the Learning Phase. In 8 weekly sessions, the group leader introduced a different educational topic and provided instruction using adult learning participatory strategies. Participants discussed personal goals for weight loss. Self-monitoring was an important part of the learning phase. Each participant conducted a 3-day initial photo-food diary to examine her intake. The photo diaries were displayed on the wall and discussed, while comparing them to the South Asian healthy plate (contact authors). Participants were weighed each week and weights were recorded. In addition, each received a pedometer, and pedometer readings also recorded. Group leaders created graphs showing average group pedometer readings and weight loss.

Goal setting. At the end of the learning phase, group members met with health workers in their bondhu pairs. Each pair reported on their experiments during the learning phase and planned behavioral goals for the next phase of the project, the 'action phase.' Participants were helped to choose strategies and accountability measures that they found to be successful during the learning phase. Each participant was encouraged to make at least 2 goals – 8000 steps per day and a weight loss of at least 7%. The plans were reviewed by a member of the author team, a nutritionist and exercise specialist, to make sure they conformed to nutrition and exercise guidelines. Bondhu pairs in the pilot phase made 'motivational videos' in which they interviewed each other about goals for the next phase. These videos were reviewed repeatedly by participants to enhance motivation.

Action phase. During 8 bi-weekly sessions over 4 months, group members implemented the strategies they had chosen to reach their goals. Monitoring and adaptation of strategies were encouraged. Groups examined barriers and adaptations to meeting goals. As an example, women carried out a photo-voice project to describe their homes (especially the kitchen) and immediate neighborhoods, to identify and analyze unhealthy food cues and messages.

Participants began work on a community-based intervention during this phase. A community conference was held in the local library. Participants developed educational materials cooking videos and pamphlets. One video modeled how to say "no" to a hostess offering food at a party. During the action phase, participants received instruction in leadership and group facilitation skills.

Maintenance phase (months 6-12). The program design included a 6-month maintenance phase. During this phase, we handed over leadership of the group to the participants. We continued to provide a comfortable, private space for them to meet, and made program staff available for consultation if needed.

Data Collection

In conducting a formative evaluation of data, we collected both *process* and *outcome* data. *Process data* is intended to document the implementation of the project. To document implementation, we collected data on refusal rates, participant attendance, participant retention, participant satisfaction, and experiences with the program. We also examined process notes, collected by the health worker, after each session; and interviews conducted by participants themselves with their bondhu partners regarding experiences with the program. *Outcome data* included participant height and weight measured at the T1 interview and 6 months later at T2. We also assessed behavior using the Physical Activity and Nutrition questionnaire (PAN) and the International Physical Activity Questionnaire (IPAQ).[48] Participants also were weighed weekly as part of their program. We continued to collect weights during the maintenance phase.

RESULTS

Process Evaluation

Attendance. Weigh-ins occurred during weight loss group meetings, which were planned weekly during the 8-week learning phase and every 2 weeks thereafter. Overall, attendance was excellent, with 455 out of 572 (80%) of all scheduled weigh-ins accomplished. Nineteen of 28 women (68%) continued to attend to their last or penultimate session. Of the 9 women who dropped out, 4 moved because of husbands finding work in another state, and one was hospitalized and could not continue. Neither initial weight, last measured weight (whether at study completion or just before

drop out), or average rate of weight loss differed by attrition status.

Barriers to implementation. Themes from the qualitative data (group field notes, bondhu interviews, and session process notes written by group facilitators) are presented here. A common theme was the lack of cooperation, at least initially, from family members regarding changes to cooking and diet. Those who lived in a large joint family had more difficulty implementing the cooking changes than those in nuclear families.

Lipi lives with 14 more members of her family. They live as a traditional joint family. Bringing change in terms of cooking with less oil and portion control had been a challenge for her. She tried to stop her family from buying large cartons of soda but was unable to do so.

Some participants reported initial anxiety about changing their cooking practices:

Cooking in less oil was a challenge. As we are used to oily, shiny food I was not sure if I would like the taste of food cooked in less oil. I felt it didn't look that great. However I was wrong. I realized it tastes fine though it may look different. More importantly, it is better for my health.

Sometimes I felt we should not eat anything and it was scary . . .But later on we discussed in class and got solution like we can eat to share with others, can bake our food instead of oil fry.

For the most part, however, family members were supportive. Many participants reported that members of their family also had lost weight during the APPLE program:

I can maintain everyone's food now. My oldest son reduced his weight from 212 pounds to 175 pounds. I try to invent new healthy menus. I always read ingredients and calories while buying any food. I am using 1% milk now. My husband [gives] thanks to the APPLE program.

Social constraints interfered with exercise in some cases:

Johora was a bit embarrassed that walking briskly or light jogging in the park would invite sneering comments from other Bangladeshi women who would say 'Look at her--she has become an American'!

Experiences with the Program

Participant satisfaction was high. Many participants expressed delight in the program. In this excerpt, one participant interviews the other regarding her weight loss goals.

Sheuli: *You have lost 10 pounds in 5 months. How is that possible?*

Halima: *It is possible because I use all the information I have learned from joining Apple.*

Sheuli: *You used to love rice very much. How have you decreased your daily intake of rice?*

Halima: *I learned that one cup of rice is 250 calories. I used to eat 2 cups which was 500 calories. After learning about these calories I have cut down to one cup of rice per meal.*

Sheuli: *Have you only changed your diet or is there more?*

Halima: *I engage in some light exercise. I even hand wash a lot of my clothes as a form of exercise. Instead of mopping the floor I will get on my knees and scrub that with a towel. I try to be more active by going up and down stairs. That is how I have lost so much weight.*

Participants reported that they experienced improved health, well-being, mobility, and quality of life.

I have made many changes [with the support of the program]. I used to walk earlier but not with any purpose. Now I walk briskly and I walk every day. I used to have a lot of acidity but now I feel lighter and the acidity problem is gone. I used to have pain but I don't feel it any more.

Participants reported enhanced self-esteem due to their new status as lifestyle experts –

How did you feel after participating *in APPLE?*

I liked it a lot. Now, everyone pays attention to things I say. I [talk about nutrition and exercise] with my sister-in-law, who studies nutrition. Now I am an expert too. [My opinions] are also right! Now I know about calculating calories. If I fry an egg, which is 80 calories, a tablespoon of oil is 100 calories.

After participating in APPLE, I felt really good. Like, we knew many things but we didn't know how to use our knowledge. For example – which food has more calories, which food has less? There are always sweets such as Chom-Chom and Payesh in Bengali homes. After coming here, I try to eat less of these and make my family avoid them as well.

Participants loved advising and teaching others – *What would* your *message be to other APPLE members*?

I would tell them to organize their plate before they start eating. When we do that, we don't realize how much we're eating. But if we organize in the beginning, then we think twice about taking more food.

Implementing the Maintenance Phase

Throughout the first 6 months of the project, staff members reminded participants that they would be leading the group on their own in the second half of the program. Although participants expressed willingness to do so, attendance dropped sharply at the beginning of the maintenance phase. It appeared that we had overestimated participants' ability to stay with the program once the community health worker, an important source of support and leadership, was withdrawn. Participants repeatedly complained: "*We can't do anything without you here*." Participants complained that they were regaining the weight they had lost.

After 2 months, attendance remained poor. We re-instated the health worker as group leader and scheduled regular, bi-monthly meetings and exercise sessions. We also reinstated a monthly honorarium of $25 for perfect attendance at group meetings and exercise sessions. Immediately attendance in the maintenance phase rose to about half of active phase participants. The health worker encouraged members to take over leadership of certain components of the session, such as the homework review or the exercise segment. Attendance and enthusiasm remained high in those who continue to participate.

Table 1
Description of the Sample (N = 28)

Variable	Mean
Age	38
Years Since Immigration	5.2
Number of Children	2.2
Years of Education	11
Income	$21,972

Outcomes

Weight loss. Table 1 contains a description of the sample. During Months 1-6 of the program, participants lost an average of 10.11 lbs., or 5.8% of body weight. Despite the small numbers, we noted significant changes in target behaviors. Analysis of the PAN found significant reduction in self-reported consumption of fried snacks/chips ($p = .011$), soda ($p = .042$), and rice ($p = .003$) over the course of the study. Analysis of the IPAQ found that the number of women describing themselves as 'sedentary' decreased ($p = .007$) and 'active' increased ($p = .043$).

Maintenance phase outcomes. Of the 9 women who continued in the maintenance phase, the average weight gained was 2.9 lbs. or 29% of weight lost over the 6-month period. Most of this weight was gained during the unplanned 2-month gap between the active and maintenance phase. Weight gain during the maintenance phase itself was minimal.

DISCUSSION

This paper describes a formative evaluation of a unique community-based weight loss program. We used participatory methods to design the project, which was grounded in preliminary research with Bangladeshi women in the Bronx, NY. APPLE is

based in situated learning theory and is designed to create a "community of practice," a sustainable community of expert learners.

Our formative evaluation of APPLE found, on the whole that the active weight loss phase was implemented successfully with excellent attendance, retention rates, and high participant satisfaction. Anticipated structural barriers such as family resistance did not interfere as much as we had feared.[49,50]

A preliminary assessment of effectiveness found that the program was successful in helping participants change diet and exercise habits and lose weight. In addition to weight loss, participants reported significantly improved quality of life in other areas, including increased mobility. In keeping with our CoP model, any participants noted that they enjoyed feeling like 'experts' and teaching others. Many of these traditional women had had few opportunities to become known to others as a valued part of an expert group. Preliminary results suggest that this experience contributed to participants' high satisfaction with the program.

The major obstacle to implementation in this pilot project was the initial failure of our maintenance phase. The loss of the valued leader, the CHW, seems to have contributed to the initial failure of the maintenance group. We found that reinstating the community health worker and the incentive had a major effect on improving attendance in the program. The honorarium, we speculate, provides symbolic meaning and enforces the CoP 'message.' Whereas *patients* receive a service they must pay for, our APPLE '*experts*' were paid for their valuable work.

Our initial efforts to establish a patient-led group was not successful. We may have underestimated the support, preparation, and time needed to develop a completely self-led CoP in our target community. It is likely that a longer period of preparation and support are needed to develop leadership and organizational skills. Nonetheless, results suggest that APPLE groups did take on some of the characteristics of communities of practice. Participants provided significant support and helped each other develop strategies for change. They appeared to relish the status as 'experts' and were excited and motivated by the opportunity to provide education and leadership to others.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

We propose that the SLT framework has exciting potential for the development of new models of health interventions. Most CoPs that have been studied in the literature are linked to workplace peer groups. Ours is the first that we know of to work with a group of 'patients' to develop a CoP. The patient identity, in itself, is not in keeping with the identity of 'expert practitioner' described in CoP theory. We are currently working on the development of an adapted model for the APPLE program that will put more emphasis on leadership and expert knowledge. Small incentives to support a revolving core of participant leaders will be supplied, and all participants will have an opportunity to become group leaders for a given month. We will see if this strategy succeeds in helping to maintain the practice community over time.

Acknowledgements

This study was funded by the National Institutes of Health through a pilot grant from the Bronx Center to Reduce and Eliminate Ethnic and Racial Health Disparities (Bronx CREED) at Albert Einstein College of Medicine. We acknowledge the intellectual contributions of the late Marcy Campbell and her HopeWorks team at the University of North Carolina, as well as Maboobha Akhter Kabita, both of whom helped us to shape our approach.

Human Subjects Approval Statement

This study was approved by the Institutional Review Board of the Albert Einstein College of Medicine.

Conflict of Interest Declaration

The authors have no conflicts of interest to declare.

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