

Gestational diabetes mellitus (GDM) is defined as diabetes diagnosed in, and confined to pregnancy.¹ The incidence of GDM is increasing and now affects 5-10% of US pregnancies, with substantial variation by race/ethnicity.^{2,3,17} GDM serves as a sentinel event in the lives of reproductive-aged women, conferring a risk of future glucose intolerance, and placing women at high risk for type-2 diabetes mellitus (DM) and cardiovascular disease, the number one killer of US women.^{4,5} Women with a GDM pregnancy represent the single most identifiable risk group for subsequent rapid onset of DM among younger populations.^{1,3,4} A 2009 systematic review concluded that women with prior GDM (pGDM) have 7 times the risk of developing DM relative to women with normo-glycemic pregnancies, with most risk conferred within 5 years of delivery.³ Ethnic minority women are especially vulnerable to developing GDM, and a subsequent strong predisposition to obesity, metabolic syndrome, and DM.⁴ Studies indicate that Latina and Asian women, and women born outside of the US, particularly of Mexican-origin and those from Southern India and Asia, have the highest GDM rates.⁶ Studies in pGDM populations have found poor understanding of DM risk and a low prevalence of postpartum diabetes screening and preventive behaviors, but there are no studies specifically examining ethnic minority women³. Postpartum ethnic minority women may face multiple barriers to receiving preventive services, due to barriers in accessing care, inadequate knowledge of risk, and limited resources.

The diabetes prevention literature, including the Diabetes Prevention Program (DPP) trial, indicates that DM risk can be reduced significantly through behavior change related to diet or exercise.^{19 13, 17, 20} There are no published intervention trials of evidence-based programs adapted to diabetes prevention among pGDM women in the postpartum period^{7,8}. A forthcoming study by a CHARM Co-Investigator⁸ using DPP curriculum with pGDM patients in a large HMO (Kaiser), found that women receiving in-person and telephone counseling were more likely to reach pre-pregnancy weight goals than were controls⁸. A review of weight loss interventions in non-GDM women similarly reported that tailored home visits or telephone counseling interventions, emphasizing overcoming challenges postpartum women face in caring for themselves while also caring for an infant and others, were most successful⁷. Our project's goal is to create and then pilot test a patient-tailored telephone-based counseling intervention based on the DPP curriculum, focusing on the end of pregnancy and 9 months postpartum for younger (<35 years) Latina and Asian pGDM women. Engaging women at the end of pregnancy takes advantage of the "teachable" moment of pregnancy, which can motivate adoption of preventive behaviors. For ethnic minority women in particular, with higher rates of chronic disease risk factors, our program can focus on particular barriers confronted in adopting preventive behaviors, thereby potentially altering the trajectory of future chronic disease incidence. We will combine DPP prevention materials with a successful telephone-based counseling intervention our team has implemented for DM self-management tailored to language/literacy. This program, the Automated Telephone Self-Management Support (ATSM) provides automated queries to patients and "live" health coach follow-up counseling for support and problem solving. ATSM has improved diabetes outcomes in minority safety net populations⁹⁻¹². We will apply participatory approaches involving community stakeholders to adapt these interventions to diabetes prevention in pGDM women. ATSM will be renamed Support via Telephone Advice and Resources (STAR-Moms).

Aim 1: Describe the target population of Latina and Asian low-income GDM women regarding diabetes risk.

Aim 2: Adapt an existing evidence-based intervention to diabetes prevention in Latina and Asian low-income pGDM women in the immediate post-partum period.

2a: Increase the STAR-Moms program's cultural appropriateness for pGDM women with low English proficiency and low health literacy through focus group input from GDM and pGDM Latina and Asian women.

2b: Identify relevant ATSM content and existing community health promotion resources for postpartum women by forming a Regional Working Group of stakeholders.

2c: Create a testable bilingual (English and Spanish) STAR-Moms pGDM intervention based on 2a. and 2b.

Aim 3: Explore whether the STAR-Moms participants, compared with controls, have: a) improved clinical outcomes, for weight loss and percent returning to pre-pregnancy weight; b) improved behavioral outcomes, for physical activity, low fat diet, and breastfeeding; and c) improved diabetes prevention knowledge and related screening behaviors.

C.2. The STAR-Moms/STAR Mamá Intervention

The STAR-Moms intervention (Figure 1) is based on Socio-Ecological and Chronic Care Models for prevention of disease and behavior change (CCM).^{46, 47} A socio-ecological framework for behavior change recognizes that in addition to behavior change messages targeted to individuals, it is essential to include enabling and reinforcing factors that are related the social and family contexts in which diabetes-related behaviors are developed and maintained.⁴⁸ The CCM has been associated with improved chronic disease outcomes and has been promoted to be equally applicable as a chronic disease prevention model.⁴⁶ CCM areas of focus in this project include: collaborative goal-setting, identification of personal barriers and supports, development of individual problem-solving, linkages to community resources, social support, and tailored follow-up.⁴⁶

The STAR-Moms intervention builds on theoretical constructs found in Social Cognitive Theory, Theory of Planned Behavior, and Theories of Social Support found to be effective in weight loss, physical activity and dietary change, based on a recent meta-analysis and other studies.⁴⁹⁻⁵¹ Our proposed development of STAR-Moms will incorporate specific behavior change techniques associated with these theories, including: "*self-regulatory*" *intervention techniques* (specific goal setting, prompting self-monitoring, providing feedback on performance, goal review), *self-efficacy building intervention techniques* (motivational interviewing, using decisional balance and relapse prevention), *individual tailoring techniques* (information on content and resources), and *culturally tailored social support, and which incorporates family needs*.^{51, 52}

Finally, STAR-MOMS builds on *health literacy frameworks* focused on improving an individual's ability to specify planned health actions and to identify environmental cues to actions, as through "action planning."⁵³ Recent studies have identified that incorporating culture-specific values can significantly improve interventions targeted at health behavior change among Latinos.⁵⁴ We will examine the importance of culture-specific constructs for Latina and Asian pGDM women. Examples of these values for Latinas relate to: *familismo* (family orientation), *personalismo* (preference for relationships with individuals, not institutions), *fatalismo* (fatalism), *respeto* (respect), *confianza* (relationship trust), and *aguantarse* (the ability to withstand stressful situations). Motivational interviewing highlights ambivalence and discrepancies between current behaviors and personal goals thereby promoting optimism and intention to change.^{54, 55} We will assess the appropriateness of these constructs for pGDM Spanish-speaking women, identify similar or different constructs relevant to Asian women, and as appropriate, integrate them into STAR-Moms.

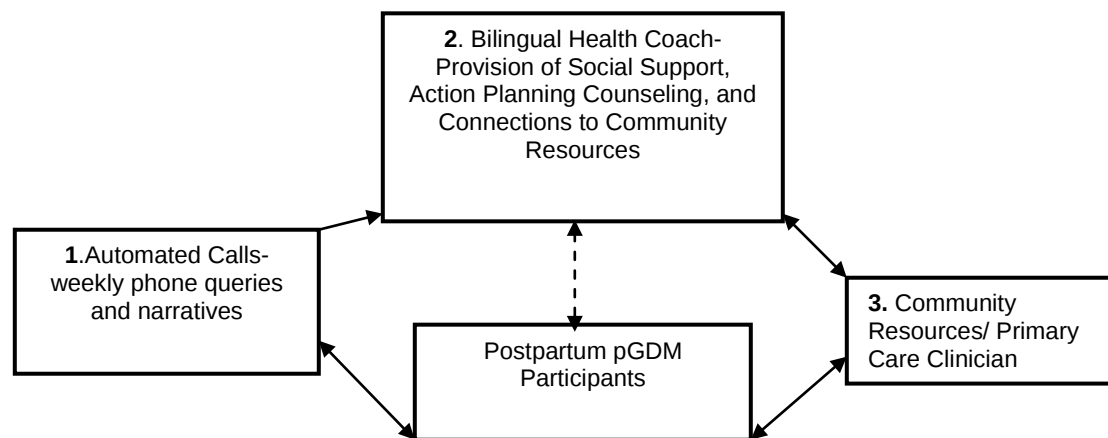


Figure 1. STAR-Moms/STAR Mamá Enrolled participants select call times to receive proactive calls or call in toll-free. 1. Each week participants receive a rotating set of prevention-focused queries (e.g., diet, exercise, breastfeeding, smoking). 2. If a participant generates a value rated "out of range," participants also hear recorded narratives related to their "out-of-range" reply encouraging behavior change. 3. A health coach receives daily electronic downloads of STAR-Mom responses and, depending on the problem, calls back to engage participant in goal setting/action and provides information about community resources. 4. The health coach may send a notification to a patient's clinic and/or clinician if deemed urgent.

REFERENCES

46. Glasgow RE, Orleans CT, Wagner EH. Does the chronic care model serve also as a template for improving prevention? *Milbank Quarterly* 2001;79:579-612.
47. Kim Y, Situ M, MA Handley, et al. Ecology matters: safety net patients' perspectives of diabetes self-management support strategies- a study from the UCSF Collaborative Research Network *Asian-Pacific Journal of General Practice* 2009;1 (1): :1-15.
48. Fisher EB, Brownson CA, O'Toole ML, Shetty G, Anwuri VV, Glasgow RE. Ecological approaches to self-management: the case of diabetes. *American Journal of Public Health* 2005;95:1523-35.
49. Greaves C, Sheppard K, Abraham C, et al. Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions. *BMC Public Health* 2011;11:1-12.
50. Lorig K. Self-management education: more than a nice extra. *Medical Care* 2003;41:699-701.
51. Keller C, Records K, Ainsworth BE, Belyea M, Pernmana Pea. Madres para la salud: Design of a theory-based intervention for post-partum Latinas. *Contemporary Clinical Trials* 2011;pre-pub.
52. Fleury J, Keller C, Perez A. Exploring resources for physical activity in Hispanic women using photo elicitation. *Qualitative Health Research* 2009;19:677-86.
53. Paasche-Orlow M, Wolf M. The causal pathways linking health literacy to health outcomes. *Am J Health Behav* 2007;31 (Supp 1)::S19-S26.
54. Anez L, Silva M, Paris JM, Bedregal L. Engaging latinos through the integration of cultural values and motivational interviewing principles. *Professional Psychology: Research and Practice* 2008;Vol. 39, No. 2:153-9.
55. Barnett B, Liu J, DeVoe M, Duggan A, Gold M, Pecukonis E. Motivational intervention to reduce rapid subsequent births to adolescent mothers: a community-based randomized trial. *Ann Fam Med* 2009;7(5):436-45.
56. Borkan J. Mixed methods studies: a foundation for primary care research. *Ann Fam Med* 2004;2(1):4-6.