

**ANALYZING THE KEY FUNCTIONS OF PEER SUPPORT IN POSTPARTUM WEIGHT  
MANAGEMENT INTERVENTIONS: A REVIEW OF THE LITERATURE**

By

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## **Abstract**

### ***Overview***

Currently in the United States, nearly two-thirds of women are entering pregnancy either overweight or obese. Additionally, many of these women gain more than the recommend amount of weight during pregnancy and often retain excess weight after delivery. Systematic reviews have been conducted in the past on the effectiveness of various behavioral interventions to manage weight postpartum. These reviews have had inconclusive results, so this review was conducted for the purpose of identifying the key functions of peer support in postpartum weight loss interventions. The rationale for exploring peer support is that this framework has been effective in achieving desirable health outcomes in diabetes prevention and management programs.

### ***Methods***

A systematic review was conducted to analyze postpartum weight loss studies that used behavioral interventions including diet, physical activity, group education, or counseling. Only studies published after 2009 were included as this is the year the Institute of Medicine changed its gestational weight gain guidelines. CINAHL and PUBMED were searched with fifteen studies meeting inclusion criteria. Studies were evaluated for baseline characteristics and general outcomes and more specifically analyzed for the key functions of peer support.

### ***Results***

The fifteen studies reviewed varied greatly in their use of peer support and in the four key functions of peer support: assistance in daily management of weight loss postpartum, social and emotional support for behavior change, connection to clinical care, and long-term support. No study explicitly relied on traditional peer supporters, or postpartum women from the same community, to facilitate weight loss postpartum.

### ***Discussion***

Although peer support has shown efficacy in diabetes prevention and management, this framework has not been utilized for postpartum weight interventions. There a many opportunities for the maternal and child health workforce to leverage peer support in policy development, practice improvements, and research.

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## Introduction

With two-thirds of reproductive-aged women in the United States currently classified as being either overweight or obese, we are facing a growing problem that affects women, their children, and society as a whole.<sup>(1,2)</sup> The health care delivery system in the United States is one of the most technologically advanced yet we have some of the worst pregnancy outcomes in the developed world when it comes to infant mortality, preterm delivery, elective C-section rates, and complications from overweight and obese mothers including macrosomia, gestational diabetes mellitus, increased risk for chronic diseases and stillbirth.<sup>3</sup> A significant number of women, 15-20%, retain at least ten pounds after the first six months postpartum.<sup>(4,5)</sup> Even in Sweden, a country known for having some of the best maternal and infant outcomes, a large epidemiological study was conducted that showed every three-unit increase in body mass index (BMI) between the first and second pregnancy led to a significantly higher risk of negative pregnancy such as macrosomia, C-sections, and gestational diabetes among others.<sup>(5,6)</sup> Retaining weight postpartum makes the complications in future pregnancies even more likely to occur.<sup>3</sup> Therefore, interventions are needed to ensure that women do not retain excess weight postpartum.

In 2009, the Institute of Medicine (IOM) changed its pregnancy weight gain guidelines to reflect the increasing prevalence of overweight and obesity among reproductive-aged women.<sup>5</sup> The IOM guidelines had not been updated in nearly twenty years, over which time research had been conducted on the effects of weight gain in pregnancy on the health of both mothers and infants. As noted in the systematic review by Berger et al., multiple studies have been conducted which show the most important predictor of gestational weight gain is prepregnancy weight.<sup>7</sup> Similarly, one of the strongest predictors of postpartum weight retention is gestational weight gain, as shown in the diet and exercise weight-loss trial by Bertz et al.<sup>(7,8)</sup> According to the

American College of Obstetricians and Gynecologists, this excess weight accumulates with subsequent pregnancies and places women at increased risk for chronic diseases such as metabolic syndrome, hypertension, type 2 diabetes, depression, and other psychosocial conditions.<sup>(3,9,10)</sup>

The maternal and child health workforce has a primary responsibility is to educate, support, and enable women to meet their pregnancy and postpartum weight goals. Many interventions that target either a gaining healthy amount of weight during pregnancy or losing excess weight postpartum tend to focus mainly on individual behaviors, like overeating or inactivity, that cause excess weight.<sup>(7,11,12)</sup> However, there are many indirect and direct causes of this excess weight, and it would be imprudent to assume that targeting individual behavior alone would lead to positive outcomes. By understanding the multiple determinants of health, MCH professionals can better understand how to work alongside mothers and families to promote environments where healthy choices can be made. One such method to accomplish this goal is using peer or social support to facilitate the intervention's goals. In this paper, the evidence for peer support in postpartum weight loss interventions will be reviewed.

### **Social Determinants of Peer Support**

The Centers for Disease Control and Prevention (CDC) promotes the widely-accepted determinants of health framework which includes overlapping factors that contribute to an individual's health – social/societal characteristics, health behaviors, medical care, genes and biology, and finally physical environment.<sup>13</sup> Social support targeted at multiple health determinants is more successful than targeting individual behaviors through peer interventions. For example, Krummel et al. conducted a postpartum weight loss intervention in West Virginia WIC offices, the *Mothers' Overweight Management Study (MOMS)*, to address health behaviors by promoting self-efficacy, educating about many topics such as breastfeeding and nutrition

and teaching parenting skills.<sup>14</sup> WIC, or the Special Supplemental Nutrition Program for Women, Infants and Children, is a federal program that supports low-income women across the country.<sup>15</sup> This support comes in the form of prescribed foods, breastfeeding and nutrition counseling, access to health services, and health care referrals at a variety of locations including county health departments, mobile clinics, community centers, schools, and public housing sites.<sup>16</sup> Another example is the CenteringPregnancy model of prenatal care which addresses health behaviors by promoting self-efficacy through group prenatal care visits in which women are responsible for charting their own visits.<sup>17</sup> CenteringPregnancy's group care increases time for emotional, information, and technical support.<sup>17</sup> Finally, CenteringPregnancy targets the physical environment by ensuring women have a safe place to talk through their concerns. CenteringPregnancy is currently working to expand sites to rural and underserved areas, with sites located in all but eight states (West Virginia, Mississippi, Arkansas, Utah, Kansas, North Dakota, Idaho, and Wyoming).<sup>17</sup> Similar models could be applied to the postpartum period to ensure that new mothers struggling with weight retention and stress among competing household and family demands would have an outlet and source for support, encouragement, and understanding. By incorporating the fundamental features of social support, postpartum care and health can be vastly improved.

One fundamental feature of social support is the importance of context, or the socioecological framework, in dictating health behaviors.<sup>18</sup> This framework recognizes that are affected by their family, their community, healthcare systems, and even their political environment.<sup>18</sup> When providing recommendations for postpartum weight loss interventions to better address the key functions of peer support, a needs assessment and theory of change model for the community and women being served are imperative first steps.<sup>19</sup> These ensure

the right intervention for the right woman at the right time because even the best-laid intentions are ineffective if the context of their implementation is ignored.

### **Importance of Understanding Context**

Conceptualizing contexts is often difficult when analyzing the potential impacts of any health care intervention or health system change. The overlapping layers include ecological, social, organizational, community, and policy contexts – all influencing each other, often concurrently.<sup>18</sup> Regardless, the consideration of context is of utmost importance as it has great impact on health behaviors, health determinants, and in turn, health outcomes.<sup>18</sup>

Understanding and appreciating the role of context is examined in many discussions of behavioral health, lifestyle, or peer support interventions. It has been one of the most difficult ideas to conceptualize as it addresses all the parts of a system, the relationship of those parts to one another, and finally how those relationships affect the system as a whole.<sup>18</sup> No one factor or person exists in isolation, and any change affects the whole system to some degree.

The effectiveness of an intervention depends on an individual's biological predispositions, economic status, ethnicity, neighborhood of residence, educational level, employment status, community resources, and public policies.<sup>20</sup> Regardless of the wide variability of communities attempting to implement postpartum weight loss interventions, humans remain social beings in all contexts and do better with help, support, and understanding from one another.

### **Four Key Functions of Peer Support**

There are many definitions and constructs embedded within the term peer or social support. *Peers for Progress* is a program of the American Academy of Family Physicians Foundation, founded in 2006 to promote peer support by advancing best practices and evidence around its use in a variety of settings. Based on the *Peers for Progress* tenets, peer support is the

sharing of knowledge and experiences from someone who has or has had a similar condition to the patient.<sup>21</sup> When delving deeper into the research base for social support, there are many names assigned to the support itself as well as those who are delivering it – peer coaches, community health workers, social supporters, counselors, Promotoras in Latin America, or even Lady Health Workers in Pakistan.<sup>(22,23)</sup> Similarly, postpartum weight loss programs, which bring women together with a shared experience of being new mothers struggling with returning to prepregnancy weight as well as other daily stressors, can serve as a support network and community for women. This symbiotic relationship mutually benefits each woman as she both gives and receives support from the group.

There are four key functions of peer support: 1) assistance in daily management; 2) social and emotional support; 3) linkage to clinical and community resources; and 4) ongoing support.<sup>24</sup> Though these key functions were meant to evolve over time, as research and practice informed one another, they have persevered as a framework by which programs and interventions can be designed, implemented, and evaluated. The purpose of this review is to evaluate the presence and/or absence of the core functions of peer support in postpartum weight loss interventions and identify methods used to facilitate such interventions in the future.

## **Methods**

The initial purpose of this review was to identify the effectiveness of postpartum weight loss interventions. As discussed in the introduction, the postpartum time period is a difficult transitional time for many women and their families as they adapt to numerous physiological and psychological changes. The process of arriving at the ultimate question as well as the specific search strategy, criteria for selecting studies, and the assessment and review of selected studies will be discussed.



Like many other problems in maternal and child health, postpartum weight loss is one that requires individualized, clinical attention as well as population policies and community actions. Postpartum weight retention and weight loss are topics that have been gaining research attention because of the growing obesity epidemic in the United States and around the world. With a health care system that is constantly evolving, more and more women will be seeking care from maternity care providers. By evaluating the use of peer support in postpartum weight loss interventions, this review aims to help maternity care providers and policy makers alike understand the potential effectiveness of this underutilized resource.

Prior to beginning a methodical literature search, guided interviews were conducted with selected experts in the field to determine the on-the-ground, local work being done in the arena of postpartum weight loss. Kathy Lamb, MS, RD, is a nutrition consultant for the North Carolina Division of Public Health Nutrition Services Branch, home of the NC WIC Program. She explained North Carolina's use of prenatal weight gain charts and gestational weight gain recommendations based on the 2009 Institute of Medicine Guidelines.<sup>25</sup> She discussed the difficulties in tracking women on these charts because of unknown prepregnancy BMI, limited staff and providers at many county clinics, poor prenatal visit attendance, and a lack of consistent and collaborating electronic medical records. Next, an interview was conducted with Corrine Giannini, RD and Nutrition Consultant from the North Carolina Division of Public Health Women's Health Branch. She discussed several state projects she has worked on including *Healthy Weight, Healthy Women*, an initiative that hoped to increase the measurement of weight and begin provider to patient discussions around entering pregnancy at a healthy weight. Additionally, she discussed the difficulties of counseling women regarding sensitive issues such as weight management as well as the North Carolina Division of Public Health's initiative to switch to electronic medical records in the hopes of better tracking these women.

Additionally, an interview was conducted with Dr. Anna Maria Siega-Riz, an associate dean at UNC Chapel Hill Gillings School of Global Public Health in the Nutrition and Epidemiology departments and a reviewer from the Institute of Medicine's weight gain guidelines. Her work has centered on the maternal and child health outcomes of overweight and obesity before, during, and after pregnancy as well as developing guidelines for nutrition management in pregnancy. She mentioned several recently published systematic reviews related to postpartum weight loss or weight management in pregnancy.<sup>(7,11,12)</sup>

Using the PRISMA process as a guideline, a focused question was developed and then reviewed by the library scientists at UNC.<sup>26</sup> The initial literature search yielded a paucity of published studies that specifically address postpartum weight loss and those that do exist had wide variability in approaches and outcomes. Building off of prior systematic reviews that had evaluated the effectiveness of postpartum weight loss interventions, this review aimed to identify barriers and facilitators to effectiveness of these interventions.<sup>(7,11,12)</sup> More specifically, this review aimed to identify the degree to which the four key functions of peer support were integrated into published interventions.

A comprehensive search strategy was developed which included searching PUBMED and CINAHL for English-only articles published after 2009 when the Institute of Medicine guidelines were reexamined. Search terms included MeSH and index terms for the following: postpartum, weight, obesity, diet, nutrition, exercise, physical activity, education, counseling, support, peer support, counseling, behavior, and lifestyle. Additionally, search results were compared to those studies assessed by the systematic reviews aforementioned to ensure that all had been captured.<sup>(7,11,12)</sup> Finally, bibliographic review of captured studies was conducted to identify any other studies missed. After title and abstract review to exclude duplicate search results and ineligible studies, the selected articles were analyzed to identify the four key functions of peer

support as well as study characteristics, participant demographics, study settings, and detailed intervention descriptions. Table 1 summarizes the eligibility criteria for the studies included in the review.

**Table1:** Eligibility Table for Studies Included in Review

	Inclusion Criteria	Exclusion Criteria
<b>Population</b>	<ul style="list-style-type: none"> <li>• Postpartum Women (within 2 years of delivery)</li> <li>• Ages 18-49 (women of reproductive age)</li> </ul>	<ul style="list-style-type: none"> <li>• Pregnant Women</li> <li>• Nulliparous Women</li> <li>• Postpartum Women (greater than 2 years since delivery)</li> <li>• Women &lt;18 years old or &gt;49 years old</li> </ul>
<b>Intervention/ Exposures</b>	Any intervention aimed at modifying behaviors impacting weight including but not limited to: <ul style="list-style-type: none"> <li>• diet, exercise, stress management, technology, support, lifestyle change, and/or self-efficacy</li> </ul>	Interventions that were not designed to address weight loss or weight management  Interventions designed to manage weight using surgical or medication-based interventions.
<b>Comparator</b>	Routine prenatal care or pre-/post-intervention	No comparison group
<b>Outcomes</b>	Maternal and child health outcomes including but not limited to: <ul style="list-style-type: none"> <li>• anthropometrics, breastfeeding intensity/duration, energy intake, nutrition quality, physical activity levels, perceived stress, perceived social support, intervention feasibility, depression, inflammatory markers, blood levels of glucose or cholesterol, self-efficacy, and/or various psychosocial changes</li> </ul>	Outcomes other than those relating to maternal and child health outcomes (for example, those that are evaluating providers' competency with interventions)
<b>Time (prior)</b>	Published studies after 2009 (release of 2009 IOM guidelines) <sup>25</sup>	Studies published prior to 2009
<b>Time (to outcomes)</b>	Postpartum (within 2 years of delivery)	<ul style="list-style-type: none"> <li>• During pregnancy</li> <li>• Postpartum (more than 2 years after delivery)</li> </ul>
<b>Study Designs</b>	Pilot studies, controlled trial, randomized controlled trials, observational and feasibility studies	
<b>Settings</b>	Limited to English publications	Studies published in any other language

## Results

In total, 102 studies were identified in PUBMED while 112 were identified in CINAHL. Three additional studies were identifying using bibliographic review. After correcting for duplications and eliminating studies that did not meet the inclusion criteria, 15 unique studies were included after abstract and full article review. Baseline characteristics for these studies are summarized in Table 2. Nine of these studies took place in the United States<sup>(4,14,27-33)</sup> – including three from North Carolina. The remaining studies included two in England<sup>(34,35)</sup>, and one each in

Sweden<sup>8</sup>, Australia<sup>36</sup>, Iran<sup>37</sup>, and Japan<sup>38</sup>. The interventions varied greatly in terms of size, demographics, intervention components, and outcomes. The goal of this systematic review was to identify the functions of peer support incorporated into the studies as well as the barriers and facilitators to successful postpartum weight loss interventions. In addition to briefly highlighting the key characteristics of the fifteen selected studies, Table 2 also addresses the degree to which peer support was addressed as a component of the intervention.

Each of the fifteen studies was evaluated by one reviewer for the overall use of peer support as well as each of the four functions of peer support. As there is no one, established definition of peer support and using these key functions is only one framework for evaluating peer support within interventions, it must be noted that this evaluation is subjective and open to different interpretations. With that in mind, there was some overlap when considering the components of the interventions and which key functions of peer support were most closely being addressed. Peer support is help or assistance provided by a supporter to an individual who has had a similar experience. In the context of this review, we sought to identify women providing support to postpartum women from the same community with similar culture and circumstances.

Table 2: Summary of Baseline Characteristics of Selected Studies

Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Baseline results from Hawaii's Na Mikimiki project: A physical activity intervention tailored to multiethnic postpartum women</b></p> <p><b>Albright et al. (2012)</b></p> <p>Randomized-Controlled Trial (RCT)</p> <p>N = 278</p>	<p>Hawaii</p> <p>Technological interfaces, no comment assessment location</p> <p>Healthy, underactive women (&lt;30 minutes/week)</p> <ul style="list-style-type: none"> <li>• Mean Age = 32±5.6 years</li> <li>• BMI 18.5-40 kg/m<sup>2</sup></li> <li>• 84% ethnic minority women (Asian-American and Native Hawaiian)</li> </ul>	<p>Test the effectiveness of a tailored telephone counseling and technology (TCT) physical activity intervention designed to initiate and maintain moderate-to-vigorous physical activity(MVPA)</p>	<p>18-month intervention that addressed mediators of physical activity: self-regulatory behavioral skills, self-efficacy, social support for physical activity, environmental factors, depression</p> <ul style="list-style-type: none"> <li>• Anthropometrics</li> <li>• Questionnaires</li> <li>• Accelerometers</li> <li>• Exercise logs</li> <li>• Baseline and four additional times at 1, 3, 6, 12 or 18-months post-enrollment</li> </ul>	<p>Print/website materials-only</p> <p>Links to internet resources for exercise</p>	<p>Still awaiting publication, no significant differences in baseline characteristics</p> <ul style="list-style-type: none"> <li>• BMI</li> <li>• Physical Activity</li> <li>• Psychosocial Mediators of Physical Activity</li> <li>• Self-efficacy for Physical Activity</li> </ul>	<p>Trained counselors delivered the intervention but no comment on who they were nor whether or not they were from within the community</p> <p>No deliberate use of peer support</p>	<p>Mothers agreeing to participate may have stronger motivations than those recruited but not enrolling (may not be representative sample)</p> <p>Difficult recruitment</p> <p>Required to have insurance to participate</p> <p>No published results on outcomes at 12- and 18-months</p>
<p><b>Diet and exercise weight-loss trial in lactating overweight and obese women</b></p> <p><b>Bertz et al. (2012)</b></p> <p>RCT</p> <p>N = 68</p>	<p>Sweden</p> <p>Research clinic , participant homes</p> <ul style="list-style-type: none"> <li>• BMI 25-35 kg/m<sup>2</sup></li> <li>• 97% white</li> <li>• 73% had over 3-years of education beyond high school</li> </ul>	<p>To determine the best approach for postpartum weight loss in lactating women</p> <p>Hypothesized that interaction of diet and exercise would lead to the most clinically significant weight loss</p>	<p>12-week intervention, three arms</p> <ul style="list-style-type: none"> <li>• Dietary behavior modification to decrease energy intake (D)</li> <li>• Physical exercise behavior modification (E)</li> <li>• Combined dietary and physical exercise (DE)</li> </ul> <p>Anthropometrics at baseline, after 12-week intervention, and 1-year follow-up</p>	<p>Usual Care (C)</p>	<p>Significant weight loss seen only in the diet-alone intervention group, sustained at 1-year follow-up</p> <p>Insignificant weight gain in exercise-only group (possible increased muscle mass)</p> <p>No effect on breastfeeding duration or infant growth</p>	<p>No deliberate use of peer support</p>	<p>Small sample size, not generalizable</p> <p>Recruited from antenatal clinics only</p> <p>Women becoming pregnant during the study were excluded from follow-up</p> <p>Almost all women enrolled on maternity leave for duration of study</p>

Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Design and outcomes of a <i>Mothers in Motion</i> behavioral intervention pilot study</b></p> <p><b>Chang et al. (2010)</b></p> <p>Pilot Study of RCT</p> <p>N=129</p>	<p>Michigan</p> <p>WIC Clinics, participant homes, technological interfaces</p> <p>Overweight and obese African-American and White WIC mothers</p> <ul style="list-style-type: none"> <li>• Ages 18-34</li> <li>• BMI 25-40 kg/m<sup>2</sup></li> </ul>	<p>Preventing weight gain in low-income overweight and obese mothers by promoting healthy eating, physical activity, and stress management</p>	<p>10-week intervention with DVD featuring educational and skills components and bimonthly peer support group teleconferences (PSGTs)</p> <ul style="list-style-type: none"> <li>• Anthropometrics</li> <li>• Questionnaires</li> <li>• Baseline, 2- and 8-months following the intervention</li> </ul>	<p>Usual WIC care consisting of nutrition education for 20 minutes every 6 months</p>	<p>No significant differences in weight changes or blood glucose</p> <p>Secondary: fat, fruit and vegetable intake; physical activity; perceived stress; feelings</p>	<p>Peer support group teleconferences, identifying social networks, integration into established care settings, WIC educators from community</p>	<p>Convenience sampling (selection bias)</p> <p>Small sample size and short duration prevented a significant effect but trends were encouraging</p> <p>Simultaneously enrolled in WIC breastfeeding peer counseling; confounding effects</p>
<p><b>Use of MyPyramid menu planner for moms in a weight-loss intervention during lactation</b></p> <p><b>Colleran et al. (2011)</b></p> <p>RCT</p> <p>N=27</p>	<p>North Carolina</p> <p>Research center unspecified, participant homes, technological interfaces</p> <p>Overweight and obese women enrolled in study examining effects of exercise and weight loss on bone mineral density during lactation)</p> <ul style="list-style-type: none"> <li>• Ages 23-37 years</li> <li>• BMI 25-30 m/kg<sup>2</sup></li> <li>• Exclusively breastfeeding</li> <li>• Limited physical activity</li> </ul>	<p>Examine the effects of energy restriction (500kcal/day) and exercise on body composition in overweight/obese lactating women</p> <p>Improve total diet or overall pattern of food consumption with individual counseling by RD using <i>MyPyramid Menu Planner for Moms</i></p> <p>Exercise with strength training and walking 10,000 steps per week</p>	<p>16-week intervention using the <i>MyPyramid Menu Planner for Moms</i> to support dietary counseling</p> <ul style="list-style-type: none"> <li>• Three 24-hour dietary recalls using Nutrition Data System</li> <li>• Maternal and infant anthropometrics, body composition, fitness test, bone mineral density, muscular strength</li> <li>• Baseline, 4 and 20 weeks postpartum</li> </ul>	<p>“Minimal Care” group, received mailed handouts only on nutrition and lifestyle recommendations</p>	<p>Significantly more weight loss in the intervention group</p> <p>Changes in energy, saturated fat, and percent energy from added sugars were significantly different in the intervention group</p> <p>Significant increases in whole fruit and vegetable servings in the intervention group</p>	<p>Research assistants (RAs) visited participant homes up to three times per week to provide childcare and facilitate the exercise sessions; no comment on who RAs were or whether or not from the community</p> <p>No deliberate use of peer support</p>	<p>Small sample size</p> <p>Designed for individuals with some food knowledge and computer experience</p> <p>Self-reporting information into <i>MyPyramid Menu Planner for Moms</i></p> <p>Dietary recall often not typical of a day</p> <p>Limited vegetarian options, tailoring</p>

Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Supporting postpartum weight loss in women living in deprived communities – design implications for a randomized control trial</b></p> <p><b>Craigie et al. (2011)</b></p> <p>Feasibility pilot of RCT</p> <p>N=52</p>	<p>United Kingdom</p> <p>Telephone calls, unspecified research center</p> <p>Overweight women 6-18 months postpartum</p> <ul style="list-style-type: none"> <li>• BMI &gt; 25kg/m<sup>2</sup></li> <li>• Residing in areas of moderate to high deprivation</li> </ul>	<p>Evaluate the feasibility of undertaking a RCT of a weight loss intervention (<i>WeighWell</i>) in postpartum women living in areas of social disadvantage</p> <ul style="list-style-type: none"> <li>• Energy deficit diet</li> <li>• Increased physical activity</li> </ul>	<p>12-week intervention using motivational interviewing in 1-on-1 home visits and telephone calls</p> <ul style="list-style-type: none"> <li>• Anthropometrics</li> <li>• Questionnaires on demographics, dietary intake, psychosocial parameters, physical activity</li> <li>• Baseline and follow-up</li> </ul>	<p>Usual care as well as a one-time consultation with a lifestyle counselor after follow-up</p>	<p>Primary: assess feasibility and acceptability of study procedures</p> <p>Significant weight loss in the intervention group</p>	<p>No deliberate use of peer support</p>	<p>Small sample size, feasibility study</p> <p>Loss to follow-up was 24% in intervention group and 39% in comparison group</p> <p>Weight loss of clinical significance was achieved by only 9%</p>
<p><b>Postpartum exercise regardless of intensity improves chronic disease risk factors</b></p> <p><b>Davenport et al. (2011)</b></p> <p>Prospective randomized trial</p> <p>N= 60</p>	<p>England and Canada</p> <p>Unspecified research center, local parks</p> <p>Healthy, non-smoking, sedentary postpartum women</p> <ul style="list-style-type: none"> <li>• BMI ≥ 25 kg/m<sup>2</sup></li> <li>• Retained ≥ 5 kg from pre-pregnancy</li> </ul>	<p>Examine the effect of exercise intensity on risk factors for chronic disease in postpartum women; predicting that nutrition control and moderate intensity exercise would have the most improvement</p>	<p>16-week intervention, two arms with supervised walking sessions</p> <ul style="list-style-type: none"> <li>• Nutrition plus low-intensity</li> <li>• Nutrition plus moderate-intensity</li> </ul> <p>Measurements at 7-8 weeks postpartum (baseline) and 23-25 weeks post-partum</p>	<p>Sedentary postpartum women matched by BMI, age, and parity (no randomized control group)</p> <p>Provided literature about eating well (“Canada’s Food Guide and Guide to Physical Activity”)</p>	<p>Significant improvement in chronic disease risk factors in intervention groups, regardless of exercise intensity, compared to control (body mass, waist-to-hip ratio, fasting glucose, LDL)</p> <p>DEXA suggested weight loss attributed to decreased fat mass</p>	<p>Weekly walking groups helped encourage adherence to the physical activity component</p>	<p>Small sample size</p> <p>Required supervised walking for 45-minutes, 3-4 times/week (heart rate zone of 30 or 70% of resting heart rate)</p> <p>“healthy volunteer” effect due to recruitment strategies</p> <p>All women on maternity leave</p>

Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Usability testing and piloting of the <i>Mums Step It Up</i> Program – a team-based social networking physical activity intervention for women with young children</b></p> <p><b>Kernot et al. (2014)</b></p> <p>Pilot Study for RCT</p> <p>N = 25</p>	<p>Australia</p> <p>Facebook app</p> <p>Five “captain” women who recruited team members from own social network on Facebook</p> <ul style="list-style-type: none"> <li>Child under 5 years old</li> <li>Current Facebook users</li> </ul>	<p>Aimed to assess the usability of the <i>Mums Step it Up</i> Facebook app</p> <ul style="list-style-type: none"> <li>High rates of engagement</li> <li>Increase physical activity</li> <li>Improve sleep, mood, wellbeing</li> <li>Applicability to other health-related behaviors</li> </ul>	<p>50-day intervention; pilot study for <i>Mums Step it Up</i> Facebook app which is a team-based, pedometer challenge for mothers and young children</p> <p>Physical activity assessed at baseline and in final weeks of the intervention (self-reported surveys related to frequency and duration)</p>	<p>None</p>	<p>Significant increase in physical activity compared to baseline with an average of 177 minutes per week</p> <p>Usage data of Facebook app was relatively high (logging steps, wall posts, and sending gifts)</p>	<p>Women connected with their own social network to create teams for physical activity challenge</p> <p>Team motivation for support and adherence to goals</p>	<p>Pilot, small sample size</p> <p>No control group</p> <p>Self-reported levels of physical activity (likely over estimated)</p> <p>Technical difficulties with the Facebook interface, especially using mobile devices (affected retention and engagement)</p> <p>14% attrition rate</p>
<p><b>Lessons learned from the <i>Mother’s Overweight Management Study (MOMS)</i> in four West Virginia WIC offices</b></p> <p><b>Krummel et al. (2010)</b></p> <p>Randomized-Controlled Pilot</p> <p>N=151</p>	<p>West Virginia</p> <p>WIC clinics in four counties</p> <p>Postpartum women enrolled in WIC , local YMCAs</p> <ul style="list-style-type: none"> <li>≥ 18 years old</li> <li>Not underweight</li> <li>65% stay-at-home mothers</li> <li>90% White</li> </ul>	<p>Project developed to address the problem of weight retention during the postpartum period in women of low socioeconomic status (SES)</p>	<p>12-month intervention, a peer-guided group</p> <ul style="list-style-type: none"> <li>10 facilitated discussion group sessions</li> <li>Monthly personalized feedback, newsletters</li> <li>Anthropometrics</li> <li>Steps and dietary intake</li> <li>Questionnaires on stress and depression</li> <li>Baseline and 12-months</li> </ul>	<p>Self-guided</p> <p>One counseling session with dietitian and monthly newsletters</p>	<p>No significant differences in any of the outcome variables at one year</p> <p>Primary: Weight change from baseline (self-reported)</p> <p>Secondary: waist circumference, steps, dietary intake</p> <p>Mediators: Perceived Stress Scale and Beck Depression Inventory</p>	<p>Peer-guided discussion group sessions to address behaviors related to physical activity and nutrition including goal setting and increasing self-efficacy</p> <p>Discussion group facilitators were diverse in roles but no comment if from within the community or not</p>	<p>57% of intervention group never attended a group session (low exposure to the intervention) – unpredictable schedules, limited timing, not as appealing to younger mothers (role for technology)</p> <p>Attendance and attrition problems (need for childcare and transportation)</p>



Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Effect of physical activity intervention based on a pedometer on physical activity level and anthropometric measures after childbirth: a randomized controlled trial</b></p> <p><b>Maturi et al. (2011)</b></p> <p>RCT</p> <p>N=66</p>	<p>Iran</p> <p>7 local health clinics</p> <p>Postpartum women</p> <ul style="list-style-type: none"> <li>BMI 19.9-28.9 kg/m<sup>2</sup></li> <li>Ages 18-40</li> <li>Literate</li> <li>Breastfeeding</li> <li>Low physical activity levels</li> <li>65.5% housewives</li> </ul>	<p>Determine the effect of a physical activity intervention program emphasizing walking using a pedometer on physical activity level and anthropometric measures in women after childbirth</p>	<p>12-week intervention tailored to encourage increased walking using a pedometer</p> <ul style="list-style-type: none"> <li>Advised to increase steps by 500 per week until achieved 10,000 steps/week</li> <li>Personal phone calls and text messages</li> <li>Educational pamphlets</li> </ul>	<p>Routine postpartum care</p> <p>In Iran, common at 10 days and 6 weeks postpartum (no usual advice on weight loss or physical activity) – addresses primarily family planning and breastfeeding</p>	<p>Intervention group had significant decreases in weight, BMI, and waist/hip circumference as well as significantly increased physical activity</p> <p>No difference in food intake pre- and post-intervention</p>	<p>No deliberate use of peer support</p>	<p>Small sample size, not generalizable</p>
<p><b>A web-based lifestyle intervention for women with recent gestational diabetes mellitus (GDM)</b></p> <p><b>Nicklas et al. (2014)</b></p> <p>RCT</p> <p>N = 75</p>	<p>Massachusetts</p> <p>Diabetes in Pregnancy Program at Brigham and Women's Hospital, technological interfaces</p> <p>Women with GDM from most recent pregnancy</p> <ul style="list-style-type: none"> <li>Age 18-45 years</li> <li>BMI 24-50 kg/m<sup>2</sup></li> </ul>	<p>Determine the feasibility and effectiveness of a web-based lifestyle intervention (<i>Balance After Baby</i>) to reduce postpartum weight retention in women with recent GDM</p> <p>All women given goal to return to prepregnancy weight over the study period</p>	<p>12-month intervention (<i>Balance after Baby</i>) of group offered with 12 core online modules</p> <ul style="list-style-type: none"> <li>Increasing physical activity</li> <li>Lower glycemic index diet, high fiber, portion control</li> </ul> <p>Each study visit included measurements of body weight, glucose levels, depression scales, food frequency and breastfeeding questionnaires</p>	<p>Routine prenatal care</p>	<p>Significantly more weight loss observed in the intervention group (from first postpartum weight and self-reported prepregnancy weight)</p> <p>Greater reduction in caloric intake in the intervention group</p>	<p>Lifestyle coaches developed strategies to reach goals through weekly phone calls but not from community</p> <p>No deliberate use of peer support</p>	<p>Single-center with lots of resources, may not be generalizable and likely too expensive</p> <p>Prepregnancy weight was self-reported</p> <p>Only 33% of women watched all 12-core modules</p> <p>No differences in physical activity levels even with free YMCA membership</p>

Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Active Mothers Postpartum(AMP): a randomized controlled weight-loss intervention trial</b></p> <p><b>Ostbye et al. (2009)</b></p> <p>RCT</p> <p>N=450</p>	<p>North Carolina</p> <p>Recruited from obstetrics clinics and community posters</p> <p>Overweight or obese women enrolled 6-weeks postpartum</p> <ul style="list-style-type: none"> <li>• Prepregnancy BMI <math>\geq 25\text{m/kg}^2</math></li> <li>• <math>\geq 18</math> years old</li> </ul>	<p>Promote a reduction in BMI through 24-months postpartum via sustainable lifestyle changes (multicomponent behavioral intervention)</p> <ul style="list-style-type: none"> <li>• Reduction in caloric intake</li> <li>• Reduction in fat calories</li> <li>• Increased physical activity</li> </ul>	<p>9-month <i>Active Mothers Postpartum</i> intervention group</p> <ul style="list-style-type: none"> <li>• 8 healthy-eating sessions (Mom’s Time Out classes)</li> <li>• 10 physical activity group sessions (ACTIVMOMS)</li> <li>• 6 telephone-counseling sessions</li> </ul> <p>Anthropometrics, dietary intake, physical activity logs</p>	<p>Regular postpartum care with biweekly newsletters containing general tips for postpartum mothers</p>	<p>Insignificant difference in weight loss between the two groups</p> <p>No differences in improvement of diet nor physical activity levels</p>	<p>Theoretical design of study acknowledged role of self-efficacy and ongoing support in making behavioral changes</p> <p>Multiple group sessions aiming to provide support</p>	<p>Average attendance was 3.8 classes while averaged 3.3 counseling calls</p> <p>Difficulty attending classes because of childcare, coordinating schedules, lots of time required by the study</p> <p>Self-monitoring of diet and physical activity encouraged but not required</p>
<p><b>A comparison of Mediterranean-style and MyPyramid diets on weight loss and inflammatory biomarkers in postpartum women</b></p> <p><b>Stendell-Hollis et al. (2013)</b></p> <p>RCT</p> <p>N= 129</p>	<p>Arizona</p> <p>Healthy, breastfeeding women</p> <ul style="list-style-type: none"> <li>• Ages 18-40 years old</li> <li>• Willing to breastfeed for 6 additional months</li> <li>• 75.2% non-Hispanic white</li> </ul>	<p>Assess the effects of a Mediterranean (MED)diet and MyPyramid diet on body weight, adiposity, and biomarkers of inflammation (TNF-<math>\alpha</math> and IL-6)</p>	<p>4-months intervention of dietary education regarding Mediterranean diet (walnuts, olive oil, fruits/vegetables)</p> <p>Counseling visits at 2 weeks and 2 months</p>	<p>“Normal” dietary education per USDA MyPyramid for Pregnancy and Breastfeeding</p>	<p>MED group and MyPyramid group had significant decreases in total energy intake and in all anthropometrics</p> <p>No significant differences in inflammatory markers between the groups</p>	<p>Individual counseling on dietary behaviors to help with daily management (no comment on whether dietitians or lactation consultants were from the community or not)</p> <p>No deliberate use of peer support</p>	<p>No true control group</p> <p>Significant differences only seen when compared to baseline but no significant differences between the dietary groups</p> <p>MyPyramid recommendations have been replaced by MyPlate recommendations</p>
<p><b>Home-based active video games to promote weight loss during the postpartum period</b></p> <p><b>Tripette et al. (2014)</b></p> <p>RCT</p> <p>N=34</p>	<p>Japan</p> <p>National Institute for Health and Nutrition, homes, technological interfaces</p> <ul style="list-style-type: none"> <li>• BMI <math>\geq 22\text{kg/m}^2</math></li> <li>• 65% exclusive breastfeeding</li> </ul>	<p>Evaluate the role active video games (AVGs) can play in helping postpartum women improve their body composition due to incompatibility of traditional physical activities with mothers’ agendas</p>	<p>AVG group provided with Wii Nintendo console and Wii Fit Plus for 40-days</p> <p>Measurements included anthropometrics, physical fitness, energy expenditure, and energy intake</p>	<p>Routine care</p>	<p>AVG group lost significantly more weight than control group</p> <p>Glucose, total cholesterol, and LDL-cholesterol significantly decreased in both groups</p>	<p>No deliberate use of peer support</p>	<p>Participants required to provide own TV and video connection</p> <p>Participants all healthy women without marked overweight or metabolic disorders (limited generalizability)</p>

Study and Author Details	Location and Patient Demographics	Goals	Intervention Components	Control Group	Outcomes	General Use of Peer Support	Limitations
<p><b>Ethnic-specific weight-loss interventions for low-income postpartum women: findings and lessons</b></p> <p><b>Walker et al. (2012)</b></p> <p>Pilot RCT</p> <p>N=71</p>	<p>Texas</p> <p>White and African-American – groups met at a family medicine clinic</p> <p>Hispanics – groups met at a school-based clinic</p> <ul style="list-style-type: none"> <li>BMI <math>\geq 25</math> kg/m<sup>2</sup></li> <li>Retained postpartum weight of <math>\geq 5</math>kg</li> <li>Age <math>\geq 18</math> years</li> <li>Medicaid</li> </ul>	<p>Determine the effectiveness of ethnic-specific weight-loss interventions among Whites, African-Americans, and Hispanics while drawing lessons from psychosocial data and follow-up interviews for future community interventions</p>	<p>13-week intervention occurring in group settings in the community</p> <ul style="list-style-type: none"> <li>Weekly group meetings and weigh-ins</li> <li>Core content on nutrition, physical activity, behavioral strategies</li> <li>Culturally-relevant printed materials</li> <li>Follow-up interviews</li> </ul> <p>Assessments at baseline, 6- and 13-weeks</p>	<p>Each ethnic group was divided into an intervention and control group (termed the “wait-list” group)</p> <ul style="list-style-type: none"> <li>After wait-list period, provided intervention materials in mail as well as weekly telephone counseling support</li> </ul>	<p>No significant differences among ethnic groups in weight changes or percentage weight change from baseline</p> <p>Weight changes correlated with level of self-efficacy across all groups</p> <p>Focus on factors related to attrition, participation, weight, and psychosocial changes</p>	<p>Group-based intervention, addressed psychosocial issues affecting weight loss, measured social support, promoted self-efficacy in self-monitoring of behaviors</p>	<p>30% of women were lost to follow-up</p> <p>Despite randomization, White group still had lower baseline BMIs and perceived stress</p>
<p><b>Diet quality and weight change among overweight and obese postpartum women enrolled in a behavioral intervention program</b></p> <p><b>Wiltheiss et al. (2013)</b></p> <p>RCT</p> <p>N=400</p>	<p>North Carolina</p> <p>Home-based</p> <p>Mothers of preschool children recruited soon after the birth of a baby</p> <p>Overweight and obese women</p> <ul style="list-style-type: none"> <li>Self-reported prepregnancy BMI <math>\geq 25</math>kg/m<sup>2</sup></li> <li>Age <math>\geq 18</math> years</li> </ul>	<p>Promote healthy weight by improving dietary and physical activity habits in preschool children of overweight or obese mothers</p> <p>Assess predictors of diet quality during postpartum period and determine if an intervention improved diet quality, reduced energy intake, and achieved greater weight loss compared to usual care</p>	<p>10-month, family based intervention, <i>KAN-DO: Kids and Adults Now – Defeat Obesity</i></p> <ul style="list-style-type: none"> <li>8 education kits, mailed monthly</li> <li>Motivational counseling</li> <li>One group class</li> </ul> <p>Measurements at baseline and follow-up</p> <ul style="list-style-type: none"> <li>Anthropometrics</li> <li>24-hour dietary recalls over phone</li> <li>Diet quality and other questionnaires</li> </ul>	<p>Monthly mailings focused on reading skills and enjoyment for the preschooler</p>	<p>Diet quality was not a significant predictor of weight loss but only 9% met these recommendations</p> <p>No significant decrease in weight</p> <p>Significant differences in duration/intensity of breastfeeding duration and amount of weight loss</p> <p>Energy consumption significant predictor of weight change</p>	<p>No deliberate use of peer support</p>	<p>Focus not specifically on postpartum women but rather designed to prevent childhood obesity with secondary aim to improve diet and physical activity habits of mothers to promote postpartum weight loss</p> <p>Mailed kits required literacy</p> <p>Self-reported dietary intake</p>

## **Results of the 15 Included Studies**

Each of the fifteen studies was evaluated by one reviewer for the overall use of peer support as well as each of the four functions of peer support. As there is no one, established definition of peer support and using these key functions is only one framework for evaluating peer support within interventions, it must be noted that this evaluation is subjective and open to different interpretations. With that in mind, there was some overlap when considering the components of the interventions and which key function of peer support was most closely being addressed. Peer support is help or assistance provided by a supporter to an individual who has had a similar experience. In the context of this review, the hope was to identify women providing support to postpartum women from the same community with similar culture and circumstances.

### ***General Utilization of Peer Support in the Interventions***

This traditional definition and utilization of peer supporters was only identified in four of the fifteen studies.<sup>(14,28,31,36)</sup> The second to last column in Table 2 details any deliberate use of peer support in the study designs. In the *Mothers in Motion* trial by Chang et al., peer support group teleconferences (PSGTs) were formed from groups of women at local WIC clinics in Michigan.<sup>28</sup> These women spoke two times a month in addition to their weekly DVD-modules and provided each other with empathy, encouragement, and competition to reach targeted weight loss goals. The *Mums Step It Up* trial by Kernot et al., based in Australia, also used a technological interface for peer support.<sup>36</sup> This time, groups of women formed teams via a Facebook interface to encourage each other during a fifty-day physical activity and weight loss challenge.<sup>36</sup> These teams were self-organized and relied on an individual woman's own social network, hoping to provide an avenue for long-term support. The other two studies using the traditional peer support definition included the *Mother's Overweight Management Study*

Table 3: Evaluation of Four Key Functions of Peer Support within Interventions

Study Author and Year	Assistance in Daily Management	Social/Emotional Support	Linkage to Clinical and Community Resources	Ongoing Support (follow-up duration)
<p><b>Baseline results from Hawaii's Na Mikimiki project: A physical activity intervention tailored to multiethnic postpartum women</b></p> <p><b>Albright (2012)</b></p>	<p>Counseling arm given pedometer to encourage self-monitoring (reported steps to counselor)</p> <p>Weekly newsletters on skill-building topics</p> <p>Assessed stages and readiness to change</p> <p>Addressed self-efficacy by assessing self-confidence to overcome barriers to physical activity</p>	<p>Counseled in methods to obtain social support for physical activity from family and friends</p> <p>Assessed using adapted version of the Sallis family/friend support for participation in exercise scales</p> <p>Average of 17 counselor-initiated telephone or e-mail contacts over 12 months/ woman (motivational interviewing techniques)</p>	<p>Newsletters, websites with information on paved paths, physical activity resources in the area</p>	<p>18-months duration</p> <p>2-12 months postpartum</p> <p>Regular, credible, individualized counseling using culturally-sensitive techniques</p>
<p><b>Diet and exercise weight-loss trial in lactating overweight and obese women</b></p> <p><b>Bertz et al. (2012)</b></p>	<p>Intervention groups were contacted twice a week with cell phone text messages or email (only to report body weight and number of walks)</p> <p>Provided supplies to help meet exercise and diet goals (scale, logs, checklists)</p>	<p>Home Visit (once)</p> <p>Counseling to identify barriers to achieving diet/exercise goals (twice)</p>	<p>Dietitian conducted the dietary and combined interventions, following Nordic nutrition recommendations</p> <p>Physical therapist explained exercise component which was a 45-minute brisk walk 4 days/week (given booklet, heart rate monitor, diary)</p>	<p>12-weeks duration</p> <p>10-14 weeks postpartum</p>
<p><b>Design and outcomes of a Mothers in Motion behavioral intervention pilot study</b></p> <p><b>Chang et al. (2010)</b></p>	<p>Informational support through DVD messages in home (included representative mothers)</p> <ul style="list-style-type: none"> <li>• Interactive information</li> <li>• Culturally sensitive narratives</li> <li>• Goal setting</li> </ul> <p>Enhanced self-efficacy and emotional coping responses (worksheets, quizzes)</p> <p>How to promote healthy home environments</p>	<p>Home visits during DVD training for featured mothers</p> <p>Peer support group teleconferences (PSGTs) – gains in coping, support satisfaction, perceived support, and decreased loneliness, stress management (every other week for 10 weeks, 30 minute sessions)</p> <p>Integration of cultural preferences through peer advisory group</p> <p>Helped identify positive social support persons in network</p>	<p>WIC coordinator and nutrition consultant served on community advisory group</p> <p>WIC educators led the PSGTs (trained in didactic instruction, demonstration, role-playing and practice exercises)</p>	<p>10-weeks duration with 2-years of follow-up</p>

Study Author and Year	Assistance in Daily Management	Social/Emotional Support	Linkage to Clinical and Community Resources	Ongoing Support (follow-up duration)
<p><b>Use of MyPyramid menu planner for moms in a weight-loss intervention during lactation</b></p> <p><b>Colleran et al. (2011)</b></p>	<p>Use of MyPyramid Menu Planner for Moms (2009) to help plan meals, track food choices and categories with interactive dietitian counseling</p> <p>Biweekly contacts to assess use of formula, birth control, physical activity, supplements, any adverse dietary events OR every two weeks in “minimal care” group</p> <p>All received multivitamin supplements without minerals</p>	<p>Research assistants visited homes to provide child care and facilitate the exercise sessions up to three times per week</p>	<p>30-minute face-to-face dietary counseling at beginning of study and then weekly thereafter with a registered dietitian</p>	<p>16-weeks duration</p> <p>4- to 20-weeks postpartum</p>
<p><b>Supporting postpartum weight loss in women living in deprived communities – design implications for a randomized control trial</b></p> <p><b>Craigie et al. (2011)</b></p>	<p>All received a weight loss booklet and intervention group received walking plans, pedometer, weight log book</p> <p>Intervention group received phone regular phone calls from lifestyle counselor to identify progress towards goals (motivational interviewing)</p>	<p>Lifestyle counselors provided positive feedback and support</p>	<p>Intervention received 3 face-to-face consultations with trained lifestyle counselor and 3 telephone calls</p>	<p>12-weeks duration</p> <p>6- to 18-months postpartum</p>
<p><b>Postpartum exercise regardless of intensity improves chronic disease risk factors</b></p> <p><b>Davenport et al. (2011)</b></p>	<p>Intervention included the baby (walking with a stroller or not) and was 45-minutes, 3-4 times per week</p> <p>Provided pedometer, food records</p> <p>Regular weigh-ins</p>	<p>Walks occurred in groups to encourage adherence to the intervention</p> <p>Included childcare</p>	<p>Registered Dietitian produced individualized diet intervention based on food intake record</p> <p>Dietitian monitored calories and macro/micronutrients to ensure sufficient to sustain breastfeeding</p>	<p>16-weeks duration</p> <p>7- to 9-weeks postpartum minimum</p>

Study Author and Year	Assistance in Daily Management	Social/Emotional Support	Linkage to Clinical and Community Resources	Ongoing Support (follow-up duration)
<p><b>Usability testing and piloting of the <i>Mums Step It Up</i> Program – a team-based social networking physical activity intervention for women with young children</b></p> <p><b>Kernot et al. (2014)</b></p>	<p>Online app via Facebook provides women with flexibility in monitoring their physical activity</p> <ul style="list-style-type: none"> <li>Tally board, graphs, statistics on hours of life gained, fat burned, carbon emissions and transport costs saved (estimates)</li> </ul> <p>Weekly emails detailing progress and reminding participants to log physical activity</p> <p>Provided pedometers, log books</p>	<p>Five “Captain” women recruited Facebook friends also with young children to be on team</p> <ul style="list-style-type: none"> <li>Aimed to have high rates of engagement and retention</li> <li>Connect women with their own social networks (self-organizing)</li> <li>Team participation increases motivation and support</li> </ul>	<p>Not addressed</p>	<p>50-day challenge</p> <p>Kids less than 5 years-old</p> <p>More usage relates to more exposure to the intervention</p> <p>Potential for long-term support because utilizing existing social networks</p>
<p><b>Lessons learned from the <i>Mother’s Overweight Management Study (MOMS)</i> in four West Virginia WIC offices</b></p> <p><b>Krummel et al. (2010)</b></p>	<p>Monthly newsletters and personalized feedback in the intervention group</p> <p>Self-monitoring records for nutrition and physical activity behaviors</p> <p>Small, achievable goals identified to ensure success (monthly calendars)</p>	<p>10 peer group sessions</p>	<p>Counseling with MOMS dietitian to develop a “lifestyle plan” – goals for eating, physical activity, stress management, coping strategies</p> <p>MOMS team (nutritionists, exercise physiologists, psychologist, health educators)</p>	<p>1-year duration</p> <p>Up to 2 years postpartum</p>
<p><b>Effect of physical activity intervention based on a pedometer on physical activity level and anthropometric measures after childbirth: a randomized controlled trial</b></p> <p><b>Maturi et al. (2011)</b></p>	<p>Provided pedometer and calendar to record physical activity level</p> <p>Twice monthly phone calls (telephone counseling) and pamphlets at 2 months</p> <p>Option for increased physical activity compatible with women’s lifestyles (at home)</p>	<p>Weekly cell phone text messages with reminders about physical activity as well as positive support to reach physical activity goals</p>	<p>Individual counseling sessions in intervention group to establish goals for physical activity</p>	<p>12-weeks duration</p> <p>6-weeks to 6-months postpartum</p>

Study Author and Year	Assistance in Daily Management	Social/Emotional Support	Linkage to Clinical and Community Resources	Ongoing Support (follow-up duration)
<p><b>A web-based lifestyle intervention for women with recent gestational diabetes mellitus</b></p> <p><b>Nicklas et al. (2014)</b></p>	<p>Intervention group encouraged to track diet and physical activity in log</p> <p>Intervention group received body weight scales, measuring cups and spoons, complimentary membership to YMCA for 10-months</p>	<p>Intervention group able to participate in telephone or email sessions with their lifestyle coach (weekly)</p>	<p>Study visits conducted occurred in hospital</p> <p>Lifestyle coaches were registered dietitians trained in patient-centered counseling</p> <p>All participants provided with National Diabetes Education Program’s handbook, “It’s Never Too Early to Prevent Diabetes”</p> <p>Women encouraged to contact lactation consultant</p>	<p>12-months duration</p> <p>Greater than 6-weeks postpartum</p> <p>Women in intervention group were provided direct support during the first 6-months but had continued contact in the second 6-months</p>
<p><b>Active Mothers Postpartum: a randomized controlled weight-loss intervention trial</b></p> <p><b>Ostbye et al. (2009)</b></p>	<p>Intervention group provided study notebooks with exercises, recipes, pedometer, workbook</p> <p>Stroller provided at 6-months postpartum for remaining patients</p> <p>Help set goals, structure meals and make grocery lists</p>	<p>Group nutrition and physical activity classes</p> <p>Counseling sessions focused on motivational interviewing and helping overcome barriers to goals</p>	<p>Trained counselor directed counseling sessions to help women reach goals</p>	<p>9-months duration with follow-up up to one year later</p> <p>Greater than 6-weeks postpartum</p>
<p><b>A comparison of Mediterranean-style and MyPyramid diets on weight loss and inflammatory biomarkers in postpartum women</b></p> <p><b>Stendell-Hollis et al. (2013)</b></p>	<p>Counseling methods included common behavioral change techniques (promoting self-efficacy, goal setting, and self-monitoring)</p> <p>Diet education notebook specific to study diet randomization</p> <p>Provided prenatal vitamins</p>	<p>Not addressed</p>	<p>One-on-one dietary counseling with registered dietitian about assigned diet and how to target behaviors</p> <p>Lactation support provided while enrolled in study</p>	<p>4-months duration</p> <p>2-weeks to 6-months postpartum</p>



Study Author and Year	Assistance in Daily Management	Social/Emotional Support	Linkage to Clinical and Community Resources	Ongoing Support (follow-up duration)
<p><b>Home-based active video games to promote weight loss during the postpartum period</b></p> <p><b>Tripette et al. (2014)</b></p>	<p>AVG group provided with Wii system, game, consoles, and instruction manuals</p>	<p>Not addressed</p>	<p>Not addressed</p>	<p>40-days intervention</p> <p>3-months to 1-year postpartum</p>
<p><b>Ethnic-specific weight-loss interventions for low-income postpartum women: findings and lessons</b></p> <p><b>Walker et al. (2012)</b></p>	<p>Focus on increasing self-efficacy through monitoring eating patterns, physical activity, stress, psychosocial well-being, and goal setting</p> <p>Provided pedometers</p> <p>Personalized food plans and meal planning recommendations adapted from MyPyramid</p>	<p>Group meetings (2 hours/week)</p> <p>Weekly telephone counseling</p> <p>Assessed social support from partner and/or family in questionnaires</p>	<p>Intervention group sessions delivered by registered nurses or health educators</p> <p>Dietitians provided personalized, written guidelines</p> <p>Intervention occurred at family medicine or school-based clinics</p>	<p>13-weeks duration</p> <p>6- to 12-months postpartum</p>
<p><b>Diet quality and weight change among overweight and obese postpartum women enrolled in a behavioral intervention program</b></p> <p><b>Wiltheiss et al. (2013)</b></p>	<p>Mailed educational kits to home on promoting diet quality, physical activity</p>	<p>One group session, family-based</p>	<p>Telephone calls from trained health coaches to review education kits and address motivations and barriers to change</p> <p>Group nutrition session by Registered Dietitian</p>	<p>10-months duration</p> <p>Less than 6-months postpartum</p>

(*MOMS*), in West Virginia WIC offices, and *Active Mothers Postpartum*, a large-scale study in North Carolina.<sup>(14,31)</sup> Both of these studies required participants to attend group-based sessions which provided both education and skills to meet weight loss goals.

### ***Peer Support Key Function 1: Assistance in Daily Management***

The first key function of peer support interventions or programs is to assist in the daily management of a health condition or behavior. By having people to turn to for practical support, women would theoretically be more successful in meeting weight loss goals. As noted above, only four of the fifteen studies utilized traditional peer supporters to help women but this review also evaluated the interventions for any other tools or methods to help women in daily management of weight loss through either diet, exercise, or other behavioral changes. Additionally, the studies were evaluated for any components that would help women put goals and plans into action, or improve their self-efficacy.<sup>39</sup> Self-efficacy is the extent to which an individual believes they will be able to take steps to accomplish certain goals.

Each of the fifteen studies had intervention components directed towards helping postpartum women manage their weight. The specific components for each study are seen in the first column of Table 3. Most studies helped in daily weight management by providing log books to encourage self-monitoring of either physical activity or diet. Albright et al., in the Hawaiian *Na Mikimiki* (“*The Active Ones*”) study, provided pedometers along with the log books while also assessing self-efficacy through regular questionnaires related to self-confidence and barriers to activity.<sup>27</sup> Additionally, this study was piloted in the population to determine what provided women the most motivation to change (IMPACT – Increasing Motivation for Physical ACTivity).<sup>27</sup> Bertz et al. also provided supplies to help meet exercise and diet goals in the form of scales for self-weighing, logs, and checklists.<sup>8</sup> In total, thirteen of the fifteen studies provided some method for self-monitoring of diet and/or physical activity with the exceptions being the

study of home-based Wii use by Tripette et al. as well as the study by Wiltheiss et al. which only encouraged behaviors through mailed educational kits.<sup>(33,38)</sup>

The other means by which the interventions promoted assistance in daily management varied greatly. The *Active Mothers Postpartum* study by Ostbye et al. provided comprehensive assistance in daily management.<sup>31</sup> First, a study notebook provided healthy, affordable recipe ideas as well as different exercises, maps of walking paths, and information on goal setting.<sup>31</sup> Additionally, the study provided women with pedometers, strollers, and access to counselors to help make daily goals, structure meals for the week, and write grocery lists.<sup>31</sup> The study by Tripette et al. helped women lose weight postpartum by providing them access to the Wii Nintendo game system as well as the Wii Fit active video game (AVG).<sup>38</sup> Though women were left on their own to use the game system, simply having access to daily exercise in their home actually led to significant weight loss compared to control groups without access to AVGs.<sup>38</sup> The authors speculated this was likely because traditional physical activity outside the home is difficult during the transition to motherhood.<sup>38</sup> Assistance in daily management is very important to meeting weight loss goals, but addressing the individual behaviors is only one component of effective behavioral change.<sup>39</sup>

### ***Peer Support Key Function 2: Social and Emotional Support***

Social and emotional support is an integral part of behavioral change, as it provides people with the motivation and encouragement to sustain changes and meet lifestyle goals.<sup>39</sup> Social and emotional support is especially important during the postpartum period when women are adjusting to life with a new baby as well as potentially the stress of returning to work and caring for herself and her family. In many studies of peer support, this key function is often the most difficult to articulate and measure. The study by Albright et al. attempted to measure this key function with the Sallis scale for family and friend support.<sup>(27,40)</sup> Though

Albright et al. were able to quantify social support, there was nothing in the study to address increasing or leveraging participants' social and emotional support.

The *Mothers in Motion* study by Chang et al. most successfully addressed social and emotional support through home visits, peer support group teleconferences (PSGTs), and activities to identify positive social support persons already within participants social network.<sup>28</sup> The PSGTs were held every other week for 10 weeks and women described feeling better able to cope with their stress, felt more satisfied with the support they received, and were less lonely.<sup>28</sup> The study by Colleran et al., which provided moms with exercise ideas and access to *MyPyramid Menu Planner for Moms*, provided child care during home visits so the women would be able to exercise without worrying about care for her infant during that time.<sup>29</sup> Walker et al. ethnic-specific social and emotional support in the form of weekly group meetings to address a variety of issues such as stress, time management, emotional eating, and body image.<sup>32</sup> By providing a space for women to share their feelings and concerns, these studies helped women see they were not alone in their struggles to manage weight postpartum.

Other examples of social and emotional support included encouraging text messages or emails (Maturi et al. and Nicklas et al. ), counseling sessions (Albright et al., Bertz et al., Craigie et al., and Ostbye et al.), and group meetings or activities (Chang et al., Davenport et al., Krummel et al., Ostbye et al., Walker et al., Wiltheiss et al.). None of the studies accounted for possible nutrition education or support provided outside of the context of the studies themselves. The *Active Mothers Postpartum* study by Ostbye et al. surveyed women before and after the group diet and physical activity sessions to determine acceptability and effectiveness of providing social and emotional support.<sup>31</sup> Though many of the women indicated their interest in group support sessions, it was often difficult for many of them to attend sessions because of busy schedules, lack of transportation, or other family commitments.<sup>31</sup> A common theme

emerged from this study as well as the studies by Chang et al. and Walker et al. which was the necessity of identifying social and emotional support persons already in the women's networks – including partners, family members, or close friends.<sup>(28,31,32)</sup>

### ***Peer Support Key Function 3: Connection to Clinical Care and Resources***

The third function of peer support interventions is to connect patients to appropriate clinical care and community resources. Many of the studies reviewed connected women to clinical resources while enrolled in the study, but then there was often no comment on follow-up care or transitioning women into primary care. Table 3 details the different clinical team components in each of the interventions. The most common team members included registered dietitians and physical therapists while some studies also included WIC coordinators, counselors, and lactation consultants. None of the studies commented on whether or not these team members were from similar backgrounds as the participants, which is an important element of effective peer support.<sup>21</sup>

Krummel et al. designed a unique pilot study in which participants in the *Mothers' Overweight Management Study (MOMS)* were recruited from local West Virginia WIC offices.<sup>14</sup> By aligning the intervention alongside already established WIC educational sessions, women were exposed to multiple clinical care personnel and resources including nutritionists, exercise physiologists, psychologists, and WIC health educators.<sup>14</sup> In the Walker et al. study, the intervention arm attended group sessions delivered by a registered nurse, worked with dietitians to develop personalized nutrition goals, and attended study visits at family medicine or school-based clinics in the communities.<sup>32</sup> The other studies varied in exposure to clinical care with the Wii physical activity study by Tripette et al. and the *Mums Step It Up* Facebook intervention providing no linkages to clinical care.<sup>(36,38)</sup>

#### ***Peer Support Key Function 4: Ongoing Support***

The final function of peer support is providing ongoing support for patients to ensure that any changes made can be sustainable over the long term. This was the weakest area for most of the interventions reviewed primarily because they are research studies that require a specified study interval for measuring outcomes. The studies varied in length from the 40-day Wii physical activity challenge by Tripette et al. to the 18-month *Active Mothers Postpartum* intervention by Ostbye et al.<sup>(31,38)</sup> There were no studies that connected women to primary care after the study ended. Most studies noted problems with attrition as well with some participants being completely lost to follow-up. For example, the study by Krummel et al. in West Virginia WIC offices noted 57% of women never attended a peer support group session.<sup>14</sup> The study with the most promise of long-term support was the *Mums Step It Up* Facebook intervention because the teams formed for the fifty-day pedometer challenge were recruited from within the woman's own social network.<sup>36</sup>

#### **Discussion**

Though this review did not focus on the effectiveness of the weight management interventions for postpartum women, the systematic review by Berger et al. included many of these same studies.<sup>7</sup> This 2014 systematic review aimed to identify the effect of nutrition and exercise interventions on weight and metabolic outcomes after delivery.<sup>7</sup> Unfortunately, the authors found an overall low strength of evidence for postpartum weight loss interventions primarily due to inconsistent findings.<sup>7</sup> Additionally, the 2013 Cochrane review by Adegboye et al. also attempted to determine whether exercise, diet, or both was most effective for postpartum weight loss.<sup>11</sup> This review drew similar conclusions and also noted that over half of weight loss achieved in many of the interventions was regained within one year of termination

of the study.<sup>11</sup> Though many hypotheses exist for why these interventions were not successful, one explanation is the lack of ongoing peer support.<sup>41</sup>

### **Opportunities for Leveraging Peer Support**

The *Active Mothers Postpartum* study by Ostbye et al. was the largest of the fifteen studies reviewed, with over 450 participants, yet was unable to show any significant weight loss between the intervention and control groups.<sup>31</sup> When analyzing their results, the authors published an additional report on unmet social support for healthy behaviors among overweight and obese postpartum women.<sup>3</sup> Several predictors of unmet social support included household income, concurrent postpartum depression, education, and living arrangements.<sup>1</sup> Unmet social support is directly related to a mother's perception that the support was appropriate, necessary, and helpful.<sup>1</sup> By matching provided social support with that which is actually desired, improvements can be made in sustaining behavioral changes postpartum.<sup>3</sup>

Many opportunities exist to leverage peer support and *Peers for Progress* has taken steps to provide guidelines and opportunities for the arenas of research, practice, and policy.<sup>21</sup> The key tenet is the importance of context in implementing peer support interventions, as there is no one best or right approach to helping postpartum women meet their weight loss goals.<sup>39</sup> The function of peer support is to link women with the shared experience of pregnancy to each other so that they might be able to provide practical, emotional, and ongoing support for sustainable changes.<sup>39</sup> This function must be preserved across cultures and practice settings even if the specific content of the weight loss interventions vary.<sup>39</sup> The standardization of function instead of content led to the development of the four key functions of peer support. The four key functions were first developed to help manage chronic diseases, specifically diabetes mellitus.<sup>39</sup>

The first key function, assistance in daily management, includes such strategies as goal setting, skilling building, problem solving, and practicing healthy behaviors.<sup>39</sup> This function finds its theoretical basis in self-efficacy. By learning and practicing a new behavior it can improve the ability to maintain the behavior long term.<sup>42</sup>This function was also utilized in a study by Berry, Stuebe et al. by using NEST (Nutrition and Exercise Education, Coping Skills Training) to help prevent the progression of gestational diabetes to Type II diabetes.<sup>43</sup> These new behaviors are necessary but not sufficient to ensure healthy weight postpartum as women must also be linked to clinical care resources and receive ongoing support.<sup>1</sup>

Fisher et al. were successful in helping patients better manage diabetes through peer support interventions applied in different international contexts including Cameroon, South Africa, Thailand, and Uganda.<sup>44</sup> They showed that by emphasizing the four key functions of peer support, diabetes management programs could be successfully introduced and tailored to specific community needs and preferences.<sup>44</sup> For example, in Cameroon trained peer supporters using existing social networks to spread information about diabetes self-care and provide emotional support to individuals through clans, tribes, religious groups, or sports.<sup>44</sup> In South Africa, individuals preferred to attend group meetings on nutrition and exercise while receiving daily, encouraging text messages.<sup>44</sup> Though the programs in the different countries chose different methods to disseminate information on daily management and provide support, both were successful in achieving improved diabetic health outcomes.<sup>44</sup> These same principles and functions can be applied to other health conditions with behavioral components, including postpartum weight loss.

### **Implications for MCH Research, Practice, and Policy**

The field of maternal and child health (MCH) is in a unique position to direct efforts that will impact research, policy, and practice. By taking a life course perspective and critically



analyzing health problems and determinants, MCH professionals can work to promote, maintain, and improve the health of first individuals, then families and entire communities.<sup>45</sup> In regards to research, peer support should be considered for integration into the interventions instead of an afterthought. This can only occur through more practice-based research instead of our current system of research-based practice. This was accomplished in the *Mothers' Overweight Management Study (MOMS)* which occurred in West Virginia WIC offices because the research study occurred in a more realistic, practice-based setting as opposed to a highly-controlled research environment such as a study center.<sup>14</sup> This will also make it more feasible to scale-up successful interventions in different contexts.<sup>39</sup>

Additionally, peer support is integral to successful interventions, but is often difficult to measure and standardize. For that reason, it is important to rely on clinically significant outcomes as much as statistically significant ones. Follow-up interviews from the Walker et al. study suggested that women found the intervention to be a “good foundation” for weight loss but wanted more continued support to meet their weight loss goals.<sup>32</sup> This study was only 13-weeks in duration but weight loss was correlated with self-efficacy suggesting that the more supported a woman perceived herself to be, the more likely she was to meet her weight loss goals.<sup>32</sup>

Closely linked to research is the practice of MCH, which occurs in a variety of settings including hospitals, community and private clinics, health departments, and schools. This review highlights the need for better linkages to clinical care, a larger peer support workforce, and better training in peer support for medical providers. None of the reviewed studies had a component of addressing ongoing support for healthy behaviors to promote postpartum weight loss. Without access to clinical care and continued support after these short-term interventions,

women often return to old behaviors and may miss opportunities to prevent the onset of chronic disease.

The final implication of this review is the need for MCH policies that promote healthy environments for healthy choices as well as access to care. Here in the United States, two policies that could greatly benefit the MCH population would be increased support for breastfeeding and parental leave after childbirth. Breastfeeding is known to promote weight loss postpartum and has been shown in numerous studies to be superior to formula for both maternal and infant outcomes.<sup>46</sup> According to the Organization of Economic Cooperation and Development (OECD), the United States is one of only two industrialized countries that do not guarantee paid maternity leave for working mothers.<sup>47</sup> Providing peer support for breastfeeding as well as time for families and partners to support women during the postpartum period, there will likely be better health outcomes and more time to focus on healthy habits after pregnancy. It is unclear how to ensure the role of peer supporters are sustainable, whether through payment or certification, without jeopardizing the unique position they have to provide support without clinical training. However, by increasing the practice of peer support while simultaneously dedicating policies and building the research base, there is the potential to better serve the needs of MCH populations and entire communities.

### **Limitations of the Review**

The process of applying the fundamental features of a systematic review to this review of the literature led to a greater appreciation of the inherent difficulty of such a process. Additionally, by conceptualizing, critically analyzing, and developing critiques of the literature, a better understanding of postpartum weight loss interventions and peer support was developed. The process of applying the four key functions of peer support to the postpartum weight loss interventions helped identify both successes and future recommendations for these programs

and studies. Regardless, there are still several limitations that are important to consider. First, this review did not address the statistical effectiveness of these interventions nor whether or not the interventions achieved their stated goals. Rather, the focus of this review was only on the components of peer support within each intervention. By deferring to prior systematic reviews which evaluated the effectiveness of these interventions, the quality of these studies was not evaluated nor were any biases or strengths.<sup>(7,11,12)</sup> Additionally, the articles reviewed did not address whether or not the mothers were simultaneously enrolled in other support groups or had been during pregnancy. The variety of support and the extent of a mother's social network can definitely affect how satisfied and supported she feels.<sup>18</sup> This review was intended to be more formative in nature with the hopes of proposing a relatively novel way of evaluating the content of postpartum weight loss interventions. Peer support is inherently difficult to study because of the lack of a consistently applied definition, although the four key functions provide a helpful framework for future research.<sup>44</sup>

## **Conclusion**

With more than two-thirds of women of reproductive age being classified as overweight or obese, the need for effective postpartum weight loss interventions has never been so great.<sup>3</sup> The postpartum time period is one of great transition and also one that sets the stage for future health outcomes, because weight retained after six months postpartum is predictive of long-term obesity, cardiovascular disease, cancer, and childhood obesity in offspring.<sup>20</sup> The successful components of weight loss in the postpartum period have not changed – healthy diet, exercise, and breastfeeding. However, it is often difficult to implement these behavioral changes into a woman's daily routine; peer support is one avenue that can help women meet their weight loss goals. Peer supporters have the potential to enable women to lose postpartum weight through

assistance in daily management, connection to clinical care, and emotional and long-term support.

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