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Physical Activity Before Pregnancy and Following Childbirth in a Multiethnic Sample of Healthy Women in Hawaii

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ABSTRACT. *Purpose:* Investigation of physical activity and related psychosocial factors reported by new mothers.

Methods: Women (N = 79) were surveyed to determine their physical activity patterns before and after childbirth. Barriers and facilitators of physical activity were also identified.

Findings: Most women (63%) were ethnic minorities, mean age was 31.8 ± 5.5 years, and their infants' mean age was 8.2 ± 3.8 months. Combining women's reported physical activities before their pregnancy and after childbirth resulted in four significantly different groups: (1) 21.5% were inactive before and after childbirth; (2) 22.7% were active before

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and after; (3) 12.6% were inactive before, but active after childbirth; and (4) 43.0% were active before but inactive or irregularly active postpartum ($p < .0003$). Barriers to physical activity included personal issues, including lack of support from a spouse, and parenting duties. Facilitators to being active included social support for exercise and availability of child-care.

Conclusions: New mothers are at high risk for inactivity and reductions in previously established levels of physical activity. They also have specific barriers and facilitators to being physically active. Future research should develop effective methods for increasing physical activity in mothers of infants. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2005 by The HaworthPress, Inc. All rights reserved.]

KEYWORDS. Physical activity, women with infants, exercise, postpartum, multiethnic

INTRODUCTION

In the face of the growing epidemic of obesity in the U.S., curtailing weight gain and encouraging physical activity (PA) in adults is important for preventing and treating many chronic diseases such as cardiovascular diseases (CVD), Type 2-Diabetes, certain cancers, hypertension, osteoporosis, and depression (Cottreau, Ness, & Kriska, 2000; Hu et al., 1999; Mokdad et al., 2001; Must et al., 1999; Paffenbarger, Jung, Leung, & Hyde, 1991; Powell, Thomposon, Caspersen, & Kendrick, 1987; Stampfer, Hu, Manson, Rimm, & Willett, 2000). Young adult women in their childbearing years, especially ethnic minority women, are at high risk for physical inactivity, or significant reductions in previously achieved levels of PA following childbirth (Anderssen et al., 1996; W. J. Brown & Trost, 2003; Caspersen, Pereira, & Curran, 2000; Leslie, Fotheringham, Owen, & Bauman, 2001; Telama & Yang, 2000; van Mechelen, Twisk, Post, Snel, & Kemper, 2000).

Cross-sectional studies have demonstrated a striking deterioration of PA patterns from adolescence into young adulthood (Caspersen et al., 2000). One such study found that significantly fewer women in their late 20's participated in vigorous and moderate intensity PA, compared with women just a few years younger (Leslie et al., 2001). Prospective studies that have followed women from late adolescence into young

adulthood, found about 30% of women in this age group had reductions in their PA, while 20% reported increases in PA during this period (W. J. Brown & Trost, 2003; Telama & Yang, 2000). The demographic factors that have been found to be associated with inactivity and/or reductions in PA over time include having a child and being employed outside the home (W. J. Brown & Trost, 2003; Eyler, 2003).

The American College of Obstetricians and Gynecologists' guidelines for exercise during the postpartum period indicate that 4-6 weeks postpartum, in the absence of medical complications, most women can gradually resume or start PA (ACOG Committee on Obstetric Practice, 2002). Nonetheless, investigations of PA during the immediate postpartum period (i.e., 6-weeks postpartum) indicate that over half of women report less PA compared with their pre-pregnancy levels (Sampselle, Seng, Yeo, Killion, & Oakley, 1999). Even after the immediate postpartum period has passed, few women resume or start a regular PA program. A prospective study, that followed primarily White women from early pregnancy to one year postpartum, found 57% reported rarely or never exercising one year postpartum (Olson, Strawderman, Hinton, & Pearson, 2003). Also, this lower level of PA was significantly related to postpartum weight retention and major weight gain (Olson et al., 2003). In a study that followed a multiethnic sample of low-income women (N = 382) from delivery until one year postpartum, African-American women significantly increased their PA from 6 months to 12 months postpartum (Walker et al., 2004). However, Hispanic and African-American women gained weight or had a plateau in their weight (i.e., retained pregnancy weight gains), between 6 and 12 months postpartum. Weight retention at the end of the postpartum year predicts levels of obesity 15 years later (Linne, Dye, Barkeling, & Rossner, 2004). A recent review of evidence-based strategies to promote PA in children, adolescents, and young adults concluded that additional studies were urgently needed to examine PA interventions aimed at young adults (Timperio, Salmon, & Ball, 2004). The factors that promote and/or inhibit regular leisure-time PA in this subsample of young, adult women, and differences across ethnic groups have not been fully investigated.

Hawaii has a unique, ethnically diverse population consisting of 42% Asians (including Chinese, Japanese, and Filipinos), 23% Hawaiians or Pacific Islanders, and 24% Whites (United States Census Bureau, 2002). Many of these ethnic groups are underrepresented in PA research, particularly Asians and Native Hawaiian/Pacific Islanders. Few adults living in Hawaii meet the nationally recommended levels for moderate or higher intensity PA on most days of the week (Pate et al.,

1995; U.S. Department of Health and Human Services, 1996). For example, 56% of women living in Hawaii are not meeting recommended guidelines for moderate PA, and 82% are not meeting recommended levels for vigorous PA (Centers for Disease Control and Prevention, 2003). Differences are also observed by ethnic group in Hawaii, with 65% of Whites, 73% of Hawaiian/Part-Hawaiian, 84% of Japanese, and 84% of Filipinos reporting no vigorous PA (Salvail, Nguyen, & Huang, 2004). Thus, Hawaii provides an optimal setting to investigating PA in a multiethnic sample of healthy women.

This study compared pre-pregnancy regular, leisure-time PA levels, reported retrospectively, with current levels of PA in women who had a child in the previous 2-18 month period. We also tested for differences among ethnic groups in PA reported before and after childbirth. Lifestyle and family issues the new mothers faced, with respect to both the barriers and the facilitators they experienced when trying to be physically active, were also examined.

METHODS

Recruitment of Participants

This project recruited new mothers from a local parenting organization called Baby Hui. Baby Hui ("hui" is the Hawaiian word for group) is a non-profit, community-based organization in Hawaii. The organization assigns members to small groups (N = 6-15) consisting of mothers with infants of similar ages, who live in the same city or in neighborhood. Baby Hui groups meet monthly to discuss infant development and to provide social support for infant care and parenting issues. An announcement describing the project and recruiting women with infants between the ages of 2 and 18 months was printed in the Baby Hui newsletter, which was sent to all the members via e-mail. Of the 500 families (many of who had children older than 18 months) who received the Baby Hui newsletter, 84 women agreed to participate in the study (i.e., approximate agreement rate of 17%), and 79 participated (i.e., 94% participation rate among those who agreed).

Data Collection

Women were recruited to attend a session in which participants completed a survey and PA issues were discussed. The sessions took approximately 60 minutes and were held during the day on weekdays

and on weekends at the University of Hawaii campus or at convenient community locations (i.e., public parks or private homes). A total of 10 groups, each with 10-12 women, was conducted in the summers of 2003 and 2004. The groups typically occurred during a Baby Hui group's regular monthly meeting at a member's private home. All verbal comments and survey responses were collected anonymously and protocols were approved by the University of Hawaii's Human Subjects Committee. Prior to starting the session, its purpose was explained, and participants provided consent. All participants received refreshments and a \$30 gift certificate to a local store or shopping center at the end of the session.

At the beginning of the session participants completed a 3-page survey. The survey obtained socio-demographic information (e.g. age, ethnicity, marital status, years of formal education), self-reported height and weight, and regular (i.e., defined as "almost daily") leisure-time PA performed prior to pregnancy and following childbirth (i.e., if active, respondents also reported the usual type(s) of PA they did, the frequency per week, and the average duration of any bout of PA). Moderate-intensity physical activity was defined as "movement of the arms and legs such that your heart beats faster than normal, for example, brisk walking, jogging, biking, swimming, rowing, dancing, bicycling, climbing stairs." This definition of moderate intensity, leisure-time PA has been used in standardized measures of PA in which respondents report frequency and duration of moderate intensity physical activities (Godin & Shephard, 1985; Marcus, Rakowski, & Rossi, 1992; Wareham et al., 2003).

After completing the survey, the group discussed PA issues in mothers of infants. The discussions were guided by a moderator (CLA) who began each session with a definition of what the term "regular physical activity" meant with respect to aerobic, leisure-time physical activities performed at a moderate or higher level of intensity (e.g., not an aerobic PA). The moderator used a set of open-ended questions to guide discussions in all the groups. The questions addressed factors such as differences in women's pre-pregnancy PA and current PA levels, their preferred physical activities following childbirth, barriers to being active, and personal or social factors that help women be physically active following the birth of a child. Participants also gave suggestions about how to design a PA intervention study that would meet their needs and accommodate their duties as new parents.

The sessions were not tape recorded, but participants' verbal comments were listed on a flip chart. The flip charts were transcribed, and five themes or categorizations were created based on similar social

and ecological categorizations identified in previous investigations of barriers/facilitators to PA in women and mothers (S. A. Brown, 2005; King et al., 2000; Symons Downs & Hausenblas, 2004). Specific statements were coded into one of the five categories by two independent reviewers who did not attend the sessions. Participants' postpartum barriers to regular PA were categorized as (1) Personal (e.g., no time, lack of sleep, work demands); (2) Financial (e.g., money for gym/exercise classes now spent on infant); (3) Parenting duties (e.g., infant's feeding/sleep schedule, household duties, responsibilities for other children); (4) Social support (e.g., no childcare available, spouse cannot baby-sit, no encouragement to exercise); and (5) Environmental (e.g., weather too hot, sun bad for baby, traffic, no sidewalks). Factors that could facilitate regular PA were coded using the same categories such as (1) Personal (e.g., having more energy when exercise, sleeping better when exercise); (2) Financial (e.g., walking in the park is free); (3) Parenting duties (e.g., wanting to be a better role model for her children); (4) Social support (e.g., going on walks with family/friends, having a supportive spouse who provided emotional support for exercise); and (5) Environmental (e.g., wanting to take the baby outside to get out of the house).

Statistical Analyses

Demographic characteristics of the entire sample were analyzed, and differences in the demographic characteristics of women in the four PA groups, as well as differences in the demographics of the ethnic groups, were tested. The main outcome for this study was participants' report of regular, moderate intensity PA before and after her child was born. Women reported whether they were regularly active, and if active, the frequency and duration of their PA. Reductions in PA reported by women who were active before and after childbirth were calculated, via a change score, in the number of days and minutes per week of PA. Thus, women who reported being active after childbirth, but who reported reductions in their PA such that they were exercising below the national guidelines of 30 minutes a day for 5 days or more a week (Pate et al., 1995; U.S. Department of Health and Human Services, 1996), were classified as inactive/irregularly active following childbirth. Reported PA before pregnancy and after childbirth were combined to create four PA groups: (1) Active/inactive group included women who had been active before the birth, but were inactive and/or irregularly active postpartum; (2) Active/active group was women who were active both

before and after childbirth, at comparable levels or at increased PA levels after birth; (3) Inactive/active group was inactive before but active after giving birth; and (4) Inactive/inactive group were inactive before and after childbirth. McNemar's symmetry Chi-square test, a non-parametric test that uses paired observations of nominal data, was used to test for whether a significantly different number of women fell into these four PA groups. Standard Chi-square tests were used to test for significant differences between two independent groups (i.e., number of women with an infant < 6 months old in each of the four PA groups compared with number of women with an infant > 6 months old in each of the four PA groups). Changes in the types of physical activity performed pre-pregnancy to postpartum were tabulated. The number of times each category of barriers and facilitators to PA were mentioned was summed up to yield a total frequency for how often each category or each theme was mentioned.

RESULTS

Sample

Table 1 lists the demographic characteristics of the sample. A total of 79 women participated in the sessions with four main ethnic groups: Whites ($n = 29$), Asians (e.g., Japanese, Chinese, and Filipino, $n = 30$), Hawaiian or Pacific Islanders (e.g., Hawaiian, Tahitian, $n = 11$), and others (e.g., African-American, Hispanic, or American Indian, $n = 9$). A majority of participants were from an ethnic minority (63%), married, well-educated (59% were college graduates), in their mid-thirties (age range 18-45 years), first-time mothers (55%), and with infants less than 18 months of age (range = 2-18 months). Many (44%) of the women had an infant less than or equal to 6 months of age. When the demographic characteristics of the four ethnic groups were compared, the only significantly different characteristic was education ($F = 3.51$, $p < 0.03$). Hawaiian/Pacific Islanders had fewer mean years of education ($M = 13.3 \pm 1.9$) compared with Whites ($M = 16.4 \pm 2.2$), Asians ($M = 15.9 \pm 1.9$), and others ($M = 15 \pm 1.4$).

Physical Activity Results

A significantly higher proportion of women (43.0 %, $p < 0.0003$) were active before the pregnancy but were inactive/irregularly active following childbirth; 21.5% were inactive before and after childbirth;

TABLE 1. Demographic Characteristics of Sample

Sample size	79
Mean age \pm S.D. (years)	31.8 \pm 5.5
Percent married	94
Mean years of formal education \pm S.D.	15.6 \pm 2.2
Mean number of children \pm S.D.	1.45 \pm .73
Mean age of infant \pm S.D. (months)	8.2 \pm 3.8
Percent with other children (in addition to infant)	45
Ethnicity/Race (percent)	
Asian (n = 30)	37.9
White (n = 29)	36.7
Hawaiian/Pacific Islander (n = 11)	13.9
Other (n = 9)	11.3
Mean BMI \pm S.D. (kg/m ²)	23.3 \pm 3.7

22.7% were active both before and after childbirth, and 12.6% were inactive before but increased their PA after childbirth. No significant differences were observed among the PA groups in socio-demographic characteristics, although women who were sedentary before the pregnancy and increased their PA following childbirth were slightly younger, and their infants were also slightly younger than women in the other three PA groups (Table 2). For those who reduced their PA following childbirth, the mean number of days reduced per week was 1 ± 3.2 days (range of 1-7 days reduced, with 52% having reductions of three days or more a week). Of those who were currently active, most (48%) exercised less than four days a week. A posthoc analysis was performed to detect any differences between women with infants less than 6 months of age to those with infants older than 6.5 months ($N = 35$ and 44 , respectively). No significant differences were observed in the proportion of women in each of the four PA groups, when these two subgroups of women were compared (Chi-square = 6.7, $p > 0.10$). However, more women with a child between 6.5 and 18 months of age reported being inactive both before and after childbirth (30%) compared with women with a younger infant (11%). The proportion of women in each of the

TABLE 2. Demographic Characteristics of the Four Physical Activity Groups

Physical Activity Group	N	Mean Age (Years) of Mother (SD)	Mean Age (Months) of Infant (SD)	Mean Number Children (SD)	Mean BMI (SD)	Mean Years of Education (SD)
Active pre-pregnancy and inactive/irregularly active postpartum	34	32.7 \pm 5.2	8.2 \pm 3.6	1.4 \pm .69	22.7 \pm 3.1	15.5 \pm 2.2
Active pre-pregnancy and active postpartum	18	31.7 \pm 5.2	8.2 \pm 3.6	1.5 \pm .51	23.1 \pm 3.4	16 \pm 2.2
Inactive pre-pregnancy and active postpartum	10	28.5 \pm 5.0	6.3 \pm 2.4	1.4 \pm .52	25.3 \pm 4.4	15 \pm 2
Inactive pre-pregnancy and inactive postpartum	17	32.2 \pm 7.2	10.1 \pm 4.1	1.6 \pm 1.0	22.7 \pm 3.9	15.6 \pm 2.9

four groups varied slightly by ethnicity; however, these differences were not significant largely due to small ethnic-specific sample sizes (Chi-square = 11.2, $p > 0.10$). When the two categories that represent inactivity following childbirth were combined, across all ethnicities, 68% of women were inactive or irregularly active following childbirth.

Women who were physically active reported doing a variety of different types of physical activities both before the pregnancy and after childbirth. Prior to the pregnancy, active women reported doing 13 different types of physical activities, with walking, running, and swimming being the most prevalent activities (31%, 14%, 12%, respectively, reporting these activities). Combining all the gym-related aerobic activities (e.g., Pilates, kick boxing, aerobics class), over 20% reported physical activities that typically occur in a gym or class. Following childbirth, fewer women were active; of those who were active, more reported walking (44%). A similar proportion of active women, both pre-pregnancy and following childbirth, were running (14%); however, for every other reported PA the proportion of women engaging in that activity dropped substantially following childbirth. For example, following childbirth only 8% of active women were going to a gym or other exercise classes; this represents a 60% relative reduction in the prevalence of gym or class-based exercise. Due to small sample size for ethnic groups strati-

fied by the type of PA, no ethnic differences were observed in the types of physical activities reported before and after childbirth.

Barriers and Facilitators of Physical Activity

A total of 170 topics were categorized into one of the five types of barriers or facilitators for PA. The inter-rater agreement (Kappa statistic) for coding the topics ranged from Kappas of 83% to 100%, with a mean Kappa of 91% across all rated topics. Disagreements between the raters were resolved by a third rater. The most common barriers mentioned in the discussions were personal issues (48%) and parenting duties (18%). Concerns about sun exposure/hot weather in Hawaii (11%), and a lack of support from their spouse were also commonly mentioned barriers (13%). For those with other children, having to buy a stroller that could accommodate both an infant and an older child (toddler) was a significant financial barrier.

The most frequently mentioned factor that would enable the women to be more active was social support for exercise (e.g., walking with other mothers) and the availability of childcare, especially from the spouse (36%). Identifying personal benefits (more energy, sleep better—28%), wanting to be a good role model for their baby or to take the baby “out”(16%), and having nice weather (12%) were also discussed as exercise promoting. Women discussed what types of intervention strategies, provided within a research program, they thought new mothers would find most appealing and effective for encouraging regular PA. Due to barriers regarding adequate childcare, many women wanted to do PA that included their infant, passively or actively. For example, walking with the infant sitting passively in a stroller, actively doing exercises with their infant, such as dancing or doing yoga while holding or lifting their infant, or doing sit-ups while their infant was sitting on their stomach were mentioned specifically. Many women wanted to exercise with a “buddy” or in a group, especially a group of other mothers (e.g., join a group that goes on stroller walks). Some wanted to attend sessions (similar to their monthly Baby Hui groups) in which they could talk with other new mothers about ways to become more active. The women wanted information on local resources/exercise facilities that could accommodate infants (e.g., gyms that provide childcare for infants less than 6 months of age). A few wanted information about economical home exercise equipment (e.g., resistance bands, exercise balls). As for receiving advice or counseling about how to start an exercise program, most women preferred e-mail or brief and scheduled telephone contacts

(i.e., the woman could set the time of the call so as not to wake the baby). Interestingly, some of the women did not want to do exercise while their infant was sleeping (e.g., exercising in their home via equipment or videos), largely because they wanted to do household tasks or spend time with other children while the infant was sleeping.

DISCUSSION

The goal of this study was to assess changes in PA before and after childbirth, and to provide descriptive data on postpartum women's barriers and perceived enablers to regular, moderate intensity PA. In addition, a major goal was to solicit ideas for PA interventions the women thought would be effective and feasible. The study was conducted with a multiethnic sample of women who had given birth in the previous 2-18 months. Both postpartum women and ethnic minority populations are underrepresented in PA research, in part, because working with these populations requires innovative, community-based strategies to reach and recruit participants. Recruitment occurred within a community-based organization that arranges mother-infant support groups. Reaching understudied populations in community settings that are supportive of research and in which the participants feel comfortable can facilitate the recruitment of populations that are often portrayed as being extremely to difficult to reach (i.e., mothers of infants).

A large proportion of our sample of women who were active before their pregnancy reported no PA or had substantially reduced their previously obtained levels of PA following childbirth. This level is comparable with the "rarely or never" exercise levels (47%) reported in a recent study of mostly White women living in New York (Olson et al., 2003). Both this study and our study collected PA information at a similar time point, about one year postpartum. Although this previous study followed women prospectively for a year, their rate represented exercise levels at one year postpartum and was not linked to the women's pre-pregnancy PA levels. Thus, in our study women who reported being inactive before *and* after their pregnancy would have been included in the Olson and colleagues study's postpartum rate. When the two PA categories that included inactivity following childbirth were combined in our study, almost 70% of women were inactive or had decreases in PA such that they were irregularly active and did not meet nationally recommended guidelines for PA. Consequently, we had a higher rate of inactive/irregular PA in postpartum women compared with Olson et al.,

(2003). Also, our rate is higher than the percentage of women (56%) not meeting recommended guidelines for moderate PA as measured by the Behavioral Risk Factor Surveillance System, Hawaii data (Centers for Disease Control and Prevention, 2003).

Our sample was performing a variety of physical activities before their pregnancy including walking, running, and swimming, along with several other activities that typically occur in gyms or classes. Of those who reported being active after childbirth, the majority preferred walking and running. However, they had fewer sessions per week of PA, compared with their prepregnancy levels. Thus, the majority of the active women were exercising at a level lower than the recommended guidelines for moderate activity on most days of the week (Pate et al., 1995). In addition, they not only reduced the frequency of their sessions per week, may also have lowered the intensity of their PA program due to changes in the types of PA performed (e.g., many changed from jogging to walking). Such reductions in PA can delay or prevent the loss of weight gained during pregnancy or increase postpartum weight gain (Linne et al., 2004; Olson et al., 2003). With subsequent pregnancies, women who stop or reduce their PA can find it even harder to regain their pre-pregnancy levels of PA, and thus, they may remain inactive permanently. Such sedentary behavior can lead to increases in weight that could negatively affect women's risk of certain cancers, Type 2 diabetes mellitus, and other chronic diseases (Manson et al., 1991; Richardson, Kriska, Lantz, & Hayward, 2004; Rockhill et al., 1999).

The participating women mentioned barriers to being active, many of which were similar to those reported in general populations (Seefeldt, Malina, & Clark, 2002). Personal and family/parenting duties were the most frequently mentioned barriers. Some of the latter barriers were unique to women with an infant (childcare for young infants is often unavailable at gyms or the cost is prohibitive), but many of their personal barriers were consistent with barriers mentioned by other women, including ethnic minority women (e.g., no time, no motivation, no energy, no childcare, priority on family needs at expense of own needs) (Fahrenwald & Walker, 2003; King et al., 2000; Richter, Wilcox, Greaney, Henderson, & Ainsworth, 2002; Symons Downs & Hausenblas, 2004; Wilcox, Richter, Henderson, Greaney, & Ainsworth, 2002). Providing women with advice on how to overcome barriers and incorporating the strategies women thought would help them be more active, is the next logical step in the design of a PA intervention that is tailored to new mothers' needs, yet needs to be sensitive to cultural beliefs about parenting and the role of a new mother. Such an intervention would use

theoretically driven constructs to increase women's self-efficacy, inform women about short-term benefits of PA, facilitate social support for exercise, and reduce environmental barriers to outdoor activities (e.g., provide information on stroller sunshades). Future research should strive to develop such an intervention that would encourage PA in this at-risk population.

A limitation of this study is its reliance on retrospective reports of PA done prior to the woman's recent pregnancy. For some women this time frame would have occurred 24 or more months in the past. Thus, their recall of pre-pregnancy PA levels may have been over or underestimated. This would modify any differences in PA levels reported from the prepregnancy to the postpartum period. However, even when using only current reported PA levels a majority of the women were not meeting national guidelines for PA. A more accurate representation of PA levels prior to pregnancy and following childbirth should be obtained prospectively, along with a more in-depth investigation of the barriers and enablers of PA changes across these important stages of life for women. Also, our assessment of PA focused on moderate intensity, leisure-time physical activities, and did not specify the inclusion of household activities done at this intensity. Thus, our data for PA may be an underestimate of a new mother's moderate intensity physical activities.

Although this study had a large proportion of ethnic minority women, recruitment was limited to one community organization. In addition, within this organization only a small proportion of eligible women, perhaps as low as 20%, attended the sessions. Thus, some bias due to selection in who participated could have influenced the results and reduced their generalizability. However, of those who initially volunteered to attend a session, 94% actually attended a session. Such a high "show-up" rate for a focus group by members of a community organization was impressive. Nevertheless, our study included a sample of convenience consisting of fairly well educated, healthy, young women. Although we don't anticipate that Baby Hui members had substantially different rates of inactivity compared with women from the same ethnic and social strata, who were not members of a mother-baby support group, differences may exist. Our results are, therefore, only generalizable to similar populations of middle to high social economic status (SES), new mothers. As such, previous research has shown that populations with high SES were more physically active than populations with low SES (Evenson et al., 2002; Eyler, 2003). Thus, the prevalence of inactivity and reductions in physical activity following childbirth may be even higher in such populations than the levels reported in this study. Although initial results with women

participating in the Women, Infants, and Children (WIC) Program has shown that low SES women could increase physical activity following childbirth (Fahrenwald, Atwood, Walker, Johnson, & Berg, 2004), more research with this population is clearly needed.

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