Research Quarterly for Exercise and Sport

Vol. 72, No. 1, pp. 39–46

Training Patterns of Athletes During Pregnancy and Postpartum

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The purpose of the present investigation was to examine exercise patterns and psychological variables mediating a return to training and competition after pregnancy. Competitive female athletes who had given birth within the last 10 years completed surveys concerning (a) training patterns before, during, and after childbirth, (b) childbirth complications and training advice, (c) perceptions of success in their postpartum comebacks to training, and (d) self-efficacy, social support, and perceived barriers to training during pregnancy and after childbirth. Results indicated that women decreased both cardiovascular and resistance training during pregnancy. Additionally, training efforts during pregnancy were independent of those during the pre- and postpartum periods. This finding suggests that athletes may be able to alter their training patterns during pregnancy without a significant impact on their postpartum training program.

Key words: exercise, childbirth, self-efficacy, female athletes

Research concerning the safety and efficacy of low-level exercise during pregnancy and postpartum has been conducted (American College of Obstetricians and Gynecologists, 1985, 1994); however, little is known about the physiological and cognitive components involved in a more strenuous exercise program during gestation and the period following. Information concerning the psychological and athletic consequences of various levels of physical exertion during pregnancy and postpartum may help clarify how the competitive athlete, who wishes to regain her prepartum training form soon after childbirth, should train during pregnancy.

Physiological Aspects of Exercise During Pregnancy and Postpartum

Until recently, little information has been available concerning the benefits or potential hazards of a woman's exercise behavior throughout gestation (Pivarnik, 1994). In 1985, the American College of Obstetricians and Gynecologists (ACOG) developed guidelines for exercise during pregnancy and the postpartum period. These recommendations were based on conservative, yet common sense interpretations of scientific data available at that time. The ACOG guidelines recommended that women might engage in a *moderate* level of physical activity throughout pregnancy and the postpartum period.

Although the 1985 ACOG guidelines acknowledged that a more physically fit woman (e.g., a competitive athlete) might be able to continue a more intense exercise program during pregnancy than her more sedentary counterparts, the guidelines provided no specific suggestions for these athletes. The 1994 revised ACOG guidelines also proposed no specific recommendations for highly trained athletes. Because the ACOG guidelines do not offer specific suggestions for high-level athletes, there is a responsibility for both the mother-to-be and her physician to design an individualized activity program to meet specific goals. The best way to accomplish these goals is not known at this time.

While some research has been conducted regarding the role of exercise training during pregnancy (Kulpa, White, & Visscher, 1987; Pivarnik, 1994, 1998; Work, 1989), much less is known about the postpartum period. Although the word "postpartum" is included in the 1994 ACOG guidelines, the only recommendation is that exer-

Submitted: October 19, 1999
Accepted: August 14, 2000

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cise routines should be initiated gradually after delivery. Clearly, a woman's prepartum motivational and physical fitness state influences what is meant by "gradually" regarding her postpartum exercise routines. The only research to date on athletes returning to competition soon after childbirth is a case study performed on an Olympic marathon hopeful in 1993 (Potteiger, Welch, & Byrne, 1993). While the individual did not qualify for the Olympic marathon, she was able to resume an intense training regimen soon (i.e., within 4 weeks) after delivery with no apparent medical complications.

Research concerning exercise patterns of physically fit women during pregnancy and postpartum is limited. Thus, athletic women who are interested in continuing cardiovascular and strength training throughout gestation are at a disadvantage. While following current ACOG guidelines for exercise during pregnancy may be beneficial for the sedentary individual or recreational athlete, these guidelines may not allow competitive athletes to maintain an optimal level of physical fitness during pregnancy. By examining the training patterns of female athletes during pregnancy and postpartum and assessing pregnancy and childbirth complications, researchers and practitioners will gain a better understanding of how female athletes are training and what variables might influence a successful return to prepartum levels of physical fitness and competition following childbirth.

Psychological Aspects of Exercise During Pregnancy and Postpartum

While psychological variables that mediate a successful comeback (i.e., rehabilitation) to fitness training and competition following serious injury or personal setbacks have received a great deal of attention (Williams & Roepke, 1993), research concerning the cognitive components involved in a return to athletic participation following pregnancy is scarce (Godin, Venzina & Leclerc, 1989). Understanding the cognitive processes involved in training during pregnancy and in the postpartum period is important so that practitioners may develop the most appropriate recommendations for women who wish to continue competitive athletic careers after childbirth.

One cognitive variable that has been an important mediator in individuals' exercise adherence and sport behavior is self-efficacy (Feltz, 1988; McAuley, 1992). Self-efficacy beliefs are defined as people's judgments concerning their ability to perform successfully specific tasks and in the face of specific obstacles. These judgments are influenced by diverse sources of efficacy information (Bandura, 1986). Sources of information for exercise efficacy in pregnant and postpartum women might include frequency of past exercise behavior (i.e., exercise habit), persuasion and social support by significant others, feedback regarding progress in an exercise program, social comparisons with similar others (e.g., similar in age, shape, pregnancy), and physical fitness condition. Self-efficacy beliefs for exercise are important, because they are thought to play a significant role in an individual's decision, effort, and persistence to continue to exercise (Feltz, 1988).

The present study examined, retrospectively, the training patterns and psychological variables of competitive female athletes before, during pregnancy, and after childbirth to explore the physiological and cognitive components mediating a successful return to training and competition in the postpartum period. A survey was administered to competitive female athletes who had given birth within the previous 10 years. The purpose of the survey was to (a) determine if athletes were successful in their postpartum comebacks, (b) quantify training patterns before, during pregnancy, and after childbirth, (c) assess childbirth complications and training advice, and (d) determine athletes' self-efficacy, perceived barriers to training, and perceived social support for training during pregnancy and after childbirth. In addition, in-depth follow-up interviews with participants were used to address further the perceived barriers to training after pregnancy.

Method

Participants

Twenty-six female athletes, ages 30–45 years (M age = 35.78 years, SD = 4.45), participated in the present study. To qualify for study participation, women needed to have at least 4 years of competitive athletic experience prior to a pregnancy that occurred within the 10 years prior to completing the questionnaire. Data were collected for a woman's first pregnancy only. Participants' ages at their first pregnancy ranged from 23 to 41 years (M = 30.65 years, SD = 0.75). The time from the birth of the participant's first child to data collection ranged from 1 to 10 years (M = 5.04 years, SD = 3.27). Eight women in the sample had no subsequent births, 12 women had one subsequent birth, 4 women had two subsequent births, and 2 women had three subsequent births.

Athletes' competitive histories ranged from local to national levels, with 77% participating in high school sports, 62% competing in collegiate sports (46% in Division I athletic programs), and 100% participating in postcollegiate competitions. The majority of athletes were either swimmers (41%) or track and field or road racing competitors (29%).

Measures

Four primary measures were used to assess the activity patterns and psychological variables of athletes in the present study: (a) the Training Patterns Questionnaire (TPQ), (b) a perceived barriers and self-efficacy measure,

(c) the Social Provisions Scale (SPS; Russell & Cutrona, 1987), and (d) follow-up telephone interviews. The TPQ was developed by the authors and piloted with five local athletes to identify and remove any ambiguous statements contained in the survey. The TPQ contained five sections: demographic and competitive history, training activities, training and competitive goals, pregnancy and childbirth information, and training advice. Each section of the TPQ is described in the following paragraphs.

Demographic and Competitive History. Participants were asked to provide information about their high school, college, and postcollege sport and competitive history. This information included the type of sport participation, events competed in, and medals and honors received. Additionally, participants were asked to report any national or world rankings they had achieved during both the pre- and postpartum periods. For the purposes of our study, prepartum training was defined as training performed anytime before a woman became pregnant. Postpartum training was defined as training performed anytime after the first pregnancy but not during a subsequent pregnancy. Most respondents kept their reports confined to 1–2 years prior to and after their first pregnancy.

Training Activities. Respondents were instructed to report their training patterns within specific periods relative to their first pregnancy. For example, the training activities and schedules were separated into prepartum; first, second, and third trimesters; and postpartum. Participants reported the frequency, duration, and intensity for each activity. Frequency was defined as days per week, duration as minutes per day, and intensity as the percentage of maximum effort. Respondents provided separate frequency, duration, and intensity information for each training activity they performed. For analysis purposes, training activities were categorized into cardiovascular or resistance training. Training indexes were constructed for both types by multiplying frequency x perceived intensity x time. For example, running 3 days/week at 50% of perceived maximum effort for 30 min per session provided a FIT (frequency, intensity, time) cardiovascular score of 45 (3 x .5 x 30). Additionally, a FIT total training effort index was calculated by adding the cardiovascular and resistance training index scores for a specific period, such as prepartum or first trimester. The authors developed the FIT training index for the present study; however, the FIT is based on common components inherent in guidelines for most types of exercise prescription programs.

Training and Competitive Goals. Participants were asked to list their pre- and postpartum training goals and competitive goals, to rate their success on a 5-point Likert scale ranging from 1 (extremely successful) to 5 (unsuccessful), and to comment on possible reasons for their success or lack thereof in achieving their goals.

Pregnancy and Childbirth Information. Participants reported pregnancy information concerning the duration of pregnancy, weight gain, type of delivery, and complications experienced during pregnancy. Participants who reported complications during pregnancy were also asked to describe how the complications affected their training activities throughout gestation. Childbirth information included the amount of time spent in labor, complications during labor, and infant weight, length, and APGAR scores.

Training Advice. Participants were asked to comment on the advice they may have received regarding their training activities prepartum, during pregnancy, and postpartum. They were also asked to provide the type of advice they received as well as where the advice was generated (e.g., from coaches, physician, or peers).

Perceived Barriers and Self-Efficacy. In addition to the TPQ, perceived barriers to training and self-efficacy to train were assessed. The barriers and self-efficacy measures were adapted from a method developed by Dzewaltowski, Noble, and Shaw (1990). This method employed a free-response format, whereby respondents listed at least three barriers that might interfere with their training. Next to each barrier, respondents then indicated their degree of confidence, from 0 to 100, that they could still participate in their training regimen at least three times per week, if that barrier was present. The free-response format is optimal in this situation, because it allows for assessing individual differences in perceived barriers for a population that has not been previously assessed. Barriers and efficacy scores were listed separately for "during pregnancy" and "from birth to first competition or present." Efficacy scores were calculated by summing the degree of confidence for each barrier participants listed and dividing the sum by the number of barriers mentioned. For example, if a participant mentioned two barriers to training during pregnancy (e.g., uncomfortable and negative support from others), and gave 30% and 60%, respectively, as the degree of confidence that she could still participate in her training regimen at least three times per week with the barriers present, then her total efficacy score during pregnancy would be $(60\% + 30\%)/2 = 45\%$.

Social Support. Social support was measured using the SPS (Russell & Cutrona, 1987), a 24-item questionnaire originally developed to gain a better understanding of the processes through which interpersonal relationships enhance or sustain well being in the context of stress. The SPS has proven reliable in measuring the link between social support and mental health in such populations as older adults, health professionals, and new mothers. For the purposes of our study, the measure was adapted for social relationships as they pertained to a respondent's training and competition. Respondents were asked to indicate their perceptions on a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). Sample items include, "In terms of my training and competition, there are people I can depend on to help me if I really need it," and "I feel that I do not have close personal relationships with other people in my sport." An SPS score was derived by summing the items, with higher scores indicat-

ing more social support. In the present sample, internal reliability of the SPS was strong ($r = .92$).

Telephone Interviews. A follow-up telephone interview with participants who returned completed surveys was aimed at examining the types of social support participants thought they needed during the postpartum period. Specifically, an attempt was made to address lack of time and energy constraints for training after childbirth. During the telephone interviews participants were asked the following questions: What type of social support would be most helpful in terms of your training? To whom do you normally turn for this support? How supportive is this person? Does this person provide you with other types of support regarding your training?

Procedure

Potential athletes were identified through advertisements to local athletic groups, health clubs, and sporting goods stores. Participants received via mail a survey containing the training patterns questionnaire, the perceived barriers and self-efficacy measure, the SPS, and an informed consent form. Three weeks later, a follow-up survey was mailed to those who had not responded. Telephone calls were made to participants who did not respond in a timely manner to encourage them to complete and return their surveys. Of the 30 athletes identified, 26 returned surveys, after which they were contacted for the follow-up telephone interview. Of those 26 participants, 25 were successfully contacted by telephone.

The statistical analysis used in the present study includes linear regression to assess the relationship between FIT training efforts and pregnancy and childbirth measures. Pearson correlations were used to examine the relationship between FIT training measures prepartum, during, and postpartum; participants' postpartum perceived training success and various cognitive and physiological variables; and participants' self-efficacy to overcome training barriers during pregnancy and postpartum. Frequency analysis was used to assess maternal and fetal complications, training patterns, training advice from others, perceived reasons for success, perceived barriers to training, and social support needs during pregnancy and postpartum. Because of the exploratory nature of the present study and the small sample size, the significance level used was $p < .10$.

Results

Pregnancy and Childbirth Data

Table 1 shows maternal and fetal complication data. Frequency analysis of maternal and fetal complications throughout gestation and in the postpartum period indicates fetal incidence and specifics similar to those found in the whole population (Klebanoff, Shiono, & Rhoads, 1990).

FIT training effort (frequency, intensity, time) in aerobic exercise during pregnancy significantly predicted infant birth weight, $F(1, 18) = 4.47$, $p < .049$. That is, the higher a woman's FIT cardiovascular effort was during pregnancy, the heavier her infant was likely to be. The combination of frequency, intensity, and time engaged in resistance training during pregnancy (FIT strength) significantly predicted fetal complications during pregnancy, $F(1, 8) = 10.55$, $p < .012$. More specifically, a higher FIT strength effort during pregnancy was related to a lower likelihood of fetal complications during pregnancy. Together, these results indicate that training effort might be related positively to favorable infant characteristics, such as normal birth weight, yet negatively to unfavorable occurrences, such as fetal complications during pregnancy.

Training Patterns

The number of athletes who trained during pregnancy decreased over time from 23 (89%) at the first trimester to 17 (65%) at the third trimester. The percentage who competed postpartum was 17 (65%). Of those athletes who trained during the third trimester, 12 (70%) competed postpartum. There was not a significant correlation between training during third trimester and postpartum competition. Figure 1 graphs cardiovascular and strength training patterns across time from pre- to postpartum.

Cardiovascular training efforts ranged from 0 to 918 ($M = 365.80$, $SD = 233.69$) FIT index prepartum ($n = 23$), 0 to 450 ($M = 151.36$, $SD = 126.07$) FIT index first trimester ($n = 20$), 0 to 504 ($M = 121.80$, $SD = 120.22$) FIT index second trimester ($n = 20$), 0 to 504 ($M = 82.52$, $SD = 110.00$) FIT index third trimester ($n = 17$), and 0 to 918 ($M = 227.86$, $SD = 201.49$) FIT index in the postpartum period ($n = 24$). Strength training efforts ranged from 0 to 288

Table 1. Maternal and fetal complications during pregnancy

	Frequency	
Maternal complications	8	(30.8%)
Pre-term labor	3	
Other medical problems		
Sinus problems	1	
Heavy bleeding	1	
Kidney stones	1	
Hypertension	1	
Extended labor	1	
Fetal complications during pregnancy	3	(11.5%)
Low birth weight	2	
Unhealthy	1	
Fetal complications during labor and delivery	6	(23.1%)

($M = 50.19$, $SD = 72.93$) FIT index prepartum ($n = 12$), 0 to 180 ($M = 23.26$, $SD = 41.30$) FIT index first trimester ($n = 10$), 0 to 90 ($M = 11.22$, $SD = 22.29$) FIT index second trimester ($n = 7$), 0 to 90 ($M = 7.19$, $SD = 19.10$) FIT index third trimester ($n = 5$), and 0 to 180 ($M = 14.85$, $SD = 37.90$) FIT index postpartum ($n = 6$).

As seen in Figure 1, women significantly decreased their participation efforts in cardiovascular and resistance exercise during pregnancy. Participation in both types of activities decreased 49% during the first trimester, 72% by the second, and 80% by the third. Pre- and postpartum FIT total training efforts were positively and significantly correlated ($r = .67$, $p < .01$), but neither were significantly correlated with training effort during pregnancy (prepartum $r = .29$, $p < .14$; postpartum $r = .13$, $p < .54$).

Training Advice From Others

Advice from others included coaches, physicians, and peers. Nearly half the women (42.3%) were told to keep their heart rate low (i.e., < 140 bpm) and to train in moderation. Other forms of advice included "listen to your body" (38.5%), "keep training" (30.8%), "wait 6 weeks after birth to return to training" (11.5%), and "do no more training than before pregnancy" (3.8%).

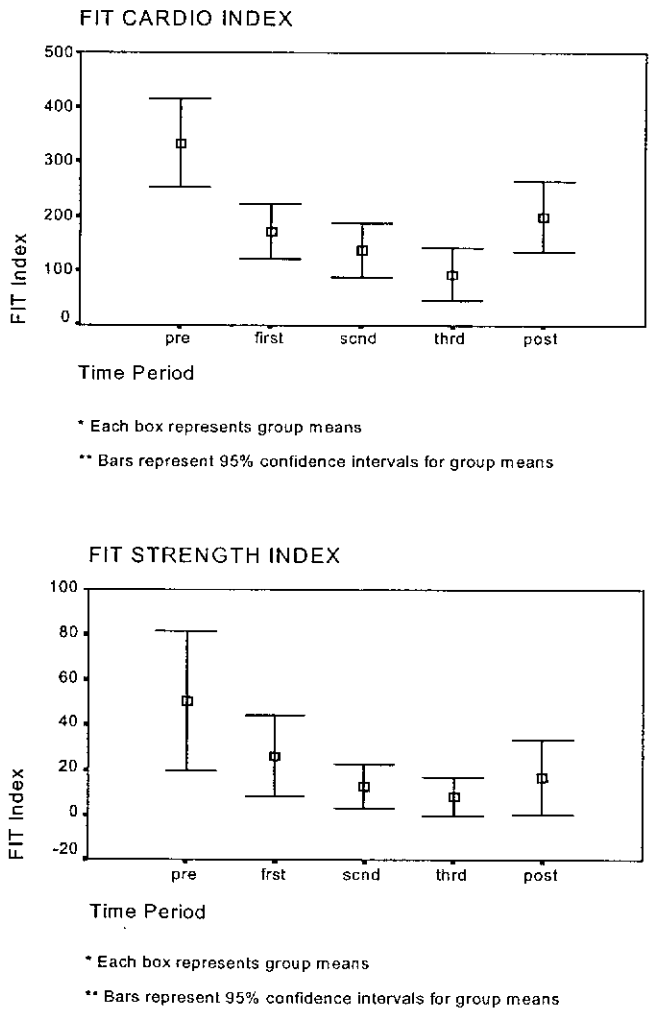

Figure 1. Mean FIT cardiovascular and FIT strength training indexes graphed across time from prepartum to postpartum.

Goals for Training and Competition

Participants were asked to provide a brief outline of their goals for training and competition pre- and postpartum. Questions concerning women's goals for training and competition during the prepartum period, pregnancy, and postpartum were separated in the questionnaire so as not to contaminate responses. Prior to pregnancy, the most frequently reported *training goals* were to improve times (race, practice), endurance, and strength (92%) and complete scheduled workouts (19%). The most frequently reported *competition goals* were to perform at goal level and time (54%), participate in competitions (39%), and win competitions (27%).

Training goals postpartum included return to pre pregnancy fitness and weight levels (81%) and training (46%). Competition goals postpartum were dramatically altered from prepartum goals. The most frequently reported goal was to participate in competitions (54%), followed by improving "personal best" performances (35%). Only 8% reported goals of winning competitions postpartum. This is compared to 27% prior to pregnancy.

Athletes were also asked to rate their success at achieving training and competitive goals in the pre- and postpartum periods and to comment on possible reasons for their success or lack of success in reaching those goals. Table 2 provides a listing of the most frequent reasons given for success or lack thereof. Motivation was reported most frequently and consistently as the reason for success in training and competition.

Perceived Barriers to Training

Table 3 presents the frequencies of perceived barriers to training. Lack of energy was reported as a primary barrier to training both during pregnancy and postpartum. However, lack of time was perceived as the most significant barrier to training in postpartum. Sixteen of the women who indicated continued training in the postpartum period reported that time was one of their top three barriers to training. Lack of time was also mentioned by 11 of the postpartum exercisers as a reason for their lack of success in achieving their competitive goals.

Relationship Between Postpartum Perceived Success and Other Variables

To examine the relationship between training strategies (during pregnancy and postpartum) and participants' perceived athletic training and competitive success post-

partum, the relationship between the degree of athletes' self-reported success of "comeback" efforts and their FIT total training effort prepartum, during pregnancy, and postpartum was examined. Additionally, other variables that might also be correlated with this relationship were examined. Table 4 shows the correlations for training and competitive success with eight selected variables. Training effort in the postpartum period was positively correlated with perceived competitive success postpartum. Perceived success was negatively correlated with age as might be expected, but it was also negatively correlated (for training) with age at first pregnancy. Perceived success was not related to the mother's pregnancy complications or to the time it took to reach training goals or return to competition after pregnancy.

Relationships among self-efficacy, training, and success at a "comeback" were also examined. As Table 5 shows, female athletes who had stronger efficacy beliefs regarding training in the face of perceived barriers during pregnancy reported greater training efforts during pregnancy, took fewer weeks to achieve their training goals and return to competition postpartum, and perceived greater success at achieving their postpartum competitive goals than those with weaker efficacy beliefs.

Social Support

The athletes perceived they needed a fair amount of social support from others in terms of their training and competition. The possible range on the SPS is 24–96. The mean score for this sample was above the scale's midpoint (M = 76.44, SD = 10.73). The SPS was correlated at the

Table 2. Perceived reasons for training and competitive success

	Frequency	
Reasons for prepartum training success		
Had adequate motivation and focus	17	(65%)
Had adequate time	10	(39%)
Had enough energy	5	(19%)
Had a good coach	2	(8%)
Reasons for postpartum training success		
Motivation	11	(42%)
Social support	6	(23%)
Training was a priority; made time	2	(8%)
Reasons for postpartum lack of success in training		
No time	11	(42%)
Training not a priority	5	(19%)
No energy	5	(19%)
Reasons for prepartum success in competition		
Motivation	15	(58%)
Had adequate time	10	(39%)
Had adequate energy	5	(19%)
Social support	4	(15%)
Self-efficacy	4	(15%)
Attainable goals	3	(12%)
Reasons for postpartum success in competition		
Motivation	5	(19%)
Social support	2	(8%)
Enjoyment of sport	2	(8%)
Reasons for postpartum lack of success in competition		
No time	11	(42%)
Other priorities/not as interested	8	(31%)
No energy	3	(12%)

Table 3. Perceived barriers to training during pregnancy

	Frequency	
Perceived barriers to training during pregnancy		
Lack of energy	15	(57.7%)
Nausea, pain	8	(30.8%)
Uncomfortable belly, back pain	4	(15.4%)
Worried about baby	4	(15.4%)
Lack of motivation	4	(15.4%)
Negative peer support	3	(11.5%)
Weight gain	3	(11.5%)
Keeping HR down	2	(7.7%)
Medical problems	2	(7.7%)
Lack of research to go by	2	(7.7%)
Perceived barriers to training postpartum		
Lack of time	16	(61.5%)
Lack of energy	13	(50.0%)
Lack of interest, other priorities	8	(30.8%)
Breast feed, sensitive breasts	6	(23.1%)
Lack of motivation	4	(15.4%)
Weight gain	3	(11.5%)
Worried about training too soon	2	(7.7%)

Table 4. Postpartum perceived success at achieving training and competitive goals

Variable	Training	Competitive
Mother's complications during pregnancy	-.07	-.04
Mother's age	-.59*	-.49*
Mother's age at first pregnancy	-.51*	-.30
FIT total training effort prior to pregnancy	.09	.11
FIT total training effort during pregnancy	.07	.11
FIT total training effort after pregnancy	.26	.44*
Weeks to first competition after postpartum	.06	-.08
Weeks to achieve training goals postpartum	.05	-.10

*$p < .05$.

$p < .08$ level with self-efficacy for training during pregnancy ($r = .37$) and in postpartum ($r = .37$). Social support showed no relationship to total training effort or perceived success at reaching training and competitive goals.

Social Support Needed During Postpartum

Participants overwhelmingly indicated that childcare was the form of social support most needed. Nineteen of 25 women (76%) stated that this was their biggest barrier to training in the postpartum period. Other social support needs they expressed were a team with which to train (12%) and motivation (8%).

Childcare Needs

Due to the large number of participants reporting childcare as their primary social support need, the frequency participants typically sought support from a specific childcare source was examined. The participant's husband and daycare services (66.67%) were the most common sources of support. Participants were then asked how supportive they felt their childcare source was. Most participants felt that this individual was either somewhat supportive (44.44%) or very supportive (44.44%).

Table 5. Strength of self-efficacy to overcome training barriers during pregnancy and postpartum

Variable	Pregnancy	Postpartum
Mother's complications during pregnancy	-.07	-.16
Mother's age	.01	-.14
Mother's age at first pregnancy	.04	-.16
FIT total training effort during pregnancy	.37*	.12
FIT total training effort after pregnancy	-.01	.14
Weeks to first competition after pregnancy	-.69**	-.37*
Weeks to achieve training goals after pregnancy	-.46*	-.32
Perceived success of achieving training goals pre	.27	.15
Perceived success of achieving training goals post	.23	.36*
Perceived success of achieving competitive goals prepartum	-.08	.01
Perceived success of achieving competitive goals postpartum	.40*	.29
Efficacy to overcome training barriers postpartum	.43**	1.00

*$p < .10$.
**$p < .05$.

Discussion

The results of the present study suggest that training efforts during pregnancy are not correlated with complications for the mother or infant. Cardiovascular training effort during pregnancy was positively related to birth weight, while strength training effort was negatively correlated with fetal complications during pregnancy. These results suggest that the frequency, intensity, and time athletes spend training (both cardiovascular and strength) may be related to the birth of healthy infants. This information bodes well for the athlete who does not have pregnancy complications and wishes to continue to train during pregnancy.

Women in the present study decreased their training over the course of their pregnancy and altered training and competitive goals from pre- to postpartum. Data from the present study also illustrate that training efforts during pregnancy are independent of training during the pre- and postpartum periods. This finding suggests that athletes may be able to alter their training patterns during pregnancy without a significant impact on their postpartum training program. This information may be especially important for women who either desire, or are required, to lower their training intensity during pregnancy yet want to return to their prepartum training and competitive form in a timely manner following delivery.

In terms of psychological aspects of training, motivation was the most frequent reason given for success in training and competition, both pre- and postpartum, and lack of time was the most frequently reported barrier to training. However, athletes who had stronger efficacy beliefs regarding training during pregnancy reported greater training efforts, took fewer weeks to achieve their training goals and return to competition postpartum, and perceived greater success at achieving their postpartum competitive goals than those with weaker efficacy beliefs. These findings suggest the need to include motivational, efficacy-building, and time management strategies in women's training programs to help them regain their competitive form. Additionally, the present results demonstrate the need for social support in terms of both childcare and training encouragement for female athletes who wish to return to training and competition after pregnancy.

While the above results are informative, there are some limitations in the present study. For instance, any self-report retrospective study of this type is subject to recall bias in which participants misreport data for which they do not have an accurate memory. The time span for recollection in the present study was a maximum of 10 years. Although this may seem to be a particularly long period on which to reflect accurately about one's exercise behavior, it was assumed that a first pregnancy was such a milestone that the participants in the present study were fairly accurate in identifying their behaviors and perceptions during and around that period. Additionally, the fact that

the women in the present study were athletes may have increased the likelihood that the retrospective information is accurate, as athletes are typically more in tune with their physical activity patterns than the general public.

Furthermore, in the present study one cannot be certain that retrospective reports of goals and self-efficacy beliefs are truly based on individuals' judgments preceding their performances. Instead, it is possible that these judgments reflect socially desirable excuses for individuals' performances (Covington & Omelich, 1979). Because data were collected postpartum, retrospective reports of goals and confidence judgments made before this period leaves some uncertainty as to whether these judgments reflect thoughts prior to performances or rather emotional feelings regarding individuals' successes and failures in their performances (Bandura, 1997). However, one's emotional feelings regarding success and failure can influence one's future actions (Bandura, 1997). Therefore, these judgments would still be predictive of a woman's motivation to continue in training and competition.

While the present findings may extend to recreationally competitive female athletes, these results may not hold true for the elite (nationally ranked) athlete. It is not known precisely how many female athletes have (a) attained elite status in their sport, (b) discontinued competition due to pregnancy, and (c) attempted a "comeback" to regain their former competitive status. Research concerning elite level athletes would serve to further the knowledge base concerning the physiological and cognitive components involved in athletic training during pregnancy and in the postpartum period.

The present study attempted to explore the physiological and psychological components mediating a successful return to athletic training and competition following childbirth. The results of this study make salient the need to further explore the training practices of female athletes at all phases of motherhood to develop the most appropriate recommendations for athletes who wish to continue their competitive sports career after childbirth.

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Authors' Notes

The authors would like to thank the Women's Sport Foundation for their support of the present study and acknowledge Lynette Craft for her contribution to this research. Please address all correspondence concerning this article to Deborah L. Feltz, Department of Kinesiology, Room 138, IM Sport Circle, Michigan State University, East Lansing, MI 48824.

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