

Short-term Impact Of Fetal Imaging On Paternal Stress and Anxiety

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Abstract: None available.

Full Text: INTRODUCTION Since the introduction of ultrasound technology first took place in the 1950's, there has been a significant increase in its utilization as a diagnostic tool during pregnancy (Romero, Jeanty, &Hobbins, 1984). Indications for the use of ultrasound scanning during pregnancy include determination of fetal gestational age, monitoring of fetal growth, evaluation of multiple gestation potential, and evaluation of fetal viability when spontaneous abortion or intrauterine demise is suspected (Kremkau, 1984). Ultrasound imaging is also applied in the detection of ectopic pregnancy, in diagnosis of physical anomalies, as a guide to physicians when treating the fetal patient in-utero and as a visual reference in the performance of amniocentesis (Gottesfeld, 1984). Ultrasound cannot detect signs of pregnancy during the first three to four weeks after conception. The first sonographic sign of an intrauterine pregnancy is the visualization of a gestational sac at five and one-half to six weeks after the last menstrual cycle (Batzer, et al., 1983). After the identification of the gestational sac, heart motion can be identified by the seventh week of gestation and fetal and trunk movements are detectable by the ninth week (Joupilla &Piironen, 1975; Robinson, 1972; and Shawker et al., 1980). Investigators continue to explore (Stratmeyer, 1980), debate and weigh (Verny, 1987) the benefits of ultrasound scanning versus the possibility of unknown hazards to the fetus with this procedure. However, as of this writing, there are no known proven risks to the unborn (Kremkau, 1984). It was not the intention of the current study to enter that debate but more to explore other aspects of this procedure. This seems particularly timely in that many hospitals and private practice physicians now use ultrasound imaging as a routine screening device during pregnancy (Platt, 1984). During an ultrasound examination with a real-time scanner, the expectant parent(s) can view their unborn child in-utero. If the fetus is moving the scanner will transmit that moving image onto a television monitor for viewing (Reading, 1983). As a result of the increasing use of this diagnostic procedure, the ways in which pregnancy and the time of expectancy are viewed may be changing. Prior to the use of this technology, the first view parents could have of their child was at birth. Ultrasound technology has now removed this limitation. As ever increasing numbers of parents are being exposed to real-time ultrasound imaging of their unborn children, assessment of the social and psychological impact of this technology is appropriate and necessary to understand its possible implications. Several studies have examined various aspects of the mother's emotional experience of fetal imaging. However, absent from those investigations were any attempt to systematically study the emotional reactions of expectant fathers who were exposed to ultrasound imaging of their child in-utero. Therefore, the purpose of the present study is to begin to explore some of the emotional responses of expectant fathers when viewing their unborn child. LITERATURE REVIEW In order to more fully understand fathers' specific reactions to fetal imaging it may be beneficial to review some of the literature related to fathers' experiences to pregnancy in general. Historically, there was a noticeable void in the literature prior to the 1970's regarding the normative experience of the expectant father during pregnancy. The limited data available prior to that time appears to have focused more upon abnormal or pathological responses of men towards pregnancy (Freud, 1909, 1918; Jacobsen, 1950; and Jarvis, 1962). Commenting on the relative lack of literature regarding the expectant father, Parke (1981), points out that until recently expectant fathers have been generally ignored in the literature. He believes that this was as a result of prior assumptions which subtly promoted the idea that fathers were less important than mothers in the development of their child. Correspondingly, fathers' responses to the pregnancy experience were not deemed important to investigate. However, changing attitudes and perspectives in the social structure of post-World War II society permitted an

ever-widening definition of, and interest in various aspects of fatherhood. With more women entering the work force, many men felt less pressure to focus solely upon being a good provider within the family system. The increased utilization of women in the work force resulted in men having more opportunities to redefine their role in the family. Whereas men were traditionally relegated to rather passive involvement during the pregnancy from the point of conception, many men are now becoming more involved in parenting and in the pre-natal care of both mother and baby. A more open and inviting attitude on the part of the healthcare community has certainly helped to facilitate this increased paternal involvement. According to Bittman and Zalk (1978), it is no longer unusual to see expectant fathers attending routine pregnancy examinations with their wives. They further note that increasing numbers of men are becoming active in pre-parenting and prepared-childbirth classes. Fathers are now routinely attending and directly involved in the labor and delivery experience. Investigators, recognizing this shift toward increased paternal involvement, are studying various aspects of the father's experience during pregnancy. Dodendorf (1981) studied various aspects of the father's reactions to first pregnancy. She described many of the father's as perceiving their involvement as going beyond that of maternal support and observed that the fathers viewed themselves as coparticipants in the pregnancy experience. This conclusion is supported by another study (Wapner, 1976) who reported that expectant fathers in childbirth education classes felt themselves to be in the center of the action with their wives, not just as mere supporters of their wives. Again, investigators, recognizing this shift toward increased paternal involvement, are just beginning to study various aspects of the father's experiences during pregnancy. The result of these studies are adding to our fund of knowledge regarding pregnancy as an important developmental phase in a man's life. Erikson's classic theory (1950) attempted to describe some of the major developmental phases which people seem to go through during the course of a lifetime. These phases or stages include parenthood as a part of adulthood. As may apply to men, both Jacobsen (1950) and Benedek (1962) have also sought to explore the male's progression towards fatherhood. Their clinical observations appear to support the notion that the emotional course of pregnancy may serve to stabilize and/or disrupt the psychological equilibrium of the expectant father. One problem with some of these clinical studies is that they have more or less focused upon the father's emotional difficulties with his wife during the pregnancy or on the idea of new parenthood vis-a-vis the baby rather than on the process of pregnancy itself as a distinct developmental phase for the male. Although there has been a recent increase in the number of studies done, these studies have dealt more with related areas such as the role of the father during labor and delivery or exploring the role of the father in the development of the child. There has been little emphasis on the various stages and experiences of pregnancy as they directly affect the father independently of his wife and child-to-be. Several experimental investigations have examined certain aspects of the father's emotional experiences during the course of pregnancy. Of particular note are reported elevations in levels of anxiety and stress (Gerzi & Berman, 1981; Dodendorf, 1981; Davis, 1977; and Bittman & Zalk, 1978). Each of these studies, in varying degrees, observed that many fathers reported increased stresses and fears directly related to their concerns about the normalcy of the fetus and about the effects of the pregnancy upon the health of their wives. Chalmers (1982) has further delineated the source of many of these paternal anxieties and stresses. He observes that a certain amount of anxiety centers around normal fears of having a malformed baby, fear of miscarriage, fear of multiple gestation, fear of losing one's spouse and/or baby during labor and delivery or fear of the fetus dying in utero. What has remained largely unexplored, however, is the psychological and social impact of newer technology in obstetrics and how exposure to modern diagnostic procedures such as fetal imaging might affect the expectant father's stresses and fears as just described. So much is unseen and therefore unknown for the expectant father regarding the health of his wife and unborn baby. His wife has, at least, the benefit of some biological clues and some sense of physiological and psychological continuity that the father can never experience unaided. Therefore, throughout the entire course of the pregnancy many fathers are looking for some indication as to the well-being of their unborn child. In a similar light, Klaus and Kennell (1976) have identified perception of fetal movement as

an important event in the development of parental attachment. They theorize that movement perception helps to prepare the mother for the birthing experience and the prospect of parenthood. Although they do not specifically site that fathers might also benefit from perception of fetal movement, it may be possible to assume that similar benefits would be derived by the father as well. If observation of fetal movement is enhanced with ultrasound imaging then the mother's ability to form an attachment to her unborn may be further facilitated. In turn it is possible that the father who is present at such an examination may be able to enhance his own ability to attach himself to his unborn. This could be particularly beneficial in fathers who may have poor bonding histories. The father who is able to visualize his child in-utero may also experience significant reductions in his levels of anxiety, fear, and stress as he directly obtains visual confirmation about the health status of his child. As previously mentioned, several studies of expectant mother's reactions to ultrasound have been conducted. They are reviewed here because these investigations helped to formulate the backdrop for the present study. Kohn, et al., (1980), studied one hundred women in various stages of pregnancy. Each woman was questioned before and after viewing her child via sonogram. Only women in low-risk pregnancies were examined. The authors reported that most subjects who felt good about the well-being of the fetus prior to the scan had no reason to alter that perception. Subjects who had expressed greater concerns about the normality of the baby and the pregnancy elicited more positive responses after viewing the scan. Campbell et al. (1982) attempted to evaluate some of the short-term effects of scanning with expectant mothers. One-hundred and twenty-nine multipare were randomly assigned to one of two groups: (a) a high-feedback group (n = 67) where the subjects saw the monitor screen during scanning, and (b) a low-feedback group (n = 62) in which the scan was accomplished but the subjects did not see the monitor screen. A third "no scan" control group was included in the study but results obtained from this group were not reported. Prior to and following the scan, the subjects were asked to rate their feelings about the fetus. Two adjective checklists were used. Following the scan the subjects were asked to indicate their subjective emotional state at the time of the scan by selecting the most appropriate adjective from the Subjective Stress Scale (Kerle & Bialek, 1958). Results of the study indicated consistent changes in all ratings for both groups as a result of the scan. The high-feedback group demonstrated more positive attitudes towards the fetus with mothers' feeling less "concerned," more "attached," "reassured," "secure," and "confident." Milne and Rich (1984) conducted an investigation of twenty women who were undergoing sonography. The purpose of their study was to determine whether pregnant women were able to perceive what they viewed on the monitor, and to ascertain how they responded to the experience of fetal imaging. The subjects prior experience with scanning varied. Subjects were asked open-ended questions. The investigators report that the pre-scan stage was characterized by a sense of anticipation, anxiety, and some confusion. Affective responses such as "neat," "fantastic," and "great," were reported by many of the women after the scan. The authors believe that the results of this investigation confirm that ultrasound scanning can allay anxieties and fears about the normalcy of the fetus. They further suggested that the father's emotional responses to fetal imaging be examined as well. Reading and Platt (1985) evaluated the impact of various fetal testing procedures on maternal stress and anxiety. This study involved a series of high-risk women who were referred for fetal assessment in the third trimester of pregnancy. These women were randomly assigned to one of four conditions: (a) high-feedback scanning, in which the monitor screen was visible to the mother; (b) low-feedback scanning, in which specific visual feedback was denied; (c) fetal heart rate monitoring, using an external heart rate monitor; and (d) a video control group in which the women viewed a videotape of a fetal scan recording that was not their own. Adjective rating scales were utilized before and after exposure to each condition. In addition, the women completed the State-Trait Anxiety Inventory (Spielberger et al., 1968) and the Subjective Stress Scale before and after each condition. The investigators report that there was a reduction of scores in all groups with the greatest reduction occurring in subjects who viewed real-time scanning of their unborn child. Subjects' feelings towards the fetus did not appear to change from one condition to the next. These studies represent the first known attempts to investigate the emotional experience of fetal imaging upon

an expectant parent. Despite the fact that these studies were limited to examining the responses of mothers they were most useful in designing some of the methodology contained in the present study of expectant fathers. Stress and anxiety are often times associated with diagnostic procedures. Thus, the purpose of the current investigation was to see if expectant fathers would experience similar reductions in anxiety and stress when viewing the fetus as did expectant mothers in the previous investigations. As there have not been any known studies of fathers in this area I thought it might be useful to first study some of the reactions of fathers who were involved in known low-risk pregnancies. In this way I hoped to attempt to establish some normative baseline of experience for fathers in this population before attempting to measure responses of fathers in known high-risk pregnancies.

METHODOLOGY In order to test the hypotheses that significant anxiety and stress reduction would occur as a result of exposure to fetal imaging a quasi-experimental/control design with pre-test/post-test measures was utilized. The experimental group (n = 35) was composed of those expectant fathers who attended a routine office visit with their wives and who saw ultrasound imaging of their unborn child. The control group (n = 32) was composed of those fathers who also attended a routine office visit with their wives but who did not view ultrasound imaging of the fetus. It should be noted that subjects were not randomly assigned to groups because, while there are no known proven risks associated with ultrasound imaging, it has been suggested that there may be some unknown long-term effect(s) upon the fetus (Kremkau, 1984, Queenan & Frigoletto, 1987). Therefore, this investigator felt that it might be potentially unethical to assign subjects and their wives to a scanning condition that was not medically indicated by the examining physician at the time of the office visit. Data from 90 subjects were collected for this investigation. However, only data from 67 subjects involved in low-risk pregnancies were used. Data from the remaining 23 subjects were excluded if the pregnancies were known to be high-risk or if abnormal or suspicious results were reported to the parents. All subjects resided in the greater metropolitan area of Los Angeles. Subjects ranged from middle to upper-middle income in terms of socio-economic status. The racial composition of the subject pool was predominantly Caucasian. Both experimental groups were comparable on variables of age, income, marital status, ethnicity, and education. Experimental sessions were conducted in the examination and waiting rooms of three physicians who share a private group obstetrical practice in Santa Monica, California. Subjects were seated in the waiting room during each of two self-reporting periods prior to and after the examination. Each self-reporting period encompassed a time-span of approximately 15 to 20 minutes. A General Electric RT 3000 ultrasound scanning system was used for this study. This machine provides real-time (live) ultrasound imaging of deep body tissue including the embryo/fetus, umbilical cord, and placenta. In addition, depending on the gestational age of the fetus, the scan provided additional views of various organs including head, spinal cord, eyes, ears, arms, legs, as well as kidneys, bladder, stomach, and heart. Attached to the scanner was a television monitor for live viewing of the fetus.

DEPENDENT MEASURES Two scales were used to measure levels of stress and anxiety both pre- and post-examination. They are the State-Trait Anxiety Inventory (Spielberger et al., 1968) and the Subjective Stress Scale (Kerle & Bialek, 1958). The State-Trait Anxiety Inventory (STAI) is composed of two separate scales. The first scale (STAI-T) measures trait anxiety. This scale asked each father to indicate how he felt in general. The second scale is the STAI-S which measures state anxiety. This scale asked each father to indicate how he felt in the present moment. Each of these scales is composed of 20 items and is scaled with numerical values ranging from a low anxiety score of 20 to a high anxiety score of eighty. The Subjective Stress Scale (SSS) is a 14 item, equal-appearing, equal-interval adjective checklist with a numerical range of absolute zero indicating low stress to a score of 94 indicating high stress. Each father was asked to mark one of the 14 items on the checklist to indicate how he felt in that specific moment. Each item on the scale is assigned a numerical ranking with the word "wonderful" given a value of absolute zero to the phrase "scared stiff" which is given a value of ninety-four. Fathers in both experimental and control groups completed the following items prior to examination: (a) an 11-item demographic questionnaire, (b) the PAPI (Paternal Attitudes towards Pregnancy Inventory), a 35-item questionnaire developed by the author to explore some of the

subject's basic attitudes, values, beliefs, and prior experiences, if any, with being an expectant father, (c) the State Anxiety questionnaire of the STAI, (d) the Trait Anxiety questionnaire of the STAI, and (e) the Subjective Stress Scale. Upon completion of the examination all subjects completed the following post-test measures: (a) the State Anxiety questionnaire, (b) the Subjective Stress Scale, and (c) a post-exam checklist for experimental subjects indicating what they actually saw during the scan. Subjects in the control group did not complete this checklist as they were not exposed to the scanning condition. In addition, the examining physician completed a one-page report indicating whether or not the subject saw his child and what results were reported to both parents. RESULTS Since the subjects for this investigation were not randomly assigned to groups, comparisons were made between the experimental and control groups to be sure that there were no socio-economic differences between the two groups. The two groups were comparable on variables of sample size, marital status, age, income, ethnicity, and education. Pre-exam state anxiety scores were comparable for both groups. Mean scores were 31.2 and 31.8 for the experimental and control groups respectively. Standard deviations for the experimental and control groups were 8.1 and 10.0, respectively. Therefore, it may be concluded the two groups closely represented the same population on the variable of state anxiety prior to the examination. Father's trait anxiety scores were also compared. Mean scores for experimental and control groups were 30.3 and 33.1, respectively. Standard deviations were 7.0 and 8.1 for the experimental and control groups. It may also be concluded that these two groups of fathers closely represented the same population on the variable of trait anxiety. Tests of the effects of the experimental condition were conducted by comparisons of change scores between pre-testing and post-testing. Tests of significance to compare means and variances on pre/post-test state anxiety scores are found in Table 1. Computation of gain scores for state anxiety are found in Table 2. Tests of significance to compare means and variances on pre/post-test subjective stress scores are found in Table 3 and computation of gain scores for subjective stress are found in Table 4. The level of significance was set at .05 in all cases.

Table 1

Pre and Post Exam Scores for Variable of State Anxiety

	<i>Experimental</i>		<i>Control</i>		<i>p = ns</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pre-Exam	31.2	8.1	31.8	10.0	
Post-Exam	28.3	8.5	29.1	8.9	

Table 2

Gain Scores: Pre and Post Exam Differences on Anxiety Scores

	<i>Mean</i>	<i>SD</i>	<i>p = ns</i>
Experimental	-2.9	5.8	
Control	-2.6	6.3	

Table 3

Pre and Post Exam Scores for Variable of Subjective Stress

	<i>Experimental</i>		<i>Control</i>		<i>p = .05</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pre-Exam	21.1	21.6	20.3	23.4	
Post-Exam	11.4	17.4	15.6	16.5	

As can be seen from Tables 1 and 2, both groups of fathers reported slight downward trends in anxiety scores however these scores were non-significant and may simply be attributable to error variance. However, post-test scores for the stress variable shown in Table 3 demonstrate a difference at the .05 level of significance. The mean post-test score for the experimental group who saw their unborn child was reduced by more than half. As seen in Table 4, the differences in gain scores were also found to be significant. The mean reduction in gain scores for the experimental group was slightly more than twice that of the control group. This appears to confirm the significant difference in levels of stress between the two groups after the experimental subjects were exposed to fetal imaging.

Table 4

Gain Scores: Pre and Post Exam Differences on Stress Scores			
	<i>Mean</i>	<i>SD</i>	<i>p = .02</i>
Experimental	-9.8	22.3	
Control	-4.8	25.6	

DISCUSSION In the present study, the short-term effects of fetal imaging on paternal anxiety and stress were investigated. This was accomplished by attempting to measure the responses of expectant fathers who attended routine pregnancy examinations with their wives. The intent was to provide a baseline of responses for fathers involved in normal, low-risk pregnancies. There were no overall differences in post-examination levels of state anxiety. Therefore, it does not appear that exposure or lack of exposure to fetal imaging of their unborn had any significant effect on anxiety as reported by either group of fathers. Thus, there appears to be no support for the first hypothesis that exposure to fetal imaging would result in significant reduction of paternal anxiety. On the variable of paternal stress, however, there were significant reductions for fathers in the scanning group compared to fathers in the no-scan group. The differences reported in this study seem to confirm the results of earlier investigations with expectant mothers, and so appear to support the second hypothesis of the current study. Specifically, that fathers who were exposed to fetal imaging of their unborn child did experience significant reductions in their levels of stress as compared to fathers who did not view their unborn children. Before drawing any conclusions it is necessary to explore possible explanations for the results of the current study. As previously stated, the fact that these fathers were all involved in known low-risk pregnancies may explain why there was no significant anxiety to begin with. Since there are no previous studies of expectant mothers in low-risk pregnancies on the variable of state anxiety, it is difficult to make comparisons. However, one possible explanation for this phenomenon is the relationship of sex role to anxiety. Bander and Betz (1981) have demonstrated that self-reported anxiety in low-stress situations is significantly lower in males than females. Their theoretical assumption may very well apply to the subjects of this investigation. The overall low scores may simply have been the result of a "floor effect." Subsequent re-examination of individual scores on the variable of subjective stress provided a rather interesting statistic. Of the 32 fathers who did not see their child in-utero, six of these fathers reported elevations in their level of stress after the exam. This was not the case for the 35 fathers who saw live imaging of their unborn child. Not one of these fathers reported any elevations in stress. Again, this appears to confirm similar results in previous studies. An examination of the adjective word choices of the fathers on the Subjective Stress Scale (see Table 5) also demonstrates the general downward trends in reported stress of the experimental group as compared to the control group. Of particular note is the increased usage of the adjective "wonderful" by those fathers who saw their child via ultrasound. Exposure to fetal imaging apparently produced feelings of elation for many of these men.

Table 5**Distribution of Word Choices for Subjective Stress Scale**

Adjective	<i>Experimentals</i> (n = 35)		<i>Controls</i> (n = 32)	
	Pre-Exam	Post-Exam	Pre-Exam	Post-Exam
Wonderful	6	16	7	6
Steady	3	3	2	2
Comfortable	15	6	10	13
Fine	6	8	8	9
Nervous	4	1	3	1
Worried	1	1	2	1

Note: None checked the adjectives indifferent, didn't bother me, timid, unsteady, unsafe, frightened, panicky, or scared stiff.

Although anecdotal, I think it valuable to report some of the informal responses of these fathers. Several subjects who had the benefit of viewing the fetus exhibited and reported noticeable feelings of happiness, excitement and reassurance. Many of these fathers also verbally expressed feelings of gratitude for having been able to participate in this study. These fathers expressed an appreciation for the fact that their experiences and feelings regarding this aspect of pregnancy was felt important enough to be explored. It is interesting to note that of the 90 fathers who participated in this study, 89 specifically expressed a desire to know the results of the study. IMPLICATIONS FOR FURTHER RESEARCH As with most scientific research, this study provides us with many more questions than it does answers. Constraints of time and the desire not to unduly disrupt the smooth operating procedure of the support staff and the patients they served imposed certain limitations on the focus of the present study. In this light, I would like to suggest several possible avenues for further exploration. First, different examination settings should be considered for future investigations. It is possible that father's responses in a hospital or clinic situation may be different from fathers in a private practice setting. Second, although the fathers in this study were homogenous on variables of age, income, education, and ethnicity, they are not necessarily representative of the general population. I would suggest that fathers from more varied and diverse socio-economic backgrounds also be studied in order to determine what similarities or differences may arise due to demographic/ socio-economic variables. Third, it may prove more productive to measure responses of first-time fathers as compared to men who have previously had children. Fourth, in addition, it would probably be beneficial to determine each fathers' experience with ultrasound and correlate that experience with possible stress reduction. It is likely that a larger sample size would be required in order to replicate and extend the present study for these variables. Fifth, it is possible that the results of this study and father's reported emotional responses to fetal imaging may have less to do with anxiety and stress and more to do with other psychological issues. For example, it may be possible that the exposure to the ultrasound scan may have also facilitated a father's attachment to his unborn child. It was suggested earlier that perception of fetal movement could possibly enhance the process of attachment. Therefore, it would be most interesting to see an investigation exploring what effect, if any, fetal imaging might have on paternal attachment. Sixth, I would also like to suggest that it might be valuable to assess the degree of reassurance that a father may be experiencing as a result of viewing ultrasound imaging of his child. If the normalcy and viability of his child could be further confirmed or enhanced with ultrasound it may help to allay many of the normal stresses and fears which an expectant father might be experiencing. It is possible that the increased sense of elation that many of these fathers reported may have been as a result of seeing first-hand that their baby appeared to be normal and healthy. Finally, I want to focus on what may be the most profound aspects of fetal imaging upon the expectant father. I am referring to the emotional impact of fetal imaging upon the expectant father who is involved in a high-risk pregnancy. This

author believes that it may be this group of parents who could experience the greatest potential benefit and possibly the most harm when exposed to fetal imaging. Hypothetically, this group of fathers may be able to benefit from the reassurance of a healthy exam outcome for their unborn child and the mother. It is quite possible, that this group would experience significant anxiety and stress reduction as opposed to fathers in the present study who were involved in known low-risk pregnancies. Conversely, negative results of such an exam could be disastrously painful for the father who views his unborn child in-utero in the event of fetal and/or maternal demise. This poses serious ethical and moral questions which were well beyond the scope of the present study. Nonetheless, I firmly believe that these issues need to be the focus of some future investigations. To summarize, it has been suggested that a social change with potentially important but perhaps unrecognized psychological consequences may be gradually unfolding as a result of advances in ultrasound technology. As these ultrasound examinations are becoming more routine we are also discovering that fathers are becoming increasingly present during these exams. Fletcher and Evans (1983) have also suggested that a new stage of human existence, "prenatality," may be emerging as an outgrowth of ultrasound technology. As this appears to be the case, many fathers' first view of their child will increasingly occur before birth. Therefore, this author strongly encourages the continuing exploration of the potential impact of this diagnostic technique. In doing so we can further our attempts to psychologically keep pace with the rapidly expanding use of this technology and, thus, more fully understand what its potential for harm and benefit is to the expectant father, mother, and developing family.

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