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EFFECTS OF PREVIOUS PREGNANCY LOSS ON LEVEL OF MATERNAL ANXIETY AFTER PRENATAL ULTRASOUND SCREENING FOR FETAL MALFORMATION

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*The impact of previous stillbirth, miscarriage, or preterm delivery on anxiety in pregnant women in various subgroups at high risk for fetal abnormality in comparison with a nonrisk control group of women with healthy uncomplicated pregnancies was studied longitudinally. The level of anxiety in women (*n = *674) during early pregnancy was assessed by questionnaire. Data were collected at three points in time: immediately before the ultrasound scanning, at 5–6 weeks, and at 10–12 weeks after the prenatal examination for fetal malformation. In general, all women with high-risk pregnancies (*n = *506) showed high levels of anxiety immediately before ultrasound scanning. There was a significant decrease in anxiety over the following 10–12 weeks. By contrast, level of anxiety was not raised in the no-risk control group (*n = *168). However, pregnant women*

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who had experienced miscarriage or stillbirth in previous pregnancies showed increasing or persistently high levels of anxiety over time. We believe it is very important to screen women whose levels of anxiety are consistently high or escalating and to offer psychotherapeutic counseling as a means of preventing pregnancy complications.

Ultrasound scanning is a widely used diagnostic tool in prenatal care. In Germany, health insurance pays for two ultrasound screenings during pregnancy. One scan is done during the 18th–22nd week of gestation to detect fetal abnormalities. If a risk factor or an indication of fetal abnormality is detected, the pregnant woman is transferred to a center specializing in the detection of fetal malformation (prenatal diagnosis of Stage III) (Terinde, 1989). The fetus, placenta, and uterus can be screened in detail between the 18th and the 22nd week of gestation (Acton & Oats, 1984; see also Crowther et al., 1999). In a study by Götzmann et al. (2002), 96.4% of pregnant women were found to favor ultrasound scanning as one of the routine procedures for prenatal diagnosis, regardless of whether the suspected malformation was confirmed or not or whether the pregnancy went to term or was terminated prematurely.

With the widespread use and acceptance of ultrasound screening during pregnancy, more is known about the psychological impact of this technology (for a comprehensive review, see Garcia et al., 2002). There is some indication that the visualization of a normal fetus during routine scanning is very attractive to women and their families (Garcia et al., 2002). However, results are contradictory with regard to the benefits of ultrasound visualization of the fetus (Kovacevic, 1993; Schönholzer, Götzmann, Zimmermann, & Buddeberg, 2000). Some studies have found positive effects in pregnant women who visualize the fetus in real time. In several studies, women reported a more positive attitude toward their pregnancy and more positive feelings of prenatal bonding (Black, 1992; Campbell et al., 1982; Kohn, Nelson, & Weiner, 1980; Milne & Rich, 1981). In other studies, however, these effects did not persist during the course of pregnancy and beyond birth (Hunter, Tsoi, Pearce, Chudleigh, & Campbell, 1987) or were not evident at all (Heidrich & Cranley, 1989; Kemp & Page, 1987). Baillie and Hewison (1999) showed in their review that most of these results are not very well documented by longitudinal research data

based on empirical research. From our clinical experience with psychotherapeutic intervention—particularly with crisis intervention—at the Subdepartment of Prenatal Diagnosis and Sonography in Gynecology (University of Ulm), we know that many pregnant women become very anxious while waiting for ultrasound scanning, especially if risk factors have been diagnosed previously (Brisch, 1998).

Prospective studies on the development of anxiety in the context of amniocentesis and chorion villus sampling are not reported on extensively here, as no comparison group undergoing ultrasound scanning was involved (Caccia, Johnson, Robinson, & Barna, 1991; Marteau et al., 1989; Möbus et al., 1992; Pauli, Blaser, & Herrman, 1990; Sjögren & Uddenberg, 1988; van Zuuren, 1993). The results of van Zuuren's study (1993) suggest that the invasive approach (needle insertion) to amniocentesis in particular may increase anxiety in pregnant women. Women are afraid that their fetus may be harmed by the technique or that they may even lose their child, which is a known complication with this method. Van Zuuren (1993) was able to show that levels of anxiety in pregnant women were lower after amniocentesis than before, even though the women did not yet know the results of the amniocentesis. The results showed that the technique itself can induce anxiety (Caccia et al., 1991).

Lumley (1990) and Michelacci et al. (1988) demonstrated that anxiety in pregnant women was high just before ultrasound scanning but that levels were reduced if there was positive feedback indicating that the development of the fetus was normal. In contrast to these findings, Zlotogorksi et al. (1996) could not explain the overall reduction in maternal anxiety after ultrasound scanning by different levels of feedback provided by the clinician (see also Eurenius, Axelsson, Gällstedt-Fransson, & Sjöden, 1997). With respect to urogenital abnormalities, Madarikan et al. (1990) found that levels of anxiety in pregnant women were high beginning at the time the fetal abnormality was detected by ultrasound and were not reduced until after birth, when the malformation was surgically corrected. In a study by Björkhem et al. (1997), anxiety decreased after normal fetal echocardiography both in women who had previously lost a child to heart disease and in those whose child with a cardiac failure was still alive. Kowalcek et al. (2002) showed a significant reduction in anxiety after

ultrasound scanning in women with a nonsuspicious scan but not in those with a suspected diagnosis of fetal malformation (see also Brisch et al., 2002). Detection of minor anomalies by prenatal scanning may generate disproportional maternal anxiety, as the findings of Thomas (2001) indicate. Levels of anxiety were significantly above the norm in both men and women before ultrasound scanning, but the men felt less stressed and experienced less anxiety than their pregnant partners (Götzmann, Kölble, et al., 2002).

There was, however, no information on whether pregnant women had experienced complications in previous pregnancies, or how they coped with the results of ultrasound screening in a following pregnancy. It is well documented that a previous pregnancy loss due to congenital anomalies can influence maternal quality of life and emotional reactions toward later pregnancies (Hunfeld et al., 1993, 1996; Salvesen, Oyen, Schmidt, Malt, & Eik-Nes, 1997). In a longitudinal prospective study, Brisch et al. (2003) found that pregnant women fell into one of three broad categories in terms of coping strategies or patterns: cognitive-oriented coping, emotion-oriented coping, or action-oriented coping. A woman's specific coping strategy either decreased or increased anxiety or had no influence on the level of anxiety longitudinally. Thus, the pattern and quality of coping mechanisms might also explain the course of maternal anxiety after ultrasound screening for fetal malformation. Coping might be influenced by the information given by clinicians about the specific purposes of ultrasound scans and what they can and what they cannot achieve (Garcia et al., 2002; Zlotogorski, Tadmor, Duniec, Rabinowitz, & Diamant, 1995), including information about the possibility of false-positive and false-negative results (Hutton & Spicer, 1994) and their psychological aftermath. Women might fear detection of a malformation as much as the possibility that it will be missed on examination (Kowalcek et al., 2002), and the ultrasound scanning as such could provoke an anxious maternal reaction (Teichmann, Rabinovitz, & Rabinowitz, 1991). Counseling might be helpful in this situation. Parents who received multidisciplinary counseling in the management of fetal surgical anomalies showed less anxiety than those counseled only by the obstetrician after birth (Alte et al., 2002).

Hypothesis

The objective of this prospective longitudinal study was to analyze the development of anxiety before and after ultrasound scanning over a period of 12 weeks with measurements taken at given intervals. We hypothesized that previous complications in pregnancies influence maternal anxiety, as discussed in the medical literature (Brisch, 1998; Feldman, 1990; Sjögren & Uddenberg, 1988, 1990; Zuskar, 1987). The results should extend our knowledge about risk groups that potentially need psychotherapeutic intervention to cope with high levels of anxiety.

Method

Design

The Ulm prospective longitudinal follow-up study on anxiety and coping processes after prenatal ultrasound scanning for fetal abnormalities was a joint project of the Department of Psychotherapy and Psychosomatic Medicine and the Subdepartment of Prenatal Diagnosis at the Women's Hospital, University of Ulm. The study was approved by the ethics committee of the University of Ulm.

All of the women were seen during the waiting period immediately before ultrasound scanning (T0). Data were collected with questionnaires, and every 10th woman was asked to participate in a semi-structured interview. The questionnaires and the interview were repeated again after 4–5 weeks (T1) and after 8–10 weeks (T2). The purpose of the study was to collect longitudinal data on the development of anxiety. During the follow-up period, some pregnant women had several ultrasound scans to confirm the diagnosis or to get a clear picture of the further development of the fetus. Sometimes the diagnosis was not confirmed until at least 5–10 weeks after the first examination and the first data sampling. This suggests that some women had to cope with a longer period of uncertainty, as they did not have a precise diagnosis until 8–10 weeks post-T0.

After informed consent, the pregnant women were asked to fill out a questionnaire on state and trait anxiety (STAI) (Laux,

Glanzmann, Schaffner, & Spielberger, 1981; Spielberger, Gorsuch, & Lushene, 1970). State anxiety measures the situational anxiety that is provoked by the scanning for fetal malformation; trait anxiety is a characteristic feature of personality, with some women being more anxious than others regardless of the situation. Further methods were applied for data collection: a questionnaire on coping processes (Heim, Augustiny, Blaser, & Schaffner, 1991); a prenatal attachment scale (Brisch, Bemmerer-Mayer, & Nehb, 1994; Cranley, 1979, 1981); a questionnaire on sociodemographic data, family and life situation, and critical life events (Brisch & Bemmerer-Mayer, 1994); a questionnaire on social support (Brisch, Bemmerer-Mayer, Buchheim, & Köhntop, 1994); and a questionnaire on personality (Fahrenberg, Selg, & Hampel, 1973). Diagnosis of fetal malformation by ultrasound scan was recorded in order to determine whether there was a difference in level of anxiety and coping styles as a result of positive findings or the extent of the malformation. At T1 and at T2, the pregnant women were again asked to fill out the same questionnaires on anxiety, on coping, and on prenatal mother-fetus attachment. At T2, the latest most precise diagnosis was recorded.

Sample

The total sample size was 674 pregnant women in the second trimester (16th–24th week of gestation): 506 women were in the high-risk group, and 168 women were in the no-risk control group. The pregnant women in the high-risk group were contacted and informed about the aims of the study when they came to Women's Hospital for prenatal ultrasound scanning because of the risk of fetal malformation. The control group included pregnant women who were seen for routine ultrasound scanning at University Hospital or in the practice of gynecologists and obstetricians. No risk factors had been determined to that point. The women were included in the study after receiving a full explanation of the study and providing informed consent. The acceptance rate was very good: 88.7% of the pregnant women contacted consented to taking part in the study. The dropout rate was 21.6% as of the latest follow-up. The high-risk group was further divided into subgroups (Table 1).

TABLE 1 Sample Subgroups

Subgroup	Frequency	%
Control	168	24.9
Suspected fetal abnormality	95	14.1
Complications in previous pregnancy	100	14.8
Maternal disease or medication	92	13.6
Advanced maternal age (>35 yrs.)/no amniocentesis	72	10.6
Endocrinological test (e.g., alpha-feto-protein)	82	12.2
Multiple risks	65	9.6
Total	674	100.0

SUBGROUP 1: "SUSPECTED FETAL ABNORMALITY"

Pregnant women who had already been diagnosed by an obstetrician as showing signs of suspected malformation of the fetus (e.g., hydrocephalus, omphalocele, spina bifida, gastroschisis) were transferred to the University Center with its specialized diagnostic facilities, where the diagnosis was to be confirmed.

SUBGROUP 2: "COMPLICATIONS IN PREVIOUS PREGNANCIES"

This subgroup included pregnant women who had experienced complications in previous pregnancies (e.g., abortus, fetal malformations, prematurity, miscarriage, stillbirth).

SUBGROUP 3: "MATERNAL DISEASE/MEDICATION"

This subgroup comprised pregnant women who suffered from infections or chronic diseases and needed ongoing medication which might result in a risk of fetal malformation, miscarriage, or other complications in the current pregnancy (e.g., rubiella infection, cytomegaly, borreliosis, epilepsy, diabetes mellitus).

SUBGROUP 4: "ADVANCED MATERNAL AGE"

Pregnant women who were older than 35 and who were at risk for fetal abnormalities because of their age were included in this subgroup, along with those who did not accept amniocentesis or chorion villus sampling.

SUBGROUP 5: "ENDOCRINOLOGICAL TEST"

This subgroup consisted of pregnant women who had undergone endocrinological diagnostic screening during the current pregnancy (e.g., alpha-fetoprotein screening) and showed elevated

blood levels resulting in a significantly increased risk of fetal malformation. High endocrine blood levels in particular proteins can be associated with a risk of Down syndrome or spinal cord defects. Further diagnostic procedures such as ultrasound scanning were then recommended to come to a more definitive diagnosis. Unfortunately, some pregnant women seemed to have been less than completely informed about the aims of blood sampling. Some did not know about the potential of false-positive or false-negative results.

SUBGROUP 6: "MULTIPLE RISKS"

Finally, subgroup 6 comprised pregnant women who had a combination of more than one risk factor.

The number of fetal malformations detected was quite different in these subgroups (Table 2). In the control group, 2.4% of the pregnant women with normal pregnancies had pathological findings. The highest rate of fetal malformations (58.9%) was detected in the high-risk subgroup of women who had already been transferred to the center because of suspected fetal abnormalities.

Statistical Analysis

The statistical analyses were done using SPSS 10.0 for Windows. We used chi-square tests for discrete variables and, depending on the distribution of the data, we applied independent samples *t* tests and Mann-Whitney *U* tests, ANOVAs, and Kruskal-Wallis *H* tests for several independent samples and Wilcoxon related samples tests to compare the results in the different groups. For comparisons of results at different points in time, we used general linear modeling (GLM) with repeated measures.

Results

Description of Sample

The high-risk group and the no-risk control group showed no significant differences on most of the sociodemographic variables (Table 3). There was a significant difference ($p = .000$) only in terms of age, with a higher percentage of older women in the high-risk group. This was because the subgroup with the "advanced maternal age risk factor" was in the high-risk sample.

TABLE 2 Pathological Fetal Malformation Findings in Subgroups

Subgroup	Diagnosis after ultrasound scanning	
	No pathological finding	Pathological finding
Control		
Count	164	4
% within subgroup	97.6	2.4
Suspected fetal abnormality		
Count	39	56
% within subgroup	41.1	58.9
Risks in previous pregnancy		
Count	92	8
% within subgroup	92.0	8.0
Maternal disease/medication		
Count	89	3
% within subgroup	96.7	3.3
Advanced maternal age		
Count	69	3
% within subgroup	95.8	4.2
Endocrinological test		
Count	73	9
% within subgroup	89.0	11.0
Multiple risks		
Count	51	14
% within subgroup	78.5	21.5
Total		
Count	577	97
% of total	85.6	14.4

Furthermore, level of education was significantly higher in the control than in the high-risk subgroups ($p=.012$). In addition, there was no statistical difference in the variables shown in Table 3 between the women in the control group who were recruited from the University Hospital and those who came from private practice.

Levels of Maternal Anxiety

All pregnant women in the high-risk subgroups showed significantly higher levels of anxiety immediately before ultrasound scanning (at T0) than did those in the control group. The two subgroups that had the highest levels of anxiety were Subgroup 1 (concrete signs of fetal malformation) and Subgroup 5 (pathological

TABLE 3 Sociodemographic Data

Variable	Control group ($n = 168$)	High-risk groups ($n = 506$)	Test
Maternal age			
M	30.7	32.3	$f = -4.266$
SD	3.2	4.7	($df = 668$),
Range	20–37	17–45	$p = .000^{**}$
Education (%)			
Senior high school	41.5	30.3	$\chi^2 = 9.734$
Junior high school	40.3	42.0	($df = 3$),
Ext. elementary school	18.2	26.7	
Special school education	0	1.0	$p = .021^{*}$
Professional education			*ns*
Professional status			*ns*
Marital status (%)			*ns*
Married	81.4	84.3	
Not married	14.9	12.5	
Divorced/separated	3.7	3.2	
Living with a partner (%)			*ns*
Yes	96.2	98.4	
No	3.8	1.6	

Note. t = independent samples t-test; χ^2 = Pearson chi-square test.
$^{*}p < .05$; $^{**}p < .001$.

endocrinological tests). These two groups had even higher levels of anxiety than the multiple-risk subgroup (Subgroup 6). The lowest level of anxiety was seen in Subgroup 4 (advanced maternal age). However, in this age-risk subgroup, the anxiety level was still higher than in the control group and lower than in the subgroup with previous pregnancy risk (Subgroup 2) (see Figure 1).

Statistical analysis showed that the levels of anxiety within the subgroups were significantly different at T0 ($p = .000$) and T1 ($p = .001$) but not at T2 ($p = .689$). With regard to longitudinal development of anxiety, there was a significant decrease in level of anxiety in each sub-group from T0 to T1 and T2 (Brisch et al., 2002).

Anxiety and Pathological Findings of Fetal Malformation

For the same sample described here, Brisch et al. (2002) reported that pregnant women who were confronted with a definitive diagnosis of

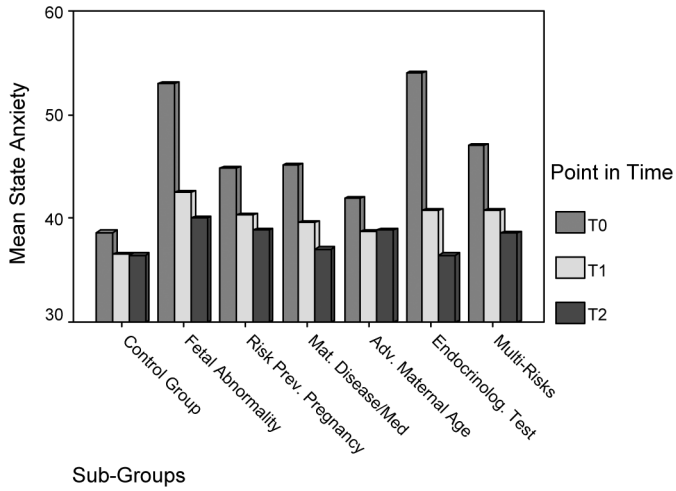

FIGURE 1 State anxiety of subgroups.

fetal malformation had significantly higher levels of anxiety even before their ultrasound examination at T0, as well as at T1 and T2, than did women with no pathological findings. The difference in the reduction in anxiety from one point in time to the next was significantly greater in women with confirmed pathological findings than in women with no diagnosis of fetal abnormality. In contrast to these results, the level of trait anxiety was not significantly elevated in women with confirmed fetal abnormalities.

Contrary to these findings, pregnant women in the control group with no risk of fetal abnormalities did not show raised levels of anxiety comparable to the female control group in Spielberger et al. (1970). Control variables (e.g., sociodemographic variables) did not show a significant correlation with level of anxiety at any of the three data sampling points.

Increases in Levels of Anxiety

Contrary to the overall decreases in level of anxiety in the total sample, a small subsample of women (11.9%) showed increasingly high levels of anxiety from T0 to T2. The cutoff point for "increase in anxiety" was defined such that the mean difference in anxiety level had to increase more than one standard deviation from T0 to T2. Even in the control group of pregnant women with no risk

TABLE 4 Increases in State Anxiety from T0 to T2 and Pregnancy Experiences

	Increase in state anxiety from T0 to T2	*n*	*m*	*SD*	Test Mann-Whitney *U* test *Z*	*p*
Children	No increase	463	.89	1.18	−2.493	.013
	Increase	62	1.13	.95		
Pregnancies	No increase	456	1.17	1.20	−4.046	.000
	Increase	62	1.85	1.33		
Deliveries	No increase	456	.82	.89	−2.639	.008
	Increase	62	1.11	.93		
Preterm deliveries	No increase	460	5.26E-02	.26	−.557	.578
	Increase	62	6.45E-02	.25		
Miscarriage	No increase	460	.25	.60	−2.595	.009
	Increase	62	.48	.84		
Stillbirth	No increase	460	3.04E-02	.17	−2.552	.01
	Increase	62	9.68E-02	.30		
Induced abortion	No increase	460	7.61E-02	.29	−.819	.413
	Increase	62	.13	.42		
Other pregnancy complications	No increase	460	9.13E-02	.32	−.771	.44
	Increase	62	.11	.32		

factor, 13.3% (vs. 11.4% in the high-risk subgroups) showed a low level of anxiety at T0 but a high level at T1 and an even higher level at T2. These women were differentiated neither by subgroup category nor by the result of a confirmed diagnosis of fetal malformation but were characterized by a significantly larger number of children, pregnancies, and deliveries before this risky pregnancy. They had, in fact, experienced significantly more miscarriages and stillbirths in previous pregnancies. Other previous complications, such as preterm delivery and induced abortion, did not correspond significantly with increases in anxiety (Table 4).

Persistent High Levels of Anxiety

We also found another subgroup of pregnant women who had high levels of anxiety at T0 that stayed high at T1 and even at T2 (1.8% of the women in the control group and 5.8% of the women in the high-risk subgroups). A persistent high level of anxiety was defined by the highest value of anxiety at T0 that was

TABLE 5 Trait Anxiety and Persistent High Levels of State Anxiety at Different Points in Time

State anxiety	Trait anxiety at T0	State anxiety at T0	State anxiety at T1	State anxiety at T2
Decreasing				
n	576	578	488	504
M	36.4444	43.0779	38.1373	36.4544
SD	8.1296	12.8245	9.6324	10.0342
Permanent high level				
n	29	29	28	29
M	47.8966	64.4828	54.7857	60.7241
SD	8.1475	5.9499	8.7786	5.1471
Total				
n	605	607	516	533
M	36.9934	44.1005	39.0407	37.7749
SD	8.4847	13.3832	10.2972	11.2673

reached by the women with a suspected fetal malformation ($M=54$). Anxiety at T2 ($M=60.72$, $SD=5.14$) remained at a level that was in the upper range (the maximum possible level of anxiety is 80) (Table 5). These pregnant women were differentiated neither by sociodemographic factors nor by subgroup, but they had significantly more confirmed fetal abnormalities after ultrasound scanning ($\chi^2=7.867$, $df=1$, Fisher's exact test $p=.001$). Nevertheless, not all pregnant women with confirmed pathological findings showed persistent high levels of anxiety from T1 to T2. These two subgroups of pregnant women with fetal malformations (one subgroup with a consistently high level of anxiety and one with a decrease in anxiety from T0 to T2) were differentiated only by one additional variable from their previous pregnancies: The women with persistent high levels of anxiety had experienced stillbirths significantly more often in the past.

In summary, the pregnant women who experienced extremely high anxiety at all three points in time also had a high trait level of anxiety at T0 ($M=47.89$, $SD=8.48$, vs. $M=36.44$, $SD=8.13$, in the group with decreasing anxiety) (Table 5). Furthermore, they showed significantly ($p=.000$–$.029$) different results on some of the personality test variables (i.e., less content with life

situation, higher level of arousal, more somatic complaints, more openness, more emotionality).

Discussion

Pregnant women who had risk factors for fetal malformation showed higher levels of anxiety before ultrasound scanning than those with no-risk pregnancies. In general, however, level of anxiety decreased significantly in the follow-up period after the ultrasound scanning in all high-risk groups. Thus, for many women, anxiety can increase just before ultrasound examination and screening for fetal abnormalities, but they are then better able to cope with the results after the tests, as anxiety levels decrease during the following 12 weeks (Brisch et al., 2002).

Despite overall decreases in levels of anxiety in pregnant women in the high-risk subgroups, there was a small subsample that showed increasing levels of anxiety from T0 to T1 and even to T2. The results from this subsample, which was recruited from *all* of the high-risk subgroups, were opposite those of the mainstream development of level of anxiety in the longitudinal follow-up. In line with our hypothesis, this subgroup was distinguished from the other high-risk subgroups by the correlation observed with the variables of previous stillbirth and miscarriage. This correlation was also found in the control group, which was characterized by a normal course of pregnancy without risks and complications. Nevertheless, the women in the control group who had previously experienced stillbirth and miscarriage had increasing levels of anxiety despite the obstetrician's confirmation that the fetus was healthy and that the development of the present pregnancy was uncomplicated. This unusual increase in levels of anxiety might be influenced by the experience of previous—perhaps traumatic—complications. Women may be afraid to lose their baby again, as Hunfeld et al. (1993, 1996) found elevated stress reactions in these women to subsequent pregnancies. If a previous stillbirth or miscarriage has not been adequately mourned (Beutel, Deckhardt, Rad, & Weiner, 1995), then the emotional background of this experience may be reactivated by the new pregnancy and may increase anxiety (Hughes, Turton, Hopper, & Evans, 2002). This would explain why women who remained at a persistently high level of anxiety had a higher level of arousal and

more somatic complaints, which may be a sign of posttraumatic stress disorder, as Seng et al. (2001) found in their study of post-pregnancy complications. The actual normal development of the fetus does not seem to be an adequate source of reassurance (Bourne & Lewis, 1984; Condon, 1986; Radestad, Steineck, Nordin, & Sjögren, 1996).

In the high-risk group, many of these pregnant women, especially those in the subgroup with complications in previous pregnancies, had experienced stillbirth or miscarriage, so an increase in anxiety in these women was not surprising. But women with increasing levels of anxiety over time came from all of the high-risk subgroups. This result is very important, as 13.3% of women in the control group and 11.4% in the high-risk group showed this course of increasing anxiety.

A second extraordinary subsample of pregnant women was distinguished by an extremely high, persistent level of anxiety at both T0 and T2. These women were not comforted by the results of the ultrasound scanning, and therefore did not show any decrease in anxiety over time. These women also differed from the other high-risk samples in having experienced more than one stillbirth in the past. These past experiences, which had demonstrated that things can indeed go wrong during pregnancy, might have made them even more anxious in their following pregnancy regardless of its course. Their hopes for an uncomplicated pregnancy as well as their anxiety at being confronted again with the potentially traumatic experience of stillbirth may be very intense. In this highly ambivalent emotional state, they may be "on alert" during the entire pregnancy. Anxiety cannot decrease before the child is born, because a healthy birth is the only outcome that removes the fear of another stillbirth and the anxiety that this fear causes.

The persistent high levels of anxiety in these women were warranted by their experience that fetal malformation is more often confirmed by ultrasound. These women had elevated trait levels as well. This could indicate that a personality feature may also conflict with the results of consistently high levels of anxiety. Furthermore, one could argue that the experience of stillbirth, in particular, could have had a long-term effect on personality in the form of emotional alertness, which may be reflected in higher trait anxiety and in increasing or persistently high levels of state anxiety.

These two special groups of pregnant women could form the target groups for psychological interventions, as one might imagine that increasing or persistently high levels of anxiety during the course of pregnancy may interfere with the somatic development of the fetus and the integrity of the pregnancy as a result of anxiety-induced elevation in vascular resistance in the placenta and a decrease in alimentary and oxygen supply to the fetus (Teixeira, Fisk, & Glover, 1999).

Limitations

Johnson and Slade (2003) discussed in their review whether the State-Trait Anxiety Inventory (Spielberger et al., 1970) is valid as a measurement of anxiety in a pregnant sample. Although the stability of this instrument was explored as a viable anxiety measure in pregnant women, the test-retest reliability of the trait scale was low around the time of delivery. In our study, we did not measure anxiety around the time of delivery. Nevertheless, Johnson and Slade (2003) questioned the use of this tool, especially during the third trimester of pregnancy. Newer instruments that focus on and evaluate specific anxieties in pregnancy in greater detail have not yet been well evaluated and must still prove their validity and reliability (Johnson & Slade, 2003). This underscores our decision to evaluate anxiety in our study using Spielberger's inventory.

Variations in the periods of time that women had to wait to learn their diagnoses introduced extraneous variables that were not accounted for in any of the analyses. Some women had additional ultrasounds, and some had delayed diagnoses. Timing of the receipt of the results could have affected anxiety levels.

Different levels of feedback given during or after the ultrasound examination were not registered in this study. However, findings from previous studies suggest that level of anxiety after ultrasound scanning for detection of malformation is unaffected by amount of feedback given (Eurenius et al., 1997; Zlotogorski et al., 1995, 1996).

We did not examine the amount and type of information women received from their obstetricians *before* they underwent testing for fetal malformations. Especially in the group with endocrine testing, knowing that the endocrinological test was not definitive may have influenced level of anxiety.

By design, there should have been no women in the control group with previous histories of stillbirth or miscarriage. Although these women presented to the ultrasound examiner with a "normal, uncomplicated pregnancy and no previous history of pregnancy complications," the data from their questionnaires revealed that there had been previous pregnancy complications in 2.4%, which is similar to the basic overall rate of 3% (Terinde, 1989). This discrepancy between oral communications to the examiner and written information in the questionnaire remains a factor of uncertainty.

Conclusions

Early prenatal ultrasound screening for fetal malformation can be a useful tool for detecting fetal anomalies during early pregnancy. Many women with high-risk factors for fetal malformation showed a decrease in their level of anxiety, and in the following course of their pregnancy their anxiety was comparable to that of women with a healthy pregnancy.

The results revealed several subgroups that should be addressed in further psychological intervention studies. Women with a confirmed diagnosis of malformation may need some form of longitudinal guidance and support (Leon, 1990; Stray-Pedersen & Stray-Pedersen, 1988). This could consist of clear information about risks, teaching of coping skills, anxiety reduction techniques, cognitive-behavioral therapy or more psychodynamically oriented psychotherapy to work through previous pathological or traumatic grieving (Condon, 1986; Ladker & Toedter, 1991; Lin & Lasker, 1996; Theut, Pedersen, Zaslow, & Rabinovich, 1988), or group counseling (Kaiser et al., 2002). Although the level of anxiety among these women decreased over time, it still stayed higher than in the other sub-groups. This is not surprising, as more than 50% of these women received a confirmed diagnosis that the expected child would have a malformation. Obstetricians should not be misled by the decreasing anxiety observed overall, as these women still needed psychosocial support to cope with the first phase of emotional shock and for the long-term coping process (Franche & Culow, 1999).

Two groups that could potentially benefit from intervention were found during this study: pregnant women with increasing

anxiety and those with extremely, persistently high levels of anxiety. These women came from all subgroups and even from the control group. As the percentage is not low (11.9% of the total sample), it would seem prudent to offer them some form of focused, short-term psychotherapy (Leon, 1990). The background common to these two groups of women seems to be past experiences of miscarriage and stillbirth (cf. Salvesen et al., 1997). The elevated level of anxiety could indicate that these previous events were not worked through and were then reactivated by the new pregnancy—regardless of whether or not it was complicated (Beutel et al., 1995; Franche & Culow, 1999). These issues could perhaps be the focus of a more trauma-oriented psychotherapy (Seng et al., 2001). The results of this study underline the importance of psychological intervention for these women after a miscarriage, a stillbirth, or pregnancy complications of any kind. Results of a recent study indicate that a high level of anxiety during pregnancy is not only a subjective emotional problem for these women, but can also decrease uterine blood circulation, negatively influencing the growth and well-being of the fetus (Teixeira et al., 1999). For these reasons, early psychological support could be used as a preventive measure in intervening in potentially problematic pregnancies.

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