Fetal Movement Counting—Maternal Concern and Experiences: A Multicenter, Randomized, Controlled Trial

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ABSTRACT:  Background: Fetal movement counting may improve timely identification of decreased fetal activity and thereby contribute to prevent adverse pregnancy outcomes, but it may also contribute to maternal concern. This study aimed to test whether fetal movement counting increased maternal concern. Methods: In a multicenter, controlled trial 1,013 women with a singleton pregnancy were randomly assigned either to perform daily fetal movement counting from pregnancy week 28 or to follow standard Norwegian antenatal care where fetal movement counting is not encouraged. The primary outcome was maternal concern, measured by the Cambridge Worry Scale. Analysis was by intention-to-treat. Results: The means and SDs on Cambridge Worry Scale scores were 0.77 (0.55) and 0.90 (0.62) for the intervention and the control groups, respectively, a mean difference between the groups of 0.14 (95% CI: 0.06–0.21, p < 0.001). Decreased fetal activity was of concern to 433 women once or more during pregnancy, 45 and 42 percent in the intervention and control groups, respectively (relative risk = 1.1, 95% CI: 0.9–1.2). Seventy-nine percent of the women responded favorably to the use of counting charts. Conclusions: Women who performed fetal movement counting in the third trimester reported less concern than those in the control group. The frequency of maternal report of concern about decreased fetal activity was similar between the groups. Most women considered the use of a counting chart to be positive. (BIRTH 39:1 March 2012)

Key words: antenatal care, concern, fetal movement, fetal movement counting, worry

Fetal movement counting is a method for pregnant women to quantify and report their baby’s movements (1,2). This method has been developed as a tool to improve the existing maternal self-screening (3) for decreased fetal activity (4–6), and thereby contribute to prevent adverse pregnancy outcomes through early intervention (7,8). The rationale for fetal movement counting is that 1) fetal deaths may be preceded by a decrease in fetal activity (7,9–11); 2) fetal activity is reduced in pregnancies with fetal growth restriction (9,12–14); and 3) maternal perception is the most important source for identification of a decrease in fetal activity (8,15–17).

Fetal movement counting is disputed among health professionals (18,19) because of lack of evidence for its effectiveness in reducing perinatal mortality and morbidity (1,2,6). Critics argue that providing general information on fetal movements is sufficient for most pregnant women (18,20). Fetal movement counting is discouraged in some national guidelines for antenatal care (1,2,6). This work has been supported by grants from the Norwegian SIDS and Stillbirth Society, Oslo, Norway.

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care (21–23), and incorporated in others (24). Lack of evidence of the sensitivity and specificity of fetal movement counting in detecting fetal compromise has raised concerns about its potential negative effects. It has been speculated that fetal movement counting may induce superfluous consultations caused by maternal concern and psychological distress, and increase maternal pressure (6).

Pregnancy is a period in a woman’s life characterized by unique biological, psychological, and social challenges, associated with heightened levels of anxiety, concern, and increased sensibility (25). Psychological distress during pregnancy is of great concern and may lead to reduced placental blood flow (26), and subsequent fetal growth restriction, spontaneous abortions, preterm delivery, and/or low birthweight (26–29). Child development also may be affected (26,30). The strongest negative effects on child development have been reported following pregnancy-specific anxieties (28,29). Pregnant women are predominantly concerned about the baby’s health, but also about a possible miscarriage in early pregnancy, the delivery, and their own physical appearance (31,32). Furthermore, decreased fetal activity is a common reason for maternal concern (3,33,34).

Current Norwegian guidelines for antenatal care include the recommendation to “provide women with general information about fetal activity, promote awareness towards decreased fetal movements and inform women of their need to contact health-care providers if they perceive a decrease” (23). Thus, an ongoing unstructured self-screening of fetal activity is administered and interpreted individually (3,18). Almost one-half of pregnant women have reported concerns about decreased fetal activity on one or more occasions (3). A study has shown that maternal recollection of information received from health professionals about quantitative limits for decreased fetal activity was associated with increased maternal concern, but neither maternal care-seeking behavior nor pregnancy outcomes improved (3).

Although improving the maternal ability to recognize a pregnancy at risk might reduce morbidity and mortality, making the pregnant woman overly concerned must be avoided. So far, there is no evidence of any association between formal fetal movement counting and increased maternal anxiety or concern (35–39). A study by Grant et al identified fetal movement counting as having little, if any, stress-inducing effects on women, suggesting that maternal anxiety could be a reflection of more general concern about fetal activity rather than concern motivated by formal counting (2). Draper et al reported the views of 132 women who filled in fetal movement charts: 55 percent were reassured by filling in the chart, but 23 percent felt it caused them to worry about the health of their unborn baby (40). Thus, further research is needed to assess levels of concern related to fetal movement counting (6).

The main objective of this study was to assess the effect of fetal movement counting on maternal concern in third trimester pregnancies using a validated inventory. In addition, we wanted to explore maternal experiences with the use of fetal movement counting and document specific concerns raised by mothers. This study is the second of three planned manuscripts aiming to explore the effects of fetal movement counting: 1) maternal fetal attachment (41), 2) maternal concern, and 3) identification of fetal risk (submitted).

Methods

Design and Participants

In a randomized, controlled trial pregnant women were assigned the task of either performing formal fetal movement counting from gestational week 28 or receiving standard antenatal care in accordance with the Norwegian guidelines. Eligible women were Norwegian-speaking women with singleton pregnancies, with the exception of pregnancies under consideration of termination at the time of recruitment. Women were recruited from September 2007 through November 2009 at nine Norwegian hospitals from both urban and rural populations, handling a total of 8,200 births annually. None had previously been included in research about decreased fetal movements (33). In Norway, the public antenatal care services are free of charge and encompass almost all pregnant women. Participants were approached during their regular ultrasound screening in pregnancy weeks 17 to 19 (Fig. 1).

Data Collection

A total of 1,155 women returned a signed informed consent. A baseline questionnaire was completed by 1,123 women (97.2%), and the final study sample included for analyses consisted of 1,013 women (Fig. 2). Randomization was determined according to a computer-generated random allocation list. The allocation sequence was concealed until participants were assigned to trial groups. After allocation, blinding for group assignment was not possible for the participants or their caregivers, as the use of a fetal movement chart was intended to be an active tool for interaction between the woman and her midwife or physician. At baseline, no differences were found between the groups with respect to demographic and clinical characteristics (Table 1).

Maternal concern was measured by a questionnaire distributed in pregnancy week 35. Ideally, to include the
entire pregnancy period, maternal concern should be measured just immediately before delivery. However, the second questionnaire was distributed by obtaining one reminder before delivery to optimize the response rate. Questionnaires were identical for the two groups, except for supplementary questions about experiences with fetal movement counting in the intervention group, and about knowledge or use of a fetal movement counting chart in the control group. Questionnaires were answered either in writing or electronically.

Demographic and obstetric information was obtained from case notes received from the hospitals after delivery. Registration of these data was blinded for allocation. Data for the reference population were obtained from the Medical Birth Registry of Norway (42). The study sample was representative for the total population of pregnant women in Norway with respect to parity and the proportion of women aged 35 years or older, but fewer smoking women were in the study sample than in the total population (data not shown).

The Intervention

Women in the intervention group received an information brochure, including instructions on how to use a fetal movement chart, and were asked to count fetal movements daily from gestational week 28 with a modified Count-to-ten method (20,43,44). The information brochure, including the counting chart, has previously been tested in a Norwegian population and has been published (15,33). To ensure correct interpretation of the...
instructions on the counting method, a midwife or an obstetrician from the participating hospitals or the research study group contacted women in the intervention group by telephone within 2 weeks after commencement.

**Instruments and Measures**

The main outcome measure was maternal concern, measured by the Cambridge Worry Scale, which was developed to assess both the content and the degree of pregnant women’s worries (45). This inventory has demonstrated good reliability and validity (46), in a Scandinavian population as well (32), with a Cronbach alpha for the total Cambridge Worry Scale reported to be 0.81. In this study sample, Cronbach alpha was 0.81 and 0.82 preintervention and postintervention, respectively. The measure contains 16 items, measuring women’s major worries during pregnancy in a four-factor structure: sociomedical, one’s own health, socioeconomic, and relational aspects. Responses are made on a 6-point, Likert-type scale ranging from “not a worry” (0) to “major worry” (45). An open-ended question at the end allowed the respondents to report other concerns not included in the scale. The original

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**Fig. 2. Flow of participants in the study; analysis by intention-to-treat principle.**
English inventory was translated for this study into Norwegian by one of the researchers (J. F. Frøen), and translated back to English by another person not related to the study group, both fluent in English.

Secondary outcome measures were frequencies of maternal reports of hospital examinations because of perceived decreased fetal movements, maternal assessments of the fetal activity if participants perceived a decrease, and evaluation of the encounter with a midwife or a doctor if they were examined because of concern. We also aimed to describe maternal experiences with use of a fetal movement counting chart. Based on literature reviews, clinical experience, and in cooperation with a resource group of midwives and obstetricians, we developed study-specific questions. The questions were scored using a 4-point Likert scale ranging from 1 (do not agree at all) to 4 (completely agree).

Baseline assessment of maternal concern was measured by the validated, self-reported psychometric scales: 1) Prenatal depression: Edinburgh Postnatal Depression Scale (47), dichotomized according to clinical cutoffs for screening for depression (i.e., sum score values \( \geq 10 \)) (47); 2) Anxiety: Hopkins Symptom Checklist, measured by the anxiety items from the SCL-25 (48), dichotomized according to clinical cutoffs for anxiety (i.e., sum score values \( \geq 18 \)) (49); 3) Self-efficacy: Generalized Self-Efficacy Scale (50); and 4) Self-esteem: Rosenberg Self-Esteem Scale (51). Maternal characteristics included relevant demographic information and risk factors in accordance with the Norwegian clinical guidelines (52).

We used compliance to counting as an indicator for acceptability with use of the counting charts. A total of 405 women (85%) returned their fetal movement chart. Among these, 78 percent had completed the chart at least twice weekly and in more than 50 percent of the days. Compliance was similar across subgroups.

**Table 1. Baseline Demographic and Clinical Characteristics by Allocation Group \((N = 1,013)\)**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Intervention Group ((n = 503))</th>
<th>Control Group ((n = 510))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics</strong></td>
<td><strong>Actual Range</strong></td>
<td><strong>Mean (±SD) or No. (%)</strong></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>17–43</td>
<td>30.5 (±4.8)</td>
</tr>
<tr>
<td>≥35</td>
<td>89 (18)</td>
<td>0.9 (±0.9)</td>
</tr>
<tr>
<td>Parity</td>
<td>207 (41)</td>
<td>240 (47)</td>
</tr>
<tr>
<td>Primiparous</td>
<td>68 (14)</td>
<td>55 (11)</td>
</tr>
<tr>
<td>Body mass index ((kg/m^2))</td>
<td>16.0–45.5</td>
<td>24.7 (±4.6)</td>
</tr>
<tr>
<td>≥30</td>
<td>396 (63)</td>
<td>300 (64)</td>
</tr>
<tr>
<td>High school graduate</td>
<td>31 (6)</td>
<td>30 (6)</td>
</tr>
<tr>
<td>Smoking in first trimester</td>
<td>41 (8)</td>
<td>44 (9)</td>
</tr>
<tr>
<td>Use of alcohol in first trimester</td>
<td>35 (7)</td>
<td>28 (6)</td>
</tr>
<tr>
<td>Women of non-Western origin</td>
<td>22 (4)</td>
<td>17 (3)</td>
</tr>
<tr>
<td>Prepregnancy obstetric risk factors†</td>
<td>17 (3)</td>
<td>14 (3)</td>
</tr>
<tr>
<td>Prepregnancy risk factors (general health)‡</td>
<td>37 (7)</td>
<td>38 (8)</td>
</tr>
<tr>
<td>Cambridge Worry Scale</td>
<td>0.94 (±0.60)</td>
<td>0.95 (±0.58)</td>
</tr>
<tr>
<td>Women with score ( \geq 10 ) on Edinburgh Postnatal Depression Scale</td>
<td>61 (13)</td>
<td>69 (14)</td>
</tr>
<tr>
<td>Women with score ( \geq 18 ) on Hopkin’s Symptom Checklist</td>
<td>50 (10)</td>
<td>48 (10)</td>
</tr>
<tr>
<td>General Self-Efficacy Scale (possible range: 5–20)</td>
<td>17–20</td>
<td>15.6 (±2.8)</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale (possible range: 4–16)</td>
<td>6–16</td>
<td>13.1 (±1.9)</td>
</tr>
</tbody>
</table>

*The \( p \) values refer to comparisons between the control and the intervention groups; chi-squared test for categorical variables and t test for continuous variables.

†Previous fetal growth restriction, stillbirth \( \geq 21 \) weeks of gestation, preterm delivery, serious preeclampsia, or malformations.

‡Hypertension, chronic renal or coronary disease, known diabetes type I or II, inflammatory and rheumatoid diseases, coagulopathy, epilepsy, or hypothyroidism.

Sample size was calculated with PS Power and Sample Sizes (53). We aimed to identify changes in the level of concern between the intervention and control groups.
The effect size was estimated by means with SDs. In the original study with 1,207 respondents in the 16-item inventory with a 6-point Likert scale, mean scores and SDs across items for the survey in pregnancy week 35 were 1.13 (0.65) (45). The current study was a part of a more comprehensive evaluation of fetal movement counting, requiring a total sample of 1,078 participants. With this sample size, with 80 percent power, a significance level of 0.05, and a SD of 0.65 according to the original study, a detectable change in mean on the Cambridge Worry Scale was 0.11.

**Data Analyses**

Data handling was performed in SPSS 17.0 (54) and Epi-sheet (55). For summary statistics we used the mean ± 1 SD for continuous variables and as frequency counts (percentages) for categorical variables. Effect size for the Cambridge Worry Scale was analyzed using the Student t test and included the mean and SD for the control and intervention groups, respectively, the difference in mean and its 95 percent confidence intervals (CIs). Effect size for categorical variables was analyzed using a chi-squared test and included relative risk (RR) with its 95 percent CI. Psychometric characteristics were analyzed using the Student t test, or dichotomized according to clinical cutoffs for anxiety and depression and analyzed using chi-squared tests. Differences in proportions of categorical variables within the intervention group were analyzed using a chi-squared test and included odds ratio (OR) with its 95 percent CI. Compliance for use of the counting chart was determined by the proportion of days counted. Comparisons of maternal age, parity, marital status, and smoking habits between the study sample and the total population of women who delivered in Norway were analyzed using chi-squared tests.

Significance level was set at $p < 0.05$. All analyses were performed according to the intention-to-treat principle. This data set consisted of numerical data with no possibilities for biased assessments. Therefore, analyses were performed by the researchers without blinding for group assignment. The study protocol was approved by the Regional Committee for Medical Research Ethics, the Norwegian Data Inspectorate, and Directorate for Health and Social Affairs. This study is reported in compliance with the CONSORT statement for reporting trials (56).

**Results**

Women in the intervention group scored significantly lower on the Cambridge Worry Scale than those in the control group; the mean and SD were 0.77 (0.55) and 0.90 (0.62) for the intervention and control groups, respectively, a difference of 0.14 (95% CI: 0.06–0.21, $p < 0.001$). The means and SDs on the Cambridge Worry Scale scores were 0.90 (0.62) and 0.77 (0.55) for the intervention and the control groups, respectively. Compared with the women in the intervention group, those in the control group scored significantly higher on all four items measuring sociomedical aspects (Table 2). No fetal deaths occurred in the study sample.

A total of 433 women reported that they had felt a concern about decreased fetal activity on one or more occasions: 222 women (45%) in the intervention group and 211 women (42%) in the control group (RR = 1.1, 95% CI: 0.9–1.2, $p = 0.370$). Women in the intervention group based their concerns less frequently than those in the control group for decreased activity on comparisons with a previous baby’s activity, a friend’s description of her baby’s activity, or guidelines she had read or heard about (Table 3). The women in the intervention group were also less likely to agree with the statement “I figured I hadn’t paid enough attention to the baby’s activity” (Table 3).

Among the women concerned about decreased fetal activity, 84 percent were afraid that the baby was sick, and 58 percent that the baby would die; we found no difference between the allocation groups (Table 3). The proportion of women who had a consultation at the delivery unit because of their concern was equal between the groups, 52 women (10.5%) in the intervention group versus 57 (11.3%) in the control group (RR = 0.9, 95% CI: 0.6–1.2, $p = 0.419$). Irrespective of group assignment, most women reported that the caregivers believed in the assessments of fetal activity, and that they received true and honest responses to their questions (Table 3).

**Explorative Results—Maternal Experiences with Use of a Fetal Movement Counting Chart**

Seventy-nine percent of women in the intervention group ($n = 503$) fully or partly agreed with the statements that “use of the counting chart is positive for me,” “use of the counting chart helps me to get to know my baby” (76%), and “it was nice to see the baby’s activity on a chart” (79%). Women found the information in the brochure easy to read and understand (96%) and useful to them (94%), but 25 percent would have appreciated more information in the brochure, and 25 percent of the women were unsure about what to count as movements. The latter response was associated with an increased failure to return the counting chart (OR: 2.0, 95% CI: 1.1–3.4) when compared with those who felt secure about what to count as movements. Thirty
women (6%) considered that their midwife’s attitude was of great importance for their use of the chart, whereas 16 (3%) considered their doctor’s attitude to be of great importance.

Forty-two percent of the women thought that the counting was time-consuming. These women had a higher rate of not returning the counting chart compared with those who disagreed that the counting was time-consuming (OR: 2.7, 95% CI: 1.6–4.6). Twenty-two percent considered that performing the counting gave too much attention to the baby’s activity.

Irrespective of whether women’s registrations of fetal activity demonstrated that they had obvious cause for concern or not, just the use of the counting chart alone caused 8 percent to be concerned. Concern resulting from the counting or having been at a consultation at the delivery unit because of such concern increased the risk of not returning the chart (OR: 4.0, 95% CI: 1.9–8.3; and OR: 2.9, 95% CI: 1.6–5.1), respectively. No data identified whether women who had discontinued the counting had done so before the point of time when they became anxious.

Discussion

We found that women in the intervention group reported a lower level of pregnancy-related concerns than those in the control group, scoring significantly lower on the Cambridge Worry Scale; the greatest effect was observed on the four items measuring sociomedical aspects. No difference was shown between the groups with respect to the incidence of maternal report of concern for decreased fetal activity. Hence, the criticism that fetal movement counting would induce increased maternal concern and more frequent visits in antenatal care was not supported. The intention of the intervention was to make the women confident in their own assessment about the fetal activity pattern, rather than relying on external sources such as listening to friends, reading guidelines, or having a previous baby. It seemed that the message had come through that the women’s subjective assessment of a decrease in fetal activity should be the most important marker of an actual decrease, that is, their perception of a change, not the crossing of a given period of time. The use of a counting chart was assessed

### Table 2. Women’s Responses on the Cambridge Worry Scale after Intervention (N = 1,013)

<table>
<thead>
<tr>
<th>Items</th>
<th>Intervention Group (n = 503)</th>
<th>Control Group (n = 510)</th>
<th>Difference (95% CI)*</th>
<th>p†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Sociomedical factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giving birth</td>
<td>1.69</td>
<td>1.43</td>
<td>1.98</td>
<td>1.51</td>
</tr>
<tr>
<td>Going to hospital</td>
<td>0.89</td>
<td>1.26</td>
<td>1.06</td>
<td>1.28</td>
</tr>
<tr>
<td>Internal examination</td>
<td>0.56</td>
<td>1.11</td>
<td>0.66</td>
<td>1.14</td>
</tr>
<tr>
<td>Coping with the new baby</td>
<td>1.04</td>
<td>1.15</td>
<td>1.28</td>
<td>1.29</td>
</tr>
<tr>
<td>Socioeconomic factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money problems</td>
<td>0.97</td>
<td>1.24</td>
<td>1.07</td>
<td>1.34</td>
</tr>
<tr>
<td>Your housing</td>
<td>0.74</td>
<td>1.24</td>
<td>0.85</td>
<td>1.29</td>
</tr>
<tr>
<td>Employment problems</td>
<td>0.46</td>
<td>0.96</td>
<td>0.57</td>
<td>1.10</td>
</tr>
<tr>
<td>Health factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The possibility of stillbirth</td>
<td>1.19</td>
<td>1.39</td>
<td>1.33</td>
<td>1.43</td>
</tr>
<tr>
<td>The possibilities of something being wrong with the baby</td>
<td>1.57</td>
<td>1.35</td>
<td>1.71</td>
<td>1.33</td>
</tr>
<tr>
<td>Your own health</td>
<td>0.97</td>
<td>1.14</td>
<td>1.14</td>
<td>1.24</td>
</tr>
<tr>
<td>The health of someone close to you</td>
<td>1.02</td>
<td>1.32</td>
<td>1.03</td>
<td>1.36</td>
</tr>
<tr>
<td>Relationship</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your relationship with your family and friends</td>
<td>0.38</td>
<td>0.80</td>
<td>0.51</td>
<td>0.90</td>
</tr>
<tr>
<td>Your relationship with your husband/partner</td>
<td>0.43</td>
<td>0.90</td>
<td>0.52</td>
<td>1.05</td>
</tr>
<tr>
<td>Other items</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whether your partner will be with you for the birth</td>
<td>0.35</td>
<td>0.90</td>
<td>0.32</td>
<td>0.89</td>
</tr>
<tr>
<td>Giving up work (if applicable)</td>
<td>0.26</td>
<td>0.74</td>
<td>0.36</td>
<td>0.85</td>
</tr>
<tr>
<td>Problems with the law</td>
<td>0.02</td>
<td>0.26</td>
<td>0.04</td>
<td>0.32</td>
</tr>
</tbody>
</table>

*Difference of means on single items between the intervention and control groups and their 95 percent confidence intervals (95% CIs), analyzed by t tests.
†The p values refer to comparisons by Mann–Whitney U tests between the control and intervention groups.
as positive for a great majority of the women in this study.

Fetal Movement Counting and Concern

Our findings are in line with previous studies evaluating fetal movement charts using the Count-to-ten method. Liston et al used the inventory of Maternal Attitudes Toward Pregnancy, which includes measures on maternal well-being, pride in pregnancy, concerns for delivery, and attitudes toward the infant (38). They concluded that fetal movement counting did not cause any harmful psychological effects to the 613 healthy women who participated. Gibby’s small study (n = 33) also found no differences in maternal anxiety scores between the counting and the control groups (35). In Eggertsen and Benedetti’s study of maternal counting of fetal movement in 394 pregnancies in primary care settings, counting was well accepted, with 85 percent of women finding it to be reassuring (39). In a comparative study by Smith et al that evaluated women’s acceptance of three different fetal movement counting charts, none of the 85 participants expressed anxiety about such monitoring (37). In a randomized, controlled study from Denmark including 3,111 women, Neldam concluded that fetal movement counting was an acceptable method for pregnant women, and close to 80 percent complied with the instructions (36).

Grant et al suggested that a potentially increased maternal anxiety among the counting women could be a reflection of a more general concern about fetal activity rather than a concern motivated by the formal counting (2). This suggestion is in line with the results in the current study.

Women in the intervention group reported an increased trust in their own assessments of their fetus’ activity level when they contacted their health caregiver about their concerns. Through formal fetal movement counting the mother becomes an expert in observing the normal quality and quantity of the activity, which in turn may increase the confidence in her own assessments.

Maternal Experiences with Fetal Movement Counting

We found that 8 percent of the women were concerned because of the counting. This percentage is much lower than that in the study conducted by Draper et al, in which 23 percent of the women felt that counting caused them to worry about the health of their infant (40). It has been suggested that the higher proportion reported in the latter study indicated that women were not provided with adequate information about the rationale for counting or the significance of decreased fetal activity. In our study the information brochure distributed to the women in the counting group included general information about fetal activity, in addition to the rationale for and

<table>
<thead>
<tr>
<th>Maternal Assessments</th>
<th>Intervention Group</th>
<th>Control Group</th>
<th>RR (95% CI)</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of mothers who totally/partly agreed with the following statements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My baby kicked less than before</td>
<td>194/221 (88)</td>
<td>187/204 (92)</td>
<td>1.0 (0.9–1.0)</td>
<td>0.189</td>
</tr>
<tr>
<td>My baby kicked differently than before</td>
<td>106/212 (50)</td>
<td>86/164 (52)</td>
<td>1.0 (0.8–1.2)</td>
<td>0.639</td>
</tr>
<tr>
<td>It seemed like it kicked less than my friend’s baby</td>
<td>11/146 (8)</td>
<td>26/89 (29)</td>
<td>0.3 (0.1–0.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>I had a baby before who kicked more than this one</td>
<td>21/97 (22)</td>
<td>26/67 (39)</td>
<td>0.6 (0.3–0.9)</td>
<td>0.017</td>
</tr>
<tr>
<td>My baby kicked less than guidelines I had read or heard about</td>
<td>40/188 (21)</td>
<td>46/117 (39)</td>
<td>0.5 (0.4–0.8)</td>
<td>0.001</td>
</tr>
<tr>
<td>I figured it was probably normal</td>
<td>81/205 (40)</td>
<td>74/191 (39)</td>
<td>0.9 (0.8–1.3)</td>
<td>0.876</td>
</tr>
<tr>
<td>I have used a kick chart and could see there was a difference</td>
<td>49/222 (25)</td>
<td>1/211 (0.5)</td>
<td>Not relevant</td>
<td></td>
</tr>
<tr>
<td>I was afraid there was something wrong with my baby</td>
<td>183/216 (85)</td>
<td>174/199 (87)</td>
<td>0.9 (0.9–1.1)</td>
<td>0.426</td>
</tr>
<tr>
<td>I was afraid that my baby would die</td>
<td>117/215 (54)</td>
<td>120/195 (62)</td>
<td>0.9 (0.8–1.0)</td>
<td>0.145</td>
</tr>
<tr>
<td>I figured I hadn’t paid enough attention to the baby’s activity</td>
<td>103/213 (48)</td>
<td>120/196 (61)</td>
<td>0.8 (0.7–0.9)</td>
<td>0.009</td>
</tr>
</tbody>
</table>

When I was at the hospital because of my concern …

<table>
<thead>
<tr>
<th>Maternal Assessments</th>
<th>Intervention Group</th>
<th>Control Group</th>
<th>RR (95% CI)</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believed that my assessment of my baby’s activity was correct</td>
<td>47/50 (94)</td>
<td>44/51 (86)</td>
<td>1.1 (1.0–1.2)</td>
<td>0.194</td>
</tr>
<tr>
<td>My caregivers believed in my assessments</td>
<td>50/51 (98)</td>
<td>51/54 (94)</td>
<td>1.0 (1.0–1.1)</td>
<td>0.336</td>
</tr>
<tr>
<td>My assessments were not considered seriously</td>
<td>3/51 (6)</td>
<td>7/54 (13)</td>
<td>0.5 (0.1–1.7)</td>
<td>0.217</td>
</tr>
<tr>
<td>I received true and honest responses to my questions</td>
<td>50/51 (98)</td>
<td>52/56 (93)</td>
<td>1.1 (1.0–1.2)</td>
<td>0.205</td>
</tr>
<tr>
<td>After the consultation, I felt reassured</td>
<td>50/52 (96)</td>
<td>55/57 (97)</td>
<td>1.0 (0.9–1.1)</td>
<td>0.925</td>
</tr>
</tbody>
</table>

*p values refer to chi-squared tests between the control and intervention groups, respectively. RR = relative risk.
how to perform the counting, which promoted the positive aspects with “count your baby’s well-being” (33). Previous studies have demonstrated that receiving this information was associated with a higher compliance rate for use of counting charts and increased the women’s acknowledgment of the importance and usefulness of the charts (33). However, although almost all women in the current study were satisfied with the written information, as many as one-fourth would have appreciated more information, and a similar proportion was unsure of what to count.

Effective communication and instructions specific for each woman’s needs, as well as consistent encouragement by health care professionals, have been identified as key factors for high compliance in using a fetal movement chart (1,2,36,57). Grant et al found that stress and anxiety were significantly reduced when women were given feedback about the health of their baby (2). Neldam pointed out that women need to be remotivated several times about counting fetal movements to maintain the compliance (36). Thus, possible improvements may be indicated by providing sufficient and adequate information to the women. The existing guidelines in Norway (23,33), as well as the information brochure used in the current study, should be improved. More research is needed.

In addition, despite the reported importance of encouragement by the health care practitioner, only a few women who used counting in our study reported that their midwife’s or doctor’s attitude had a great impact on the use of the chart. This finding may indicate women’s high level of trust in their own role to assess and monitor their baby’s health, analogous to results from a cross-sectional survey previously performed in Norway (3). In this study, 99 percent of the women assessed themselves as being the most important individuals in monitoring their pregnancy (3). Irrespective of group assignment, when concerned, almost all women described their contact with the health caregivers in an extremely positive way: their caregivers believed in their assessments of fetal activity, and the women described receiving truthful answers to their questions. This finding indicated that the women felt strong support from their health caregivers.

Compliance in studies where the Count-to-ten method was used has been measured using different criteria, making comparisons complicated. A general impression is that our study had a compliance rate similar to those reported by other studies (2,36,37,39,58–60), indicating that women were happy to record fetal activity.

Methodological Considerations

The strength of this study lies in its experimental design. The sample size was sufficiently large to permit a cautious generalization of the findings. The sample was representative for the total population of pregnant women in Norway with respect to demographic characteristics, with one exception: the lower proportion of women in the study sample who smoked. However, no association between the Cambridge Worry Scale scores and maternal smoking was identified. The population of pregnant Norwegian women is fairly homogeneous and represented a typical Scandinavian population: the participants were predominantly employed, cohabiting, white, and well educated. Therefore, generalization should be limited to similar populations.

The Cambridge Worry Scale has been identified as a valid and reliable inventory for assessing the extent and content of worries in pregnancy (32,45,61). Studies in which the Cambridge Worry Scale has been used have been reported differently, which complicates comparisons. In a study by Öhman et al, the Cambridge Worry Scale was reported as median values on single items, measured in pregnancy week 28 (variance: 8–42) (32). Petersen et al reported mean values on single items and their 95 percent CI in pregnancy week 31.4 (SD: 2.7) (61). Women’s worries seem to be U-shaped, with a decrease in midpregnancy (31,32,45). The difference between the intervention and control groups on mean scores for the Cambridge Worry Scale has been regarded as clinically relevant (45).

A potential Hawthorne effect cannot be ruled out. The recruitment brochure provided information about the purpose of the study, namely, to improve our knowledge about the effects of fetal movement counting on expectant mothers. In addition, the purpose of the study was explained to the women by the recruiting midwife, and the women were informed about the possibility of being allocated to the fetal movement counting group. This information may have increased the general awareness toward fetal movement in the total sample. Among women in the control group, 194 of 418 (46.4%) knew about fetal movement counting when asked directly in the questionnaire. Among them, 101 (52.1%) had heard or read about it in the information brochure, whereas 45 (23.2%) had obtained information from the Internet, friends, or the midwife or physician during antenatal care. However, we intended to measure the effects of increased awareness to fetal activity following formal fetal movement counting, versus general awareness toward fetal activity.

A spillover effect would be present if there was an extensive use of a counting chart by women in the control group. Our data demonstrated a clear separation in this respect; only one woman in the control group (0.2%) had used a fetal movement chart. It is unlikely that fetal movement counting among women in the control group influenced the results.
Further Research

The overall goal of fetal movement counting is to reduce perinatal mortality. As the perinatal mortality rates are as low as 4.4 per 1,000 live births in our population (42), there is a need for a large-scale, multicenter, randomized, controlled trial to investigate the effects of fetal movement counting on mortality rates. The potential of such easy and inexpensive self-screening in a low resource setting should be explored. In particular, it is necessary to understand the role of fetal movement counting in a more diverse population. Women in a relatively affluent homogeneous population such as ours may be less susceptible to anxiety than others, such as poor or minority populations. The population studied is also likely to feel more empowered in terms of authority over their bodies and lives than other populations.

Conclusions

Women who performed fetal movement counting in the third trimester reported less concern than those in the control group. The frequency of maternal report of concern about decreased fetal activity was similar between the groups. Most women considered the use of a counting chart to be positive. Further research is needed to assess and develop methods to improve maternal self-screening for decreased fetal activity in general and in other settings than ours.

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