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Title: Women and Birth: Journal of the Australian College of Midwives

ArticleTitle: Maternal perception of fetal movements in the third trimester: A qualitative description

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Description: Date: Dec 2017

Date: Dec 2017

OCLC - 70166695x, 70166695; ISSN - 18715192, 18781799;

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Contents lists available at ScienceDirect

Women and Birth

journal homepage: www.elsevier.com/locate/wombi



Original Research – Qualitative

Maternal perception of fetal movements in the third trimester: A qualitative description

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ARTICLE INFO

Article history:

Received 21 August 2017
Received in revised form 7 December 2017
Accepted 12 December 2017
Available online xxx

Keywords:

Fetal movements
Fetal monitoring
Pregnancy
Maternal perception
Stillbirth

ABSTRACT

Problem: Decreased fetal movements is a common reason for unscheduled antenatal assessment and is associated with adverse pregnancy outcome.

Background: Fetal movement counting has not been proven to reduce stillbirths in high-quality studies. **Aims:** The aim was to explore a qualitative account of fetal movements in the third trimester as perceived by pregnant women themselves.

Methods: Using qualitative descriptive methodology, interviews were conducted with 19 women experiencing an uncomplicated first pregnancy, at two timepoints in their third trimester. Interview transcripts were later analysed using qualitative content analysis.

Findings: Pregnant women described a sustained increase in strength, frequency and variation in types of fetal movements from quickening until 28–32 weeks. Patterns of fetal movement were consistently described as involving increased movement later in the day and as having an inverse relationship to the women's own activity and rest. At term, the most notable feature was increased strength. Kicking and jolting movements decreased whilst pushing and rolling movements increased.

Discussion: Maternal descriptions of fetal activity in this study were consistent with other qualitative studies and with ultrasound studies of fetal development.

Conclusion: Pregnant women observe a complex range of fetal movement patterns, actions and responses that are likely to be consistent with normal development. Maternal perception of a qualitative change in fetal movements may be clinically important and should take precedence over any numeric definition of decreased fetal movement. Midwives may inform women that it is normal to perceive more fetal movement in the evening and increasingly strong movements as pregnancy advances.

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Statement of significance

Problem

Perception of reduced fetal movement is associated with fetal compromise. Qualitative features of maternal perception of fetal movement such as pattern and strength are under-investigated.

What is already known

Maternal perception of fetal movement is indicative of fetal wellbeing. Women want quality information about what to expect regarding fetal movement.

What this paper adds

This paper adds a descriptive account of normal fetal movement by pregnant women themselves. Key features are increasing strength of movements, a diurnal pattern and an inverse relationship between fetal and maternal activity and rest.

1. Introduction

Maternal perception of fetal movements is an important indicator of fetal wellbeing. Normal fetal activity suggests normal

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<https://doi.org/10.1016/j.wombi.2017.12.007>

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cardio-vascular, musculo-skeletal and neurological function. Pregnant women report that it is important for them to feel fetal movements every day and monitor fetal activity regardless of whether or not they have been advised to do so¹ Women who notice reduced fetal movement worry that their baby might have died.

Decreased fetal movements is a common cause for unscheduled pregnancy assessment.² Presentations for decreased fetal movements are associated with adverse pregnancy outcomes including preterm birth, fetal distress, fetal growth restriction (FGR), small for gestational age (SGA), stillbirth, and neurodevelopmental impairment in offspring.^{3–7}

Between four and 16% of pregnant women present with a complaint of decreased fetal movements at some point in pregnancy.² However approximately 75% of women with a single uncomplicated assessment for decreased fetal movement will have a normal pregnancy outcome.^{5,6} Assessment of women with decreased fetal movements has potential to reduce perinatal mortality but may also increase intervention, particularly induction of labour.⁸ At the current time there is a paucity of high quality evidence to guide appropriate assessment of pregnancies where women report decreased fetal movements.²

High-quality studies have failed to determine a numerical kick count that can reliably be used to screen for and prevent stillbirths.⁹ Maternal qualitative perception of a reduction in fetal movements is considered to supersede in clinical importance any quantitative definition of reduced fetal movements,² although the nature of qualitative perception of fetal movements by the pregnant woman is under-investigated.^{10,11}

Pregnant women may be informed by various sources that it is normal for movements to be reduced at term, deterring consultation for fetal movement concerns. A number of studies have shown that fetal movements are less frequent at term,^{12,13} whilst one large ultrasound study showed that bouts of movement were less frequent at term although movements per bout were increased resulting in no change in number of movements overall.¹⁴ Presentations for reduced fetal movements at term in some cases may be due to benign causes such as longer fetal sleep periods with fetal nervous system maturity or the fetal back lying anteriorly.¹⁵ A change in fetal movement pattern is considered important by many midwives but the term 'pattern' in relation to maternal perception of fetal movement is not well defined.

Improved understanding of fetal movement patterns and movement quality at term, as perceived by the pregnant woman is needed, so that women may be properly informed about what to expect in normal pregnancy. This study sought to explore an account of fetal activity over the third trimester by pregnant women themselves in order to better understand any changes that may occur.

2. Participants, ethics and methods

Maternal perception of fetal movements is a subjective phenomenon and is known to vary widely between pregnant women.^{9,16} To investigate this phenomenon a methodological approach that was both qualitative and embracing of variation was called for. Modern understandings of health, illness and disease have been built up over centuries of observations of symptoms and detailed case study.¹⁷ In order to understand the abnormal one must first understand the normal. The purpose was not to explore maternal perception as a social phenomenon but as a physiological one. A qualitative descriptive account of maternal perception of fetal movements in uncomplicated pregnancy could provide a useful starting point from which to propose further studies in relation to risk groups (Table 1).

Qualitative description, as described by Sandelowski¹⁸ was deemed an appropriate methodology, as the object is to provide a

Table 1
Participant demographics.

Characteristic	<i>n</i>	Mean (range)
Total participants	19	
Age in years		26.5 (19–34 years)
Body Mass Index (BMI)		25.3 (19–34)
Employment status		
Employed	13	
Unemployed	5	
Student	1	
Marital status		
Married	11	
De facto	4	
Single	4	
Fetal sex		
Male	9	
Female	10	
Placental location		
Posterior	10	
Anterior	5	
Posterior/fundal	2	
No data	2	
Infant birthweight		3450 gm (2990–4130)

broad rather than deep description that captures both typical and unusual cases. Morse and Singleton consider 'fit' and essential element of rigour when collecting and analysing data.¹⁹ Qualitative description was deemed to have a good fit with the study aims to explore a broad description of a physiological phenomenon in the everyday terms of those experiencing the phenomenon, namely pregnant women.^{18,20}

A pamphlet was produced inviting eligible women to participate in the study, which was left in antenatal clinical waiting rooms. LMC midwives were also approached and asked to pass on information about the study to eligible women in their care. Twenty-one primigravid women were recruited, via five community-based midwifery practices in a provincial city in New Zealand. Women with a singleton pregnancy, under the care of a Lead Maternity Care (LMC) Midwife, and able to speak English were eligible to participate. Women who had conditions warranting transfer to secondary care, as per the New Zealand National Referral Guidelines were excluded.²¹ Two participants interviewed were later excluded as not meeting eligibility criteria (one due to parity, one due to high BMI), leaving the final sample for analysis at 19. Participation was limited to primigravid women as it was thought that inclusion of women with previous pregnancies could result in participants making comparisons with previous pregnancies, which though potentially interesting, would add 'noise' without furthering the aims of the study.

Each woman was interviewed twice in the third trimester: early (28–32 weeks) and late (37–41 weeks). The interviews were conducted face-to-face in the setting of their usual ante-natal care, although some repeat (late) interviews were conducted by telephone for ease of the participants. This setting was selected as it was felt to be most like the setting where women would normally share information about fetal movements with their midwife. All interviews were recorded and transcribed for later analysis. Notes were taken during interview, to gather additional non-verbal information such as hand-gestures and facial expressions ensuring rich data. Women were asked to describe how their baby's movements felt, patterns of movements over the day, how the movements felt compared to earlier in their pregnancy and any factors they noticed that appeared to increase or decrease their baby's movements. The first author was the interviewer.

Techniques used to avoid researcher inference included; using semi-structured interview questions that were brief and open-ended, allowing periods of silence whilst the woman considered her responses or restated her observations, and avoiding reflexive sharing of information by the interviewer. An iterative approach to data collection was used, by asking clarifying or expanding questions such as 'what do you mean by . . . ?' or 'how did that feel?' in order to gain rich descriptions. Interesting or unusual participant responses prompted additional questions to be added to the interview schedule, to be asked of later participants. In order to check validity of the sampling method, data analysis was commenced concurrently with data collection. Data saturation is an indication of validity in sampling and is considered to be achieved when the themes and categories emerging during analysis become redundant and repetitive with no new data emerging.²² Saturation was not a stated aim of this study, however it was noted that later participants provided no new information, but simply added colour in restating the categories that had already emerged, suggesting that sampling was adequate.

Interview transcripts were analysed using qualitative content analysis; coding, organising into themes and then checking and rechecking against the original recordings and transcripts.²³ A deliberate decision was made not to employ any overarching theoretical perspective in the study. Codes were drawn directly from the data so that the descriptions and comparisons might be informed by the participants words rather than by any contingent theoretical perspectives or assumptions.^{18,20} Organisation of the codes into categorical groups then allowed for comparison of accounts within subject, ie at both interview time-points, leading to a chronological account. Comparison of codes and categories between subjects allowed for consideration of variation between subjects including themes in common and diverging accounts. Codes were initially loosely gathered into themes, prompting a return to the literature for hypothetical explanations for the phenomena described, alongside continual rechecking against the raw data. This analytic approach borrows from grounded theory's constant comparison method but without pressing on to a unified theory. To ensure a broad description with greater potential for transferability only those codes that emerged from multiple participants were carried further in the analysis.

Ethics approval was obtained from the New Zealand Central Region Ethics Committee, and locality approval for the various community sites was obtained prior to approaching participants. Consultation was sought from a Maori Health Advisor prior to commencement, who emphasised that it was important Maori women be included in the study as 'the Wahine (woman) is the guardian of her pepe (baby) on behalf of her ancestors and generations to come'. The interviewer was a midwife and strategies were devised to address the possibility that woman may seek advice from the interviewer or potentially share information that suggested a cause for concern. Permission was obtained from participants to access pregnancy, labour and birth records. Pseudonyms have been used to protect participants' identity.

3. Findings

3.1. Quickening – strange new sensation

Participants interviewed at 28–32 weeks were asked to recall when they first felt their baby move and to describe the sensations as if they were describing them to a close friend or family member. The purpose of these questions was to elicit plain-language descriptions of fetal activity by putting women in touch with their initial impressions of the sensations and also to provide a starting point for a chronological account.

Women had often read about or heard from others what the first movements felt like and keenly anticipated experiencing quickening for themselves. Identification of the first fetal movements was usually accompanied by a feeling of uncertainty, where the woman questioned whether it really was the baby she had felt or some other bodily sensation. Fetal movement was suspected when the sensation was identified as something new, something not felt before. Only with repetition of the new sensations could women confidently say they had felt their baby move.

It was just one little tiny movement and I wasn't sure if it was, but then movements after that felt the same. (Gabrielle)

The absolute smallness and lightness of the first movements was emphasised by women using words like 'knock', or 'flick' to describe the movements. Some participants, in order to emphasise how truly small the movements were, forwent words and instead uttered small sounds such as 'dink' or 'ugh' or used gestures such as raising the hand as if to hold an imagined tiny object in a pincer grip. First baby movements were identified for some as 'small bumps' felt when placing hands on the belly, but for most the sensations were only internal.

Quickening descriptors were often watery in nature. The movements might feel 'floaty' or 'fluttery', like 'bubbles moving below the surface' or like a 'worm swimming in the belly'. Some described the sensation of fetal contact with the uterus and its impulse transmitted through the abdominal wall as below:

Imagine yourself swimming in a pool, and then hitting a glass on the outside or something, and then try to imagine that inside your belly. (Anahera)

For the women in this study identification of fetal movements made the pregnancy real. Many used the word 'weird' to describe first fetal movements, but were quick to elaborate the sensations were not weird in an unpleasant sense but rather strange and new, in that they provided a profound indication of impending motherhood. Identification of fetal movement sensation made the baby and the pregnancy real, often sparking feelings of happiness. One young woman whose pregnancy was unplanned described the moment as below.

It was unusual for me at first 'cause I was still getting it into my head, "I'm pregnant, I'm pregnant." It was a real shock but I kind of felt happy at the same time too, yeah. (Beth)

Movements after quickening were sporadic in frequency, and some mothers described long periods of not feeling movements following their initial identification. As the pregnancy advanced the fetal movement sensations became increasingly strong and frequent serving as a regular reminder of the baby's presence and giving the mother a sense of being accompanied. Ongoing perception of fetal movements was regarded as an enjoyable aspect of pregnancy that was reassuring of normal pregnancy progress and a reminder of the baby to come, as illustrated below.

I like it because it lets me know the baby is there. If it is moving it has got to be a good thing . . . that's why I stop and notice them during the day because I sort of enjoy them as they come along. That's my way of bonding I guess, because I don't know what I'm having. So, I feel connected. (Jane)

4. Baby movement in early third-trimester – 'there is someone in there'

4.1. Quality and quantity

When reflecting on the change in movements from quickening to early third-trimester, women described a sustained increase in strength, frequency and most notably variation in types of fetal

movements. The increase in strength of fetal movements left no doubt that the new sensations were the baby. Where movement sensations at quickening had been primarily internal, but by 28–32 weeks most women reported that they could now see the baby's parts moving under the skin and feel many movements with their hands on the abdomen.

I have only just started to notice them on my skin. Like before that they felt like they were quite a way inside, like you can sometimes see the actual skin moving. I can't tell what it is; like an elbow, knee or foot, but just seeing the skin move. (Jane)

Being able to feel the movements by placing hands on the abdomen, meant that the experience could now be shared with partners and other family members. Two participants with an anterior placenta provided a divergent account reporting that the sensations though increasingly strong and frequent were internal and not able to be felt with the hands.

Frequency of the movement sensations increased to the extent that how often baby moved was more likely to be described according to length of time without movements as opposed to number of movements felt, as below.

Probably four weeks ago like I was getting maybe six to seven kind of movements [per day]. And then since then it's probably like every, at least every half an hour to three quarters of an hour I feel something. (Louise)

Self-assessed frequency varied considerably between participants. Some women reported feeling hundreds of movements over the course of the day, whilst for others movements were largely absent during the day and only noticeable in the evening. Despite the wide variation in frequency of movements, a pattern of increased movement in the evening was consistently reported.

4.2. Pattern

Participants were asked if their baby's movements had a pattern to them and if so to describe this pattern. Participant descriptions of fetal movement patterns were invariably tied to time-of-day, maternal activity and rest and in some cases environmental stimulus such as maternal hunger or eating, cramped maternal position, noises or touch.

All participants in this study reported a pattern of increased fetal movement later in the day and most especially on going to bed, regardless of variation in frequency. Once this pattern of movement was identified women were reassured by its repetition. As below, Beth described at times feeling concerned about baby movements during the day . . .

Until I noticed he was in a pattern . . . once I got used to the routine of him being up at night then yeah it was all right for me after that. (Beth)

Kinaesthetic factors also became apparent. Mothers reported that their own activity and rest seemed to have an inverse relationship with fetal movement and quiescence, so that when the woman was active very few fetal movements were felt and when the woman was still, fetal activity was increased. Some pondered whether the decreased fetal activity during ambulation was a function of their attention to other tasks, however many reported that their own activity seemed have a soporific effect on the fetus, as Jane describes below;

I think that when I'm moving around maybe the baby tends to go to sleep, 'cause it's not like a rocking motion but because you're moving it must like, make it sleepy; well that's what I think. (Louise)

Conversely maternal stillness seemed to promote vigorous fetal activity, as Tahlia states;

"If I'm up walking around then I go and sit down, I've woken him kind of, I feel, and then he starts to squirm around in there" (Tahlia)

Some interpreted this increase in activity as the baby being bored and needing to entertain themselves by moving about if the woman was not moving. Others reported with wry amusement that their baby chose inconvenient times to make their presence known such as when they were seated at work meetings. Women in this study came to expect bouts of increased fetal activity when they sat or lay down and were reassured by this familiar response.

4.3. Types of movements

The most prominent feature of maternally reported fetal activity at 28–32 weeks was its great variation in types of movements. Women at this gestation described a considerable repertoire of fetal actions. Smaller softer actions included; 'wriggling', 'pressing', 'tickling', 'playing with hands', 'snuggling', 'massaging' and 'soft tapping'. Forceful and vigorous actions included; 'rolling', 'kicking', 'flip-flopping', 'tumbling', 'turning', 'swooping', 'pumping' and 'somersaulting'. Women described large complex movements which might involve many areas of the abdomen, often in a sequential moving of fetal parts, creating a ripple pattern. These movements were interpreted by mothers as 'stretching' or 'dancing', as Roimata recounts.

So you know sometimes it's just lovely little taps, but then other times it's quite strong. And the stomach will actually move with the stronger movements, either in wave or the whole stomach will jolt – depending. And sometimes she does like a dance, 'cause it's sort of, you know, it's not just the one point of contact there's lots, all over the stomach. (Roimata)

The variation in movement types was often described as 'random', and the strength at times surprising, almost alarming. 'Strange' movements were also recounted such as startles, jumping movements 'as if they have got a fright', or 'spastic' movements. 'Jerky' and 'jolty' were frequently used descriptors for movements at this gestation.

Sometimes it's almost like she gets a spasm or something like that and she'll kind of shake all over and those are the really weird movements. She's still doing that. She'll just have this big shudder. (Ruth)

Movements might be so strong and sudden at times that the woman could feel herself thrown off balance or almost winded by the sudden lurch in the belly. The following quote illustrates how sudden and strong such movements might feel.

I like the little ones and I don't like feeling like my whole body is going to give way. When the baby . . . I don't know what it's doing, whether it's turning right round, or pushing on something and making me lose my balance. (Jane)

Some expressed excited trepidation at the prospect of their baby continuing to grow in size and strength, wondering should the vigour continue to increase at this rate, how they might tolerate the movements at term.

4.4. Fetal movement as a form of communication

Environmental stimuli were often recounted by women as prompting a fetal response examples included loud noises such as dogs barking, voices or music. Fetal movements also occurred in response to touch, such as bumping of the woman's abdomen, by young children or palpation of fetal parts by the midwife or by the mother herself. Vigorous movements were recounted when the abdomen was compressed for example if mother adopted a cramped position e.g. in the car or on a low couch, or was embraced

tightly by a relative, these strong movements were interpreted by mothers as a sort of protest by the baby “Oh, stop squashing me; get off.” (*Beth*). In response to these fetal actions, women might shift their weight, or change position entirely, so that the baby’s movements facilitated a maternal-fetal interaction.

5. Baby movements a term – ‘mostly they are normal’

5.1. Quality and quantity

At term the impressive variation in movement types reported in the early third trimester had subsided. ‘*Jerky*’, ‘*jolty*’ or ‘*random*’ movements had disappeared and were replaced by strong, sustained ‘*pushing*’, ‘*rolling*’ or ‘*shuffling*’ movements. Movements were no longer sudden or unpredictable as they had been earlier in the pregnancy.

It’s like baby knows what they are doing now so they do it all the time. (Anahera)

There was still variation in movement types such as whole body twisting and rolling, kicking and lighter tickling hand movements felt in the pelvis, but the overall variation was more constrained. Fetal hiccups were more commonly reported, however some participants reflected that they had probably felt hiccups earlier but only recently identified what the sensation was. Dominant movement types were ‘*pushing*’, ‘*rolling*’, ‘*squirming*’, and ‘*stretching*’, but most especially ‘*pushing*’. The change from jerky to smooth movements was illustrated by Liz below;

Kind of like he’s just sort of rolling, rather than lots of I don’t know jerky I guess, punches and kicks and stuff. I guess with there being not as much room any more, he . . . feels like he’s stretching now, rather than just I don’t know, having a wriggle or whatever. Like there might be like a foot or something, like he’s stretching, like it’s kind of pushing. (Liz)

Some participants role-played the fetal pushing action by flexing both their arms and then extending them with effort as if to demonstrate a strong bilateral leg extension by the baby. When the baby pushed in this way the bottom would move up and out from the mothers body and then settle back again. The change from frequent kicking to strong pushing movements over the course of the third trimester was commonly described as below.

Oh heaps more stronger, but it’s not so much kicking, its pushing, its pushing now, pushes out and around and yeah . . . There’s not the constant kicking feeling. It’s like waves kind of in your stomach, like pushing out and moving it along. (Tahlia)

5.2. Pattern

The pattern of movements described at 28–32 weeks persisted at term. Movements were not described in terms of instances of single movements but rather as periodic in nature involving busy times and quiet times. At term movements were increasingly strong and occurred in bouts when the woman was sitting or lying down and were especially apparent later in the day. Some described longer quiet periods between the busy times as below.

Baby just moves whenever . . . whenever it really wants to I guess. There are big gaps more now than there was before. (Anahera)

Three women reported that they felt fewer movements after their baby assumed a cephalic presentation with occipito-anterior position. One reported that after her baby moved from a position where the back lay against her spine to an occipito-anterior position the movements felt less frequent as she could no longer feel the small hand movements. Another woman who before term had an unstable lie and frequent position changes described the

relative reduction in movements following her baby assuming a cephalic presentation as ‘*the new normal*’ (*Gina*).

Women who reported increased fetal activity in response to environmental stimuli at earlier interviews reported similar responses at term. Describing even the lightest stroking of the abdomen as prompting the baby to move. Movements in response to touch might involve a stretching out or retracting of a limb. One woman described this interaction as being ‘*like a game of tag*’ (*Roimata*). Although some women reported that it was easier to get a response from their baby in this way at term, they also joked that there were times the baby was sleeping or simply did not want to play.

Descriptions varied considerably between participants, to the extent that each mothers account of her baby’s movements at term was more like her own earlier description than that of any other participant. Mothers in this study commonly used the word ‘*normal*’ to describe movements at term, suggesting they had established for themselves an expected norm for their own baby’s activity.

5.3. Maternal monitoring of fetal activity

Women were asked if they had ever felt concerned about their baby’s movements and if so why and what they did about it. Most women reported being concerned about baby’s movements at some point at some point (15 [79%]). In all but one case the reason given was that the baby was ‘*quiet*’ or that there had been little or no movements for a longer period of time than usual. In the remaining case the woman was concerned that the movements were too vigorous.

When women observed that their baby had been quieter than usual, their first response was an attempt to elicit fetal movement by repeating an action that had previously been noted to prompt movement such as; rubbing or prodding the belly, bringing up the legs to compress the abdomen, or simply resting following a period of ambulation. A positive response to these self-devised fetal activity tests would reassure the woman that there was no need to contact the midwife. Women who were concerned about movements often discussed concerns with family or friends or referred to advice from their antenatal class before contacting their midwife.

6. Discussion

Self-reported frequency of fetal movement varied considerably between women in this study, however descriptions of fetal movement types, patterns of movement and changes with advancing gestation were relatively homogenous. Fetal movements were consistently reported to occur more in the evening and tended to have an inverse relationship with maternal activity and rest. Early in the third trimester movements were strong, varied and often jerky or sudden. At term a qualitative change had occurred whereby frequent kicks and jolts gave way to increasingly strong, shuffling, wriggling and pushing movements. A noticeable increase in strength of movements was a key feature emphasised in both early and late third trimester accounts.

This account is consistent with ultrasound studies of fetal development which have described the overall character of fetal activity with advancing gestation as defined by a shift from chaotic to organised movements.²⁴ In the first half of pregnancy fetal movements increase in frequency, variation and complexity and by term jerky or spastic movements subside in the normal fetus.^{25–27} At term fetal behavioural states develop and fetal movements are defined by a pattern of bursts of activity occurring between increasingly longer rest periods occurs.^{24,28}

Maternal observations of the qualitative changes in fetal movements with advancing gestation in this study were remarkably consistent with those described by developmentalists. Quality of fetal movements is increasingly emphasised by neurologists as important in determining normal fetal neurological status.^{29–31} Aspects of fetal activity thought to be indicative of pathology include lower amplitude of movements, sluggish or stereotyped movements,³² persistence of jerky or spastic movements at late gestations, abnormalities in sleep/wake cycling³² and lack of smooth complex general body movements.^{30,33}

The finding of increasing strength of fetal movements as pregnancy advances is consistent with other studies. In a cross-sectional survey of maternal perception of fetal movements 70% of respondents reported an increase in strength of movements in the preceding two weeks, regardless of gestation.¹⁰ In a Swedish study, 39 of 40 women interviewed in the two weeks prior to delivery described fetal movements as “strong and powerful”.¹¹ The Auckland Stillbirth Study, a case-control study of late stillbirth found that increased strength of movements was reported by 36.0% of control women compared to only 14.6% of women who experienced a late stillbirth.³⁴ Increased strength of fetal movements may well be a normal and expected feature of maternal perception of fetal movements at term.

6.1. Movement type

Descriptive terms for types of fetal movement in the third trimester reported in this study are consistent with other qualitative studies of maternal perception of fetal movements at term.^{10,11} A survey of 156 women at more than 28 weeks of pregnancy reported a progression with advancing gestation in fetal movement quality from ‘gentle’ to ‘strong’ and in actions from ‘limb’ to ‘whole body’ movements.¹⁰ Interviews with 40 women at 37 weeks’ gestation or more concluded in analysis that fetal movements at term were strong, slow (or smooth) and included whole body movements such stretching, wiggling and twisting.¹¹ The predominance of whole body movements being perceived at term suggests use the word ‘kick’ as a catch-all term for fetal movements by health professionals should be discouraged at term, as for women the word ‘kick’ largely refers to just one type of movement and may lead to a miss-reporting of reduced frequency of movements at term.¹¹

The fetal pushing action i.e. bilateral leg extension, frequently described by participants in this study has been observed on 4D ultrasound to be a frequently undertaken movement by the term fetus. These pushing movements have been noted to be similar to those undertaken by the chick in preparation for hatching and are hypothesised to have a similar function in facilitating birth in humans.³⁵

6.2. Pattern

In this study periods of increased fetal movements that were identified by women as recurring in the same circumstances were considered to be a pattern. A diurnal pattern characterised by increased fetal movement in the afternoon or evening was reported by all participants in this study. Maternal perception of increased fetal movement later in the day has previously been described in surveys of pregnant women^{10,36} and independently verified in ultrasound studies.³⁷ A study of fetal heart-rate and locomotor activity in 2500 fetuses demonstrated a pattern of increased fetal activity between the hours of 7 pm and 2 am. The authors of that study concluded that fetal physiological systems are related to maternal systems but run in a reverse phase.³⁸ That observation is in keeping with the inverse relationship between maternal and fetal activity and rest

described by women in this study. Importantly, a study where pregnant women were instructed to count fetal movements between the hours of 7 pm and 11 pm whilst resting on the left side, and present for assessment that evening if they failed to count 10 movements in 2 hours, was successful in reducing intra-uterine deaths.⁸ The potential significance of maternal perception of fetal movement specifically in the evening has perhaps been overlooked.

Maternal reports of fetal inactivity whilst ambulant are common but have not been the subject of significant research interest to date. In a study of maternal posture during cardiotocograph (CTG) monitoring involving 365 women, walking was associated with perception of fewer fetal movements and a longer period to record fetal heart rate accelerations.³⁹ Perception of increased fetal movement on sitting or lying down has often been attributed to maternal focus of attention in static positions but was clearly described by women in this study as a fetal response to their own position. Future studies could explore the possibility of a physiologic cause for perception of fetal movement changes in response to maternal position and activity.

6.3. Self-monitoring

In describing their baby's movements women in this study accounted for a broad range of fetal movement properties and responses. Environmental stimuli, including: touch, music or loud voices, and maternal hunger or eating promoted movement for some women.⁴⁰ Increased fetal movement later in the day and in seated positions was universally reported. These fetal movement properties came to be an expected part of the baby's movement pattern and were spontaneously monitored by women in an individualised self-assessment that was qualitative in nature.

When pregnant women present with reduced fetal movements prior to intra-uterine death, concerns may be expressed in vague terms, e.g. ‘something is not right’ suggesting a qualitative aspect. In this study, maternal descriptions of fetal movements involved a broad range of observations that varied between individuals and were often complex. Thus, maternal perception of fetal movement may encompass a broader range of movement parameters and therefore fetal biophysical functions, than just the ability to extend and retract a limb, perhaps explaining the sensitivity of maternal perception of a change in fetal movements in predicting fetal compromise.

A strength of this study is the novel design involving longitudinal gathering of qualitative descriptions of fetal movements from pregnant women themselves. Participation was limited to primigravid women who were uncomplicated at time of booking and accounts may vary in other demographics. Each woman and baby are different. Not all elements of the synthesised findings presented here will apply to all pregnant women. Rather, many elements of the description are likely to ring true for many pregnant women. The intention for this study was to provide a descriptive account. However, description and interpretation are entangled.¹⁸ Participants frequently provided interpretations of their baby's movements and made meaning of movement responses. These interpretations have been reported in the findings as features of the descriptive account but not analysed in a philosophical manner, in keeping with the intentions of the study.

A limitation of this study is that the findings offer no information in relation to stillbirth risk. Further exploration of the qualitative aspects of maternal perception of fetal movements in relation to pregnancy complications is warranted in order to

improve approaches to fetal monitoring involving maternal perception of fetal movements.

7. Conclusion

This study demonstrates that fetal movement pattern and quality as perceived by pregnant women changes over the course of pregnancy in keeping with normal fetal growth and neurological development. At term, fetal movements are smooth rather than jerky and there are longer gaps between the bouts of activity. It is reasonable for maternity care providers to inform pregnant women that a pattern of increased fetal activity later in the day and when sitting or lying down is normal, as is perception of increasing strength of fetal movements as pregnancy advances.

We report that a number of qualitative aspects of fetal activity are self-monitored by pregnant women and interpreted as reassuring. These include; increasing strength of movements, bouts of increased activity in the evenings or following a period of ambulation and in some cases movements in response to stimuli such as external noise, touching the abdomen, or adopting a cramped position. We conclude that the impressive detail with which mothers in this study were able to describe normal fetal behaviour supports the view that reduced fetal movements is defined as the qualitative perception of a reduction by the pregnant woman herself and should not be superseded in importance by any numeric definition of reduced fetal movements.

Ethics statement

Ethical approval was obtained for this study from the New Zealand Central Health and Disability Ethics Committee (ref. 12/ CEN/9) and locality approval was granted by the various community sites prior to approaching participants. Signed consent was provided by participants prior to interview and participant identity has been protected by use of pseudonyms in the manuscript.

Disclosures

The authors declare no conflicts of interest or funding assistance for this work.

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