Cognition in pregnancy: perceptions and performance

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Background

It is well established that if pregnant women are asked whether they believe their pregnancy has affected their cognitive abilities, many will report a decline (e.g. Casey, Huntsdale, Angus, & Janes, 1999; Crawley, Dennison, & Carter, 2003; McDowall & Moriarty, 2000; Sharp, Brindle, Brown, & Turner, 1993). While there are a number of plausible reasons why pregnancy might result in subtle changes in cognitive performance (including hormonal changes, emotional and mood changes, and an increase in self-absorption and preoccupation with the role changes accompanying pregnancy), the strength of pregnant women's perceptions of worsening cognition does not appear to be warranted by the objective evidence from laboratory studies of their cognitive performance. There are some reports of a mild decline in specific cognitive functions such as incidental recall of words (Sharp *et al*., 1993), implicit memory (Brindle, Brown, Brown, Griffith, & Turner, 1991), verbal memory (Buckwalter, Buckwalter, Bluestein, & Stanczyk, 2001; Keenan, Yaldoo, Stress, Fuerst, & Ginsburg, 1998); retrieval from semantic memory (de Groot, Hornstra, Roozendaal, & Jolles, 2003), and selective attention (de Groot, Adam, & Hornstra, 2003). However, the evidence is not consistent (e.g. Casey *et al*., 1999 failed to replicate the effect on implicit memory; and McDowall & Moriarty, 2000, failed to replicate effects found by Brindle *et al*., 1991), and some studies have failed to find any effects at all (Casey *et al*., 1999; Casey, 2000; Christensen, Poyser, Pollitt, & Cubis, 1999; Crawley *et al*., 2003; McDowall & Moriarty, 2000).

The aim of this research was to investigate two possible reasons for the discrepancy between subjective and objective measures of pregnancy-related cognitive changes. The first possibility is that there are some real changes but these are mild and usually only noticeable in cognitively complex everyday situations. The perceived changes reported by pregnant women are small rather than dramatic (e.g. McDowall & Moriarty, 2000), and even when pregnancy-related deficits are detected using objective tests, the effects are small (e.g. Casey *et al.*, 1999). It is therefore possible that in the laboratory, when women know they are being tested, they can focus all

their cognitive resources on the task and so overcome any mild decline that they notice in their everyday lives. The second possibility is that there are no real changes and the perceived difficulties arise from expectations based on a societal myth or stereotype. Expectations based on a negative stereotype appear to influence the reporting of cognitive difficulties in the premenstrual phase of the menstrual cycle (Marvan & Escobedo, 1999; Nicolson, 1995; Ussher, 1992). If the stereotype that characterises women as victims of their hormones influences women's beliefs about their cognitive abilities during their menstrual cycle, it might also influence their beliefs about other life events related to reproduction, including pregnancy.

These two explanations are not necessarily mutually exclusive. It is possible that subtle changes in actual cognition and cultural expectations might both contribute to the reporting of cognitive deterioration during pregnancy in the same way that both actual changes and expectations appear to interact in the reporting of premenstrual symptoms (e.g. Klebanov & Jemmott, 1992).

Objectives

The main aim of this project was to examine possible reasons for the discrepancy between pregnant women's perception of worsening cognitive abilities during pregnancy and the objective evidence from studies that have assessed their performance using objective tests of cognition in the laboratory. Three studies were undertaken to explore two possible explanations.

The objective of the first two studies was to explore the possibility that the effects of pregnancy are mild enough to be noticeable only in cognitively complex everyday situations and not in the simpler, contrived tasks typically used to measure cognition in the laboratory. In Study 1 the performance of 50 first-time pregnant women (25 in their 2nd trimester and 25 in their 3rd trimester) and 25 non-pregnant, childless women was compared on a range of cognitive tests. The tests were chosen because they have been shown to be sensitive to mild cognitive decline and because they use familiar, everyday materials. Thirteen tasks from four published tests providing a wide coverage of memory and attention functions were used to compare the three groups of women. In Study 2, the performance of 13 first-time pregnant women and 17 non-pregnant childless women was compared using two driving simulation tasks. Driving is one of the most cognitively complex everyday activities, and some pregnant

women have reported changes in their driving behaviour when pregnant (e.g. Crawley, 2002). If there are real effects of pregnancy on cognition, the cognitively demanding nature of the driving tasks maximises the possibility of revealing such effects. In both studies, the perceptions of the pregnant and non-pregnant participants regarding recent cognitive change were measured using a series of self-rating scales.

The main objective of Study 3 was to ask whether there is a stereotype of pregnancy being accompanied by a decline in cognitive abilities that might influence pregnant women's perceptions of cognitive change. The existence of such a stereotype in the general public was investigated by asking two groups of men and women, those in frequent, daily contact with pregnant women (pregnant women themselves and their partners), and those with infrequent contact (childless women and men), to rate the likelihood of pregnancy-related cognitive changes. Ninety-nine pregnant women took part, 55 male partners of pregnant women, 100 childless women and 100 childless men. If a stereotype exists, it might lead women to be more aware of their cognitive slips (the kind everyone makes) and attribute them to their pregnancy. This might either wholly explain the self ratings or, if there are some real mild and specific changes in cognition, it might magnify these changes so they are perceived to be more marked than they actually are.

A subsidiary objective of Study 3 was to examine the influence of expectations on the reporting of pregnancy-related changes by pregnant women. The pregnant women were asked to complete the ratings in two forms: once in relation to pregnant women in general, and once in relation to their own, personal experience. A positive correlation between the ratings for women in general and ratings for the pregnant women specifically would be consistent with an influence of expectations on the perception of personal changes.

The objectives of the three studies were met. Details are provided in the Methods and Results sections below. The only deviation from the original design of the studies was that in Study 2, the plan to divide the group of pregnant women into those in their 2nd trimester and those in their 3rd trimester was not possible. Recruiting difficulties meant that not enough women were tested to allow the more detailed examination of pregnancy by trimester. The comparison across trimesters was possible in Study 1 and showed little evidence for a difference so the lack of a comparison by trimester in Study 2 is not a major problem.

Methods

Self-ratings of cognitive change

In all three studies, participants completed 21 self-rating items relating to possible cognitive and emotional changes they might have experienced recently, either in comparison with their pre-pregnant selves (in the case of the pregnant participants) or in comparison with one year ago (in the case of the non-pregnant participants). All were rated on a 7-point scale (where 1= much more able, 7= much less able). The 15 items relating to changes in cognitive abilities were chosen to reflect a range of cognitive functions suggested as potentially affected by pregnancy in the published literature. The cognitive items were categorised and analysed as three composites of five items each: memory (ability to find the right word when speaking; memory/forgetfulness; ability to remember names; ability to remember appointments, important dates, etc.; ability to remember what has been read), attention (absentmindedness; ability to concentrate; preoccupation; ability to think clearly; ability to divide attention), and applied cognitive abilities (ability to make decisions; effectiveness at work; ability to drive a car; organisational ability; ability to learn). Six filler items related to other possible pregnancy-related changes (e.g. tiredness, emotional changes). Participants were given the opportunity to make additional comments beside each item and, at the end, to note examples from personal experience. They were also asked to indicate which, if any, of a list of given factors (e.g. hormonal changes, tiredness) they thought might be responsible for any reported changes in cognition.

In Study 2 participants completed an additional question asking whether they were aware of any changes in their driving habits either since becoming pregnant, or (in the case of non-pregnant women) compared with one year ago. If they answered yes, they were asked to check specific examples on a list of possible changes (e.g. driving more quickly, driving less frequently, forgetting where their car was left in a large car park, intending to drive to A and finding themselves on the road to B).

Ratings of cognitive change in pregnant women in general

In Study 3 a version of the self-rating scale described above was used in which the items to be rated referred to changes that might be experienced by pregnant women in general.

Tests of cognition

Thirteen cognitive tasks from four published tests were used in Study 1. The tasks (with the cognitive functions measured in parentheses) were as follows:

- The Rivermead Behavioural Memory Test (Wilson, Cockburn, & Baddeley, 1991): story recall task (explicit retrospective memory).
- Speed and Capacity of Language-Processing Test (SCOLP, Baddeley, Emslie, & Nimmo-Smith, 1992): speed of comprehension task (speed and efficiency of language comprehension). The Spot-the-Word task from the SCOLP was used to match the pregnant and non-pregnant participants for verbal intelligence.
- Behavioural Assessment of Dysexecutive Syndrome (BADS; Wilson, Alderman, Burgess, Emslie, & Evans, 1996): zoo map task (planning ability) and modified six elements task (planning, organisation and prospective memory).
- Test of Everyday Attention (TEA: Robertson, Ward, Ridgeway, & Nimmo-Smith, 1994): map search task (visual selective attention), elevator counting task (sustained attention), elevator counting task with distraction (auditory-verbal working memory and auditory selective attention), visual elevator task (attentional switching), elevator counting task with reversal (manipulation of information in auditory-verbal working memory and auditory selective attention), telephone search task (visual selective attention), telephone search task while counting (sustained and divided attention), lottery task (sustained attention).

Driving simulation tasks

The driving simulator consisted of a mock driving seat, dashboard, steering wheel, accelerator and brake pedals linked to a simulated road environment and data acquisition system. Three LCD projectors displayed the driving simulation on to three 2.29m x 2.50m screens creating a total viewing angle of 120 degrees. Data were acquired from signals on the primary controls of the driving rig via a data acquisition card and an interface card, and were stored in a real-time and an event log. There were two tasks; a brake task and a junction task:

- Brake task: participants completed 10 trials in which they drove along a straight stretch of road (on a hill) with one car visible in front. The task was to brake as soon as the brake lights of the car in front came on. Measures taken were

thinking time (from the brake light coming on to the time the participant's foot came off the accelerator), movement time (from thinking time until the first detectable pressure on the brake pedal), 100N response time (from the first detectable brake pressure until 100 Newtons has been applied to the brake), and total brake time (thinking time, plus movement time, plus 100N response time).

- Junction task: participants turned right from a stationary position at a T-junction into a main road in which the direction of traffic flow and gap size were manipulated. There were two trials in which there was no other traffic on the road (practice trials), and two trials in each of three traffic conditions (traffic from the right, traffic from the left, and traffic from both directions). In the three traffic conditions, the scenario began with a group of eight cars driving past the stationary participant, followed by a gap, a group of three cars, a gap, and so on. The gap sizes became progressively larger. The measures taken were decision time, manoeuvre time, gap size accepted, time to collision, and the number of collisions with other vehicles or street furniture. The decision time is the time from the beginning of the scenario until the gap is accepted and the participant presses the accelerator to move forward. Manoeuvre time is the time at which the trial ends (when a fixed point on the main road is passed) minus the decision time. Gap size is the size of the gap in the traffic flow that the participant turned into. The time to collision is the time it would take two vehicles to collide if they continued on their route at the current speed, without braking or taking evasive action. For the third scenario where traffic flowed in both directions, time to collision was calculated for both the vehicle coming from the left and the vehicle coming from the right. The shorter of these two times was used in the analysis.

Results

Perception of pregnancy-related changes in cognition: Self-ratings

In Study 1, ANOVAs showed that the composite mean self-ratings for memory, for attention and for applied cognitive abilities differed significantly between the three groups of women. For all three composites, post hoc Tukey tests revealed that the non-pregnant women gave lower ratings than either the 2nd or 3rd trimester women. Similarly, in Study 2, t-test comparisons showed that the pregnant women rated themselves as worse than the non-pregnant women on all three composite measures. The self-ratings provided by the pregnant women in Study 3 showed a similar perception of mild decline in memory, attention and applied cognitive abilities. Personal examples of changes noted include "since becoming pregnant, when talking I sometimes find I can't remember the most simple words" and "I find myself in a different place to where I intended to be".

The self-ratings show that the pregnant women perceive that their cognitive abilities have changed for the worse since they became pregnant, as predicted.

Pregnancy-related differences in cognitive performance

Study 1: Cognitive tasks

The scores for 71% percent of participants reached ceiling for the modified six elements task from BADS, and the majority of participants (91%) performed at ceiling level on the elevator counting task from the TEA, so no comparisons were conducted for these measures. For the remaining measures, the performance of the three groups of women was compared using a series of one-way ANOVAs. Bonferroni adjustments were made to control for the possibility of inflated Type I errors due to multiple comparisons (with an adjusted significance level of $p \leq .0038$). Group differences were found for two measures only: the scaled score of the speed of comprehension task from the SCOLP, and the scaled timing score of the visual elevator task from the TEA. Post hoc Tukey tests showed that the non-pregnant women completed more items in the speed of comprehension task than either the 2nd or 3rd trimester pregnant women, and that women in their 3rd trimester were significantly slower at attentional switching in the visual elevator task than either women in their 2nd trimester or non-pregnant women.

Study 2: Driving simulation tasks

In the brake task, independent t-test comparisons showed no difference between the

pregnant and non-pregnant women on any of the four measures. Similarly, in the junction task there was no difference between the pregnant and non-pregnant women on any of the four measures. Mixed 2x3 ANOVAs comparing each of the junction task measures for the pregnant and non-pregnant women in each of the three conditions (traffic from the right, from the left, and from both directions) showed only a significant effect of traffic direction reflecting the difficulty of the task in the different traffic flow conditions.

The comparison between the pregnant and non-pregnant women on the performance measures from the four published cognitive tests and the measures from the two driving simulation tasks showed very little effect of pregnancy. There was no effect on any of the measures from the driving simulation tasks in Study 2 and, of the 15 measures compared from the cognitive tests in Study 1 there were only two differences, one on a speed of language processing measure and the other on a speed of attentional switching measure. The evidence from the comparison of test performance in Study 1 and driving simulation task performance in Study 2 would not seem to warrant the perception of cognitive decline revealed in all three studies by the pregnant women's self-ratings.

Perceived changes in cognition: Ratings of pregnant women in general

In Study 3 the mean ratings for the three composite ratings (memory, attention and applied cognitive abilities) from all four groups (pregnant women, their partners, childless women and childless men) were all above 4 but below 5 indicating a belief amongst all groups that cognitive abilities decline slightly during pregnancy. Analysis of the composite ratings of attention and applied cognitive abilities ratings using 2x2 ANOVAs with immediate experience of pregnancy and gender as factors revealed no significant effects of either factor, and no interactions. However, a 2x2 ANOVA of the memory composite ratings showed significant effects of both factors. Those with immediate experience rated memory as worse than those without, and women as a group rated pregnant women's memory as worse than men as a group.

Perceived reasons for cognitive change: Chi-square comparisons showed that the percentage who did not believe cognitive changes were generally experienced in pregnancy differed significantly across the four groups in Study 3. For example, only 8% of pregnant women doubted cognitive change was experienced during pregnancy, compared to over a quarter of the childless women. A higher percentage of those with immediate experience of pregnancy believed tiredness was a cause of

cognitive change, and a higher percentage of those without immediate experience believed that nutritional or lifestyle changes were responsible. There were no differences in the percentage of participants choosing hormonal changes (a high percentage in all groups) or preoccupation with pregnancy/motherhood as potential causes.

Correlation between self-ratings and ratings of pregnant women in general: The pregnant women's mean composite self-ratings for memory, attention, and applied cognitive abilities were very similar to the ratings they gave for pregnant women in general with significant positive correlations between self-ratings and ratings for women in general in each case.

The results of Study 3 suggest that there is a pervasive stereotype of mild pregnancy-related cognitive decline. It is not only women and men who are currently living with their own or their partner's pregnancy who rate pregnant women as slightly worse in memory, attention and applied cognitive abilities, it is also women and men of comparable age who have never had close contact with pregnant women. It is noteworthy, however, that the perception is that the changes are not substantial. For all groups, the mean rating was only just on the negative side of 'same as usual'. The positive correlation between pregnant women's ratings for women in general and their self-ratings suggests there may be an influence of expectations on the reporting of pregnancy-related changes.

Conclusion

The results of these three studies suggest that pregnant women's reports of cognitive decline during pregnancy exceed any actual performance decrements. While there was some evidence from Study 1 that pregnant women performed worse in tasks measuring speed of language processing (in the 2nd and 3rd trimesters) and attentional switching (in the 3rd trimester only), there was no evidence for worse performance in the cognitively complex driving simulation tasks. Thus, the evidence from this, and other studies, is that there is little change in performance during pregnancy and no consistency in the specific aspects of cognition affected. It is possible therefore that the effect of pregnancy on cognition is either entirely, or if one accepts that there are changes in some specific functions, primarily a metamemory effect. In other words, pregnancy's major influence is on women's beliefs about their

cognitive ability rather than their cognitive abilities themselves. The ratings in Study 3 show that the belief that cognition is worse during pregnancy is widespread. This stereotype may influence pregnant women's perceptions of their cognition by making them more aware of everyday cognitive slips (the kind everyone makes) which they attribute to their pregnancy because of the cultural stereotype within which they are experienced.

Activities

The research has been presented at research seminars in the Department of Psychology, University of Sunderland (November 2005) and the Institute of Neuroscience, University of Newcastle-upon-Tyne (May, 2006). A presentation was made to about 35 staff of the obstetrics department (including midwives, midwife team leaders, matrons, consultant obstetricians, registrars, and SHOs) at Sunderland Royal Hospital (January 2006). Written summaries of the findings were sent to the ten midwife teams involved in recruiting participants, and to participants who requested them.

The following conference presentations have been made:

- Crawley, R.A., Grant, S.M., & Hinshaw, K. (2005). Cognition in pregnancy: perceptions and performance. Paper presented at 25th Conference of the Society for Reproductive and Infant Psychology. Abstract published in *Journal of Reproductive and Infant Psychology, 23*, 251-297.
- Crawley, R.A., Grant, S.M., & Hinshaw, K. (2006). Cognitive changes in pregnancy: mild impairments or societal myth? Poster presented at the Annual Conference of the British Psychological Society, Cardiff, March 2006.

There was much media interest following the presentation at the British Psychological Society conference. Following interviews with newspaper journalists at the conference and a telephone interview with a journalist from the Press Association, a number of reports appeared in national newspapers (including The Times, The Independent, The Daily Telegraph, The Daily Express, and Irish Independent), regional newspapers (including Liverpool Daily Post, and the Yorkshire

Post) and on websites (including British Nursing News Online, and the Mental Health Foundation) in April 2006. There was also a report of the research in the British Psychological Society's publication The Psychologist (Volume 19, 350). In addition, interviews with Ros Crawley were included in the BBC TV programme 'How to improve your memory' (August 2006) and the Australian radio programme 'All in the Mind' (October 2006).

Outputs

One journal article has been prepared and will be submitted to Applied Cognitive Psychology by the end of November 2006:
Crawley, R.A., Grant, S.M., & Hinshaw, K. Cognitive changes in pregnancy: mild decline or societal stereotype?

Another journal article is in preparation and will be submitted to an obstetrics journal, probably the Journal of Psychosomatic Obstetrics and Gynecology.

The dataset has been accepted for deposit at the Data Archive and will be sent in December 2006.

Impacts

There has been substantial interest in the findings so far reported with much media coverage because of the challenge to the prevailing view that memory and attention abilities decline during pregnancy.

Future research priorities

While these findings suggest that the effect of pregnancy is primarily an effect on beliefs about cognition, there is some suggestion of specific effects on speed of language processing and speed of attentional switching. In relation to the finding that

pregnant women were slower on the language processing task, it is interesting to note that the personal examples offered by pregnant women include examples of word finding difficulties and this deserves further attention. In addition, there is a need to explore further why there is no consistency in which particular cognitive function appears to be affected in this and other published studies.

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Methodology

Study 1

Pregnant and non-pregnant women who expressed an interest in the study were contacted by the research assistant to arrange an appointment to take part. Twenty five pregnant women in their 2nd trimester, 25 in their 3rd trimester, and 25 non-pregnant, childless women participated. Cognitive tests and self-rating scales were administered individually by the research assistant. The rating scales consisted of 21 items, 15 of which related to cognitive abilities, and 6 to non-cognitive experiences that may be associated with pregnancy (e.g. tiredness). Pregnant women rated changes in a range of cognitive functions since becoming pregnant, and the non-pregnant women compared themselves to one year ago. The 13 cognitive subtasks were taken from four published neuropsychological tests: the Rivermead Behavioural Memory Test (Wilson, Cockburn, & Baddeley, 1991), The Speed and Capacity of Language-Processing Test (Baddeley, Emslie, & Nimmo-Smith, 1992) The Behavioural Assessment of Dysexecutive Syndrome (Wilson, Alderman, Burgess, Emslie, & Evans, 1996) and The Test of Everyday Attention (Robertson, Ward, Ridgeway, & Nimmo-Smith, 1994). The subtasks were:

The Rivermead Behavioural Memory Test

Story Recall (immediate and delayed)

The Speed and Capacity of Language Processing Test

Speed of Comprehension Test

Spot-the-Word Test (used to match the women for verbal intelligence)

The Behavioural Assessment of Dysexecutive Syndrome

The Zoo Map Test

Modified Six Elements Test

Test of Everyday Attention

Map Search

Elevator Counting

Elevator Counting with Distraction

Visual Elevator

Elevator Counting with Reversal

Telephone Search

Telephone Search dual task

Lottery

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Study 2

Pregnant women were introduced to the research assistant and the study by midwifery staff during routine antenatal hospital appointments. Ninety nine pregnant participants in their 3rd trimester completed two rating scales in a private room following their appointment. The rating scales were similar to those used in Study 1, consisting of 21 items, 15 of which related to cognitive functioning. The pregnant women completed two scales: one version relating to their own experience, and one relating to their perception of the experience of pregnant women in general. Fifty five male partners of the pregnant women also completed two scales: one relating to their partner's experience, and one relating to pregnant women in general. Male partners completed the scale either in a private room at the hospital following their partner's appointment, or by post. One hundred non-pregnant, childless women and 100 childless men also participated, the majority of whom completed the scales by post. The non-pregnant women and childless men completed the rating scale relating to pregnant women in general.

Study 3

Thirteen primigravid pregnant women in their second or third trimester of pregnancy, and 17 non-pregnant, childless women who had expressed an interest in the study were contacted by the research assistant to arrange an appointment to take part. Participants completed two tasks in the driving simulator at the University of Sunderland. One was a braking task in which participants braked as soon as the brake lights of the car in front activated (10 trials). The other task involved turning right at a T junction from a stationary position into a main road in which the flow of traffic and gap size were manipulated. There were two practice trials in which there was no traffic on the road, and two trials in each of three traffic conditions: traffic

flowing from the right only, traffic flowing from the left only, and traffic flowing from both directions. Participants also completed the same 21 item rating scale as in Study 1, and some questions related to their driving experience.

Study 1: all participants

CONSENT FORM

Title of Project: Performance on tests of memory and attention during pregnancy

Name of Researcher: Dr. Ros Crawley
Name of Research Assistant: Sophie Grant

Please initial box

1. I confirm that I have read and understand the information sheet provided for the above study and have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

1 copy for patient; 1 for researcher; 1 to be kept with hospital notes (if applicable)

CONSENT FORM

Title of Project: Perceptions of cognitive change during pregnancy

Name of Researcher: Dr. Ros Crawley
Name of Research Assistant: Sophie Grant

Please initial box

1 I confirm that I have read and understand the information sheet provided for the above study and have had the opportunity to ask questions. ☐

2 I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Participant Identification Number:

1 copy for patient; 1 for researcher; 1 to be kept with hospital notes (if applicable)

Study 2: for participants contacted by post

CONSENT FORM

Title of Project: Perceptions of cognitive change during pregnancy

Name of Researcher: Dr. Ros Crawley
Name of Research Assistant: Sophie Grant

Please initial box

1. I confirm that I have read and understand the information sheet provided for the above study. I have the contact details for the researcher, Dr. Ros Crawley, and understand that I may contact her for further information at any point before, during or after my participation. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Participant Identification Number:

1 copy for patient; 1 for researcher; 1 to be kept with hospital notes (if applicable)

Study 1 Pregnant women **Information Sheet**

Study title: Performance on tests of memory and attention during pregnancy

You are being invited to take part in a research study investigating whether there are any changes in the way women perform certain tasks when they are pregnant. This is a collaborative study involving psychologists from the University of Sunderland and staff at the Sunderland Royal Hospital. The study has been approved by the Sunderland Local Research Ethics Committee and the University of Sunderland Ethics Committee. The main aim is to investigate whether there are any changes in memory and attention during pregnancy. Before you decide whether or not to take part, it is important for you to understand what the study is about and what you would be asked to do. Please read this information sheet carefully and ask if anything is not clear.

If you agree to take part, you will be asked to complete 13 short tasks. The kind of thing you will be asked to do is to look for a symbol on a map, listen for a particular pair of numbers from a long list that someone is reading out loud, or decide whether some sentences you are given to read are sensible or silly. You will also be asked to consider 21 items relating to changes that might be experienced during pregnancy. For each one, you will be asked to indicate whether or not you think during your pregnancy you are different from how you are when you are not pregnant by circling a number from 1 to 7.

The results provided will be confidential and anonymous. It would not be possible to identify you in any publication arising from this study. The results you provide will be used, together with results from other people and the results from other studies, to tell us more about the cognitive changes that women experience during pregnancy. It is intended that the results will be presented at conferences, and published in academic journal articles and in magazines that are read by pregnant women, midwives and others who care for pregnant women.

Each of the tests in themselves are quite short but there are quite a lot of them so the testing session will probably take about 1½ hours altogether. There will be a couple of scheduled breaks in that time but of course you would be free to ask for breaks at any other time if you needed them. We can arrange for the session to take place at a time and place to suit you.

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If you have any questions about the study you can ask Sophie Grant, research assistant (0191 515 2636, email sophie.grant@sunderland.ac.uk), or contact the person responsible for this study:

Dr. Ros Crawley Tel: 0191 515 2522
Sunderland Business School
University of Sunderland SR6 0DD email: roz.crawley@sunderland.ac.uk

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Study 1- Non-pregnant women **Information Sheet**

Study title: Performance on tests of memory and attention during pregnancy

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If you agree to take part, you will be one of the comparison group of non-pregnant women and you will be asked to complete 13 short tasks. The kind of thing you will be asked to do is to look for a symbol on a map, listen for a particular pair of numbers from a long list that someone is reading out loud, or decide whether some sentences you are given to read are sensible or silly. You will also be asked to consider 21 items relating to changes that you might have experienced in the last year. For each one, you will be asked to indicate whether or not you think you are different compared with one year ago by circling a number from 1 to 7.

The results provided will be confidential and anonymous. It would not be possible to identify you in any publication arising from this study. The results you provide will be used, together with results from other people and the results from other studies, to tell us more about the cognitive changes that women experience during pregnancy. It is intended that the results will be presented at conferences, and published in academic journal articles and in magazines that are read by pregnant women, midwives and others who care for pregnant women.

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Study 1 Rating scale

Pregnant: Do you think there are any other cognitive or emotional changes during pregnancy that have not been included?
Non-pregnant: Have you noticed any other cognitive or emotional changes in yourself in the last month or so, compared with one year ago that have not been included?

Participant no	Pregnancy category	Comment
7	2nd trimester	Good at prioritising and organising. Tiredness at work made me sometimes find I was not concentrating. In early pregnancy when I wasn't well, I knew I only had an hour when I felt well and so if going to the shops I planned and made quick decisions.
11	3rd trimester	Expressing more emotion to an event. More sensitive to how wonderful life actually is.
14	2nd trimester	Get upset easier. Lower tolerance levels.
17	3rd trimester	More happy than normally – feel content and very emotional.
30	2nd trimester	Moving house, learning to drive, and doing NVQ.
37	3rd trimester	Thoughts more about another person (i.e. that of my child) that I would not normally have needed to think about (i.e. less selfish!!)
45	2nd trimester	Sometimes I feel manic / silly / happy to a ridiculous degree. I think someone should observe pregnant women and see if they display any signs of bipolar disorder.
50	3rd trimester	Loss interest to phone or communicate with friends.
103	Not pregnant	I am much less "testosterone driven" – I have a better reign on my short temper- and am, although sometimes tired, never utterly exhausted any more following prescription of thyroxine for underactive thyroid gland.
104	Not pregnant	I think in the last few years e.g. 30-35 I have noticed my memory worsening.
108	Not pregnant	Happier. More accepting. Content with self.
111	Not pregnant	I have more confidence in myself.
120	Not pregnant	Not that I've noticed.

Pregnancy and Cognition

Schedule for Study 1- Tests of Memory and Attention

Procedure for administering tests of memory and attention:

At participant's home, private room at hospital education centre or classroom in Reg Vardy Centre at University of Sunderland.

1. Go through information sheet, answer questions, and take informed consent.
2. Pregnant only - ask for GP's name, and permission to write to GP.
3. Ensure room is clear of interference (TV is switched off, dog in other room, and that no visitors are expected.

"The purpose of the testing is to assess a wide range of skills and abilities. Because the tests are designed to assess such a wide range of abilities, some of the questions will appear very simple, and some may appear very difficult or frustrating. You are not expected to solve every problem or answer all questions correctly. The most important thing is to do your best.

Today we are going to through four sets of tasks. I shall let you know after we have finished each set of tasks, just to let you know where we are. The gap between tasks is an ideal time to have a break, though you can of course stop at any time.

We are going to start with a task called Rivermead".

<u>Order of tests:</u>
Rivermead Story Recall– immediate recall.
Speed of Comprehension
Spot the Word
Zoo Map 1, and 2
Modified Six Elements
Rivermead Story Recall- delayed recall.
TEA Subtasks Tasks 1-7
Rating scale
TEA Lottery task.

Debrief, answer questions and thank.

Information Sheet

Study title: Perceptions of cognitive change during pregnancy

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If you agree to take part, you will be presented with a list of 21 items relating to changes that might be experienced during pregnancy. For each one, you will be asked to indicate whether or not you think that pregnant women in general are different from how they are when they are not pregnant by circling a number from 1 to 7 on a rating scale. The results provided will be confidential and anonymous. It would not be possible to identify you in any publication arising from this study. The results you provide will be used, together with results from other people and the results from other studies, to tell us more about the cognitive changes that women experience during pregnancy. It is intended that the results will be presented at conferences, and published in academic journal articles and in magazines that are read by pregnant women, midwives and others who care for pregnant women.

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Study 2 Rating Scale

Form A – Ratings of pregnant women in general
Do you have any personal examples of any cognitive or emotional changes associated with pregnancy, either from your own experience or that of someone you know?

Participant no.	Participant group	Comment
3	Pregnant woman	I feel like a victim sometimes.
6	Pregnant woman	Bad temper followed by depression.
7	Pregnant woman	Worry about baby. Worry about labour.
36	Pregnant woman	Finding everyday things harder to deal with.
404	Pregnant woman	Sister: champion and lively. No different. Can't remember her being clumsy. Auntie: clumsy, more tiredness, and older. (she would) go through all the names….
106	Partner of pregnant woman	Is more sensitive than usual of what they say.
201	Non-pregnant, childless woman	Mood swings – sometimes to extremes – highs and lows.
203	Non-pregnant, childless woman	Anxiety does seem to affect people I've known, but most of my friends have either had miscarriages or difficulties getting pregnant and have lost babies at any early age.
204	Non-pregnant, childless woman	I have known different pregnant experience a range of different cognitive and/or emotional changes. Particularly enhanced due to perhaps hormonal changes, but I really do believe it depends on the individual.
208	Non-pregnant, childless woman	My sister seemed quite out of it when she was pregnant, kind of calm, more sedate but generally happy. Often it seemed like she wasn't that with it, with us in conversation, bubble like. My sister is a teacher and usually very articulate but sometimes she couldn't express herself as quickly and as clearly as she used to.
237	Non-pregnant, childless woman	My friend came to visit for a party at 3 months pregnant. She was much happier than usual but also content to sit back and be sensible and let others be more crazy – go out dancing – stay up late. She

		was conscious that her being pregnant would not interfere with everybody else's activities or hold anyone back.
245	Non-pregnant, childless woman	From my experience of a close friend's pregnancy, I found that she valued people more and appreciated friends and family more (emotional changes).
255	Non-pregnant, childless woman	Friend's mood swings.
267	Non-pregnant, childless woman	Obviously pregnant women have their unborn children to think about and therefore more likely to be more careful and anxious about certain situations e.g. driving. Take less risks and become more distracted – big excitement! But doesn't affect their normal selves too much in my opinion.
268	Non-pregnant, childless woman	Tiredness in the first 3 months. Much more 'happy' and likely to cry about the smallest things. Excessively worried about the health of the unborn baby.
272	Non-pregnant, childless woman	My sister was very emotional when she was pregnant. One minute she was happy then she could be in tears the next minute.
280	Non-pregnant, childless woman	Friend had mood swings and increased emotional.
297	Non-pregnant, childless woman	A cousin had an unplanned pregnancy. At first she was upset and shocked. When she got used to the idea she was happy. However she spent the last 2 months of pregnancy unable to stop crying an worried about her 3 yr old.
299	Non-pregnant, childless woman	Have experienced close family members with extreme mood swings during pregnancy and alternating from high self esteem to v. low with uncertainty and doubt. Friends have become very depressed (although not all!).
414	Non-pregnant, childless woman	Members of staff have been very emotional, very very tired and easily upset. They are happy about their pregnancy but concerned about their growing baby.
425	Non-pregnant, childless woman	I have heard women who are pregnant talking about a general preoccupation with thinking about the baby and their pregnancy a lot (of course you get that with any major event).
426	Non-pregnant, childless woman	Forgetfulness. Leaving items behind. Forgetting where have put items. Feeling lethargic, not concentrating at work and being distracted easily. Feeling hormonal, emotional and planning ahead, bonding with baby distracts a lot from daily life (friends and work colleagues experiences).
420	Non-pregnant, childless woman	When a friend was pregnant, she became absentminded, however found it quite amusing so enjoyed the whole experience!
514	Non-pregnant, childless woman	Nesting instinct – wanting to get unfinished jobs done around the house. My sister was fitting a new shower in her bathroom when 8 months pregnant (boyfriend was holding the ladder as not very good

		at DIY)!
340	Childless man	A friend suffered from frequent mood swings when pregnant, going from upbeat to down in a matter of minutes. She also had trouble remembering names, often going through a list of names to get the right one.
368	Childless man	My sister has had three children.
377	Childless man	Yes – my sister! Became quite ‘grouchy’ as would be expected and perhaps a little more ‘mature’.

Study 2 Rating Scale

Form A – Ratings of pregnant women in general
Do you think there are any other cognitive or emotional changes?

Participant no.	Participant group	Comment
7	Pregnant woman	Worry about baby. Worry about labour.
51	Pregnant woman	The situation an individual is in may affect this.
53	Pregnant woman	I have worked and known many pregnant women and have had two previous pregnancies myself. I am unable to comment / complete questions as I find it difficult to generalise.
70	Pregnant woman	Feeling much more anxious and nervous than usual. Very emotional at times.
103	Partner of pregnant woman	Be worried about health of baby.
104	Partner of pregnant woman	Irritability.
208	Non-pregnant, childless woman	Daydreaming or fantasy – I'm not sure this counts but my sister said she felt pregnancy was 9 months of imagining, imagining the baby, male/female etc, what sort of person it will be etc. I suppose this applies to concentration, hearing less of it and daydreaming more than usual.
227	Non-pregnant, childless woman	Cravings – emotional demands on partners.
237	Non-pregnant, childless woman	I think that there's more need for friendship and company.
255	Non-pregnant, childless woman	In general I would say I don't believe pregnancy affects cognitive abilities but I do believe it affects you physically and emotionally.
268	Non-pregnant, childless woman	Responsiveness to the emotional needs of others – either heightened or depressed. More upset by distressing events – real or fictional eg films, news footage, books, less emotionally resilient.
297	Non-pregnant, childless woman	Pregnant women may experience higher stress levels due to worries about money, whether the pregnancy will be OK. Fear a lack of control, lack of social life etc.

425	Non-pregnant, childless woman	I would assume that the kind of emotional experience would depend a lot on the attitude or personality of the person and how they deal with the situation.
427	Non-pregnant, childless woman	I think a lot of women probably use pregnancy as an excuse to do less and get the sympathy vote.
308	Childless man	Possibly women change their mind more?
340	Childless man	Rationality.
346	Childless man	Mood swings.
371	Childless man	Ability to do physical work.
377	Childless man	Empathy? Most expectant mothers could probably relate to those in similar circumstances or with children of their own.
395	Childless man	Food cravings.
396	Childless man	Happy.

Study 2 Rating Scale

Form B – Ratings of their pregnant partner by partners of pregnant women (specific)
Do you have any personal examples of any cognitive or emotional changes associated with pregnancy, either from your own experience or that of someone you know?

Participant no.	**Comment**
106	Is more sensitive than usual of what people say.
123	Frustration at ability to perform usual tasks.
124	She is more argumentative than usual.
126	None that aren't on the list.

Study 2 Rating Scale

Form B – Ratings of their pregnant partner by partners of pregnant women (specific)
Do you think there are any other cognitive or emotional changes associated with pregnancy, either from your partner's experience or that of someone you know?

Participant no.	**Comment**
104	Irritability.
184	Lots of dreams, bad dreams, all that goes with that during waking hours.
196	She is very unsure of herself and worries a lot.

Study 2 Rating Scale

Form C – Pregnant women's self-ratings (specific)
Do you have any personal examples of any cognitive or emotional changes associated with pregnancy, either from your own experience or that of someone you know?

Participant no.	**Comment**
2	Differences between women in how they adapt, particularly after baby is born. Some women are very different in how much attention they give to other things.
4	Coming to today's appointment. Forgot my blue notes. Went home to get notes. Had to check time of appointment. Very unlike me.
6	Snap very easily. Someone just have to say something I don't like and I lose temper followed by depression. Can sob for ages cos feel guilty about snapping.
7	Worry about baby being ok. Think a lot about labour
14	Used to pride myself. Now write things down. Diary. Must write things.
17	Forget hospital appointments. Always tired.
25	Find myself in a different place to where I intended to be e.g. find myself in allotment.
27	Feeling more emotional and not being in control.
33	Really, just inability to remember certain words at times.
36	Finding what would normally be an ordinary task or event much more difficult to cope with.
40	I feel that since becoming pregnant I have changed my eating habits. Before I ate quite healthy food and I was fit and very

	happy and never had mood swings but now I have started eating for convenience whatever is lying around and I have mood swings and am very sluggish. I feel that it is because of my diet changes.
51	Early on I came in one night planning to get tea ready. Somehow, I put my keys in the freezer and ended up in the kitchen wondering what I was looking for!
58	I have always been scatterbrained, but I was shocked when I came back to my car once and discovered I had left the handbrake off! Also, I have been forgetting to lock the back door, etc… small things.
59	Forgetting names at work. Particularly names of people which are not relevant. As though only focusing on the important and relevant issues.
65	Always having to think ahead. Spend a lot of time planning & working out what to do if something goes wrong. Maybe due to fear of what's happening next.
66	I feel more tearful some days.
78	Having had IVF twins in Jan 04, my pregnancy was far different from this one. My attentions were completely focused on my impending babies, whereas this pregnancy was "out of the blue". Most of my thoughts/emotions are still centred around my twins as it is harder to rest whilst looking after them, thus this baby is practically overlooked!
81	Child of 20, 5 and now pregnant. But different this pregnancy. Moods and memory more to do with physical problems, being tired. Physical causes. Head feels muggy.
85	Walking into a room and forgetting why. Going upstairs and not remembering why.
91	Much more emotional when watching TV. Anything sad makes me cry.
403	Just very low but I do think this is down to tiredness. I like to be on the go and have found it more difficult having a toddler with this pregnancy. Angry if words come out quick. Have to be more efficient. Say what you have to say and out comes out right. No pussy footing.

404	Feel everything is such a struggle. I used to drop things. I can't get the right word out…such as put milk on the mantelpiece, rather than microwave. Participant knew she was pregnant because "I was getting vexed with the kids".

Study 2 Rating Scale

Form C – Pregnant women's self-ratings (specific)
Do you think there are any other cognitive or emotional changes associated with pregnancy, either from your own experience or that of someone you know?

Participant no.	**Comment**
1	Driving – less patience. Feels more vulnerable at times.
6	Bad temper. Annoyed then forget.
7	Worry about baby being OK. Think a lot about labour.
40	During my pregnancy I have experienced a lot of emotional changes (mood swings). I have enjoyed becoming more involved with my partner, sharing this experience is very important.
51	For the first 16-20 weeks of pregnancy my brain felt mushy. Almost as though I was thinking through a thick fog. Since 16-20 weeks this has improved and I feel more or less back to normal.
58	I think that there is a difference between the first part of pregnancy (which is when I felt most depressed, ill and anxious) and the latter half.
59	Constant worry that my husband will leave me – very bizarre and unlike me!
70	Feeling much more anxious and nervous than usual. Very emotional at times.
403	Feelings of isolation, even recently pregnant women forget the worry, tiredness, anxiety that can come with pregnancy and when you do need to express your feelings it can be difficult for people to understand.
404	Self esteem (low).

Information Sheet

Study title: Performance on a driving simulator task during pregnancy

You are being invited to take part in a research study investigating whether there are any changes in the way women perform certain tasks when they are pregnant. This is a collaborative study involving psychologists from the University of Sunderland and staff at the Sunderland Royal Hospital. The study has been approved by the Sunderland Local Research Ethics Committee and the University of Sunderland Ethics Committee. The aim is to investigate whether there are any changes in performance on a driving simulation task during pregnancy. Before you decide whether or not to take part, it is important for you to understand what the study is about and what you would be asked to do. Please read this information sheet carefully and ask if anything is not clear.

If you agree to take part, you will be asked to perform a task in the driving simulator at the University of Sunderland. The simulator facility has been subjected to a full health and safety check by the University. The task involves sitting in a mock driving seat (complete with steering wheel, accelerator and brake pedals) and using the controls to perform a mock right turn at a T junction. The T junction scenario is projected on to a large screen in front of the mock driving seat. You will also be asked to consider 21 items relating to changes that might be experienced during pregnancy. For each one, you will be asked to indicate whether or not you think during your pregnancy you are different now from how you are when you are not pregnant by circling a number from 1 to 7. The results provided will be confidential and anonymous. It would not be possible to identify you in any publication arising from this study. The results you provide will be used, together with results from other people and the results from other studies, to tell us more about the cognitive changes that women experience during pregnancy. It is intended that the results will be presented at conferences, and published in academic journal articles and in magazines that are read by pregnant women, midwives and others who care for pregnant women.

Participation in the study is voluntary. If you do not want to take part, you do not have to give a reason. If you decide to take part, you will be given this information sheet to keep and you will be asked to sign a consent form. If you do decide to take part, you are free to change your mind and withdraw at any time without giving a reason. Occasionally people have reported experiencing mild nausea in the simulator. If this happens to you, you should let us know immediately and the simulation can be stopped.

If you have any questions about the study you can ask me, Sophie Grant, now or contact the person responsible for this study, Dr. Ros Crawley, at the following address:

Sunderland Business School
University of Sunderland
Tel: 0191 515 2522
email: roz.crawley@sunderland.ac.uk

If you would like to know the results of the study when it is finished, you can contact Dr. Crawley (contact details above).

Information Sheet

Study title: Performance on a driving simulator task during pregnancy

You are being invited to take part in a research study investigating whether there are any changes in the way women perform certain tasks when they are pregnant. This is a collaborative study involving psychologists from the University of Sunderland and staff at the Sunderland Royal Hospital. The study has been approved by the Sunderland Local Research Ethics Committee and the University of Sunderland Ethics Committee. The aim is to investigate whether there are any changes in performance on a driving simulation task during pregnancy. Before you decide whether or not to take part, it is important for you to understand what the study is about and what you would be asked to do. Please read this information sheet carefully and ask if anything is not clear.

If you agree to take part, you will be one of the comparison group of non-pregnant women and you will be asked to perform a task in the driving simulator at the University. The simulator facility has been subjected to a full health and safety check by the University. The task involves sitting in a mock driving seat (complete with steering wheel, accelerator and brake pedals) and using the controls to perform a mock right turn at a T junction. The T junction scenario is projected on to a large screen in front of the mock driving seat. You will also be asked to consider 21 items relating to changes that you might have experienced in the last year. For each one, you will be asked to indicate whether or not you think you are different compared with one year ago by circling a number from 1 to 7. The results provided will be confidential and anonymous. It would not be possible to identify you in any publication arising from this study. The results you provide will be used, together with results from other people and the results from other studies, to tell us more about the cognitive changes that women experience during pregnancy. It is intended that the results will be presented at conferences, and published in academic journal articles and in magazines that are read by pregnant women, midwives and others who care for pregnant women.

Participation in the study is voluntary. If you do not want to take part, you do not have to give a reason. If you decide to take part, you will be given this information sheet to keep and you will be asked to sign a consent form. If you do decide to take part, you are free to change your mind and withdraw at any time without giving a reason. Occasionally people have reported experiencing mild nausea in the simulator. If this happens to you, you should let us know immediately and the simulation can be stopped.

If you have any questions about the study you can ask Sophie Grant, research assistant (**0191 515 2636**, email sophie.grant@sunderland.ac.uk) or contact the person responsible for this study, Dr. Ros Crawley, at the following address:

Sunderland Business School Tel: 0191 515 2522
University of Sunderland, SR6 ODD email: roz.crawley@sunderland.ac.uk

If you would like to know the results of the study when it is finished, you can contact Dr. Crawley (contact details above).

CONSENT FORM

Title of Project: Performance on a driving simulator task during pregnancy

Name of Researcher: Dr. Ros Crawley

Please initial box

1. I confirm that I have read and understand the information sheet provided for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐
3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Participant Identification Number:

1 copy for patient; 1 for researcher; 1 to be kept with hospital notes (if applicable)

ID: _____

Some possible ways in which your driving habits may have changed:

1. Driving more quickly
2. Driving more slowly
3. Driving more frequently
4. Driving less frequently
5. Avoiding certain roads or road layouts (e.g. motorways, multi-lane roundabouts, staggered junctions on dual carriageways, merging into moving traffic)
6. Avoiding certain driving conditions (e.g. driving in bad weather, driving in the dark, driving for long periods driving in the rush hour)
7. Getting into the wrong lane at a roundabout or approaching a road junction
8. Forgetting where you left your car in a large car park
9. Failing to notice someone stepping out from behind a bus or parked vehicle until it is nearly too late
10. Failing to check your mirror before pulling out, changing lanes, turning etc.
11. Getting involved in unofficial races with other drivers
12. Forgetting which gear you are currently in and having to check with your hand
13. Failing to notice pedestrians crossing when turning into a side street from a main road
14. Failing to read signs correctly, and exiting from a roundabout on the wrong road
15. Becoming angered by another driver's behaviour, and chasing them with the intention of giving them a piece of your mind
16. Misjudging the speed of an on-coming vehicle when overtaking
17. Driving especially close to or ' flashing' the car in front as a signal for the driver to go faster or to get out of your way
18. Intending to switch on the windscreen wipers, for example, but switching on the indicator (for example) instead
19. Misjudging the time it will take to cross when turning right and narrowly missing having an accident
20. Intending to drive to A, and suddenly realising you are on the way to B, where the latter is the more usual journey
21. Becoming impatient with a slow driver in the outer lane and overtake on the inside
22. Being stuck behind a slow moving vehicle, and trying to overtake in risky circumstances
23. Trying to overtake without first checking your mirror, and not realising that the car behind had already begun to overtake you
24. Deliberately disregarding speed limits late at night or very early in the morning

Study 3

Driving Simulator

Question at end of the rating scale questionnaire:

Do you have any personal examples of any cognitive or emotional changes you have noticed since becoming pregnant/in the last month or so?

Participant no	Pregnancy category	Comment
2	Not pregnant	Happier/more settled due to significant change in personal circumstances.
7	Not pregnant	Very emotional over the last year. I think this is due to lots of changes in my life e.g. moving house, new job, new environment etc
26	Pregnant	You can share experience with your partner but sometimes they don't truly understand. Can feel alone sometimes through no fault of partner. Changes of emotions make u feel this way.
27	Pregnant	Feeling overemotional for slightest little thing. Feeling much more empathetic to others who are upset and/or going through difficulties (i.e. on TV even if fictional).
28	Pregnant	I feel once I entered 2nd trimester you become much more safety conscious, which is attached to your emotions and anxiety, as you have something precious inside you need to keep safe, not just yourself to think about
29	Pregnant	Irrational behaviour. More emotional than usual
30	Pregnant	I cry when telling a sad story I've seen on TV or radio as well as crying when I heard it myself

Study 3

Question at the end of the rating scale questionnaire: Have you noticed any other cognitive or emotional changes in yourself…?

Participant no	Pregnancy category	Comment
22	Not pregnant	Not really, feel happier in my job as more settled
28	Pregnant	I think the emotional state of the person reflects on their memory / concentration / happiness/ sadness. If it is a happy experience, then there won't be as much change during pregnancy

Cognition in Pregnancy: Driving Simulator Study

Schedule for testing:

Obtain informed consent.
Introduction to driving simulator
Brake task – 10 trials
Junction task – No traffic, traffic from right, traffic from left (order of traffic from right and traffic from left is alternated), both directions.
Complete self-rating scales
Debrief.

About you

We will now ask some questions about you. All information you give in this self-rating scale will be treated as confidential. If you would prefer to leave any of the questions blank, that is entirely up to you.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

Are you? ☐ Male ☐ Female

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children? ☐ Yes ☐ No

If yes, how many? ☐ 1 ☐ 2 ☐ 3+

If you have been pregnant before, but not had a child, can you please indicate how many months you were pregnant for?

☐ Up to 3 months
☐ 3-5 months
☐ 6-8 months
☐ 8+ months

Are you pregnant now? ☐ Yes ☐ No ☐ Don't know

Are you single or do you have a partner? ☐ Single ☐ Have a partner

Your education:
Please indicate the stage at which you completed, or expect to complete your education.

☐ Left school at 16 or 17
☐ Left school at 18
☐ Study for college qualification
☐ Study for university or professional qualification

Thank you very much for your participation.

About you

We will now ask some questions about you. All information you give in this self-rating scale will be treated as confidential. If you would prefer to leave any of the questions blank, that is entirely up to you.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

Are you? ☐ Male ☐ Female

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children? ☐ Yes ☐ No

If yes, how many? ☐ 1 ☐ 2 ☐ 3+

If you have been pregnant before, but not had a child, can you please indicate how many months you were pregnant for?

☐ Up to 3 months
☐ 3-5 months
☐ 6-8 months
☐ 8+ months

Are you pregnant now? ☐ Yes ☐ No ☐ Don't know

If yes, how many weeks pregnant are you? ☐☐ weeks

Have you had significant complications during your pregnancy? ☐ Yes ☐ No

Are you single or do you have a partner? ☐ Single ☐ Have a partner

Your education:
Please indicate the stage at which you completed, or expect to complete your education.

☐ Left school at 16 or 17
☐ Left school at 18
☐ Study for college qualification
☐ Study for university or professional qualification

Thank you very much for your participation.

For official use only ☐☐☐☐

Emotional stability **Compared with one year ago, I have:**

Far fewer mood swings than usual — Same as usual — Far more mood swings than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember what I have read **Compared with one year ago, I am:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

The items on this questionnaire relate to cognitive abilities (e.g. memory, concentration), or to emotional experiences (e.g. depression, happiness). Have you noticed any other cognitive or emotional changes in yourself in the last month or so, compared with one year ago that have not been included? Please list them below.

Do you have any personal examples of any cognitive or emotional changes you have noticed in the last month or so? If so, please describe them briefly below (and continue on a separate sheet if you need to do so).

Reasons **The final two questions relate to possible reasons for emotional and cognitive changes during pregnancy.**

If you believe you have experienced emotional changes in the last month or so compared with one year ago (e.g. mood swings, depression, happiness), which of the following factors, if any, do you think might be responsible?

☐ I do not believe I have experienced emotional changes ☐ Preoccupation with other things going on in my life ☐ Hormonal changes
☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

If you believe you have experienced cognitive changes in the last month or so compared with one year ago (e.g. changes in memory, concentration, the ability to think clearly), which of the following factors, if any, do you think might be responsible?

☐ I do not believe I have experienced cognitive changes ☐ Preoccupation with other things going on in my life ☐ Hormonal changes
☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

For official use only ☐☐☐☐

Thank you very much for your participation

Changes you have experienced in comparison with one year ago

FORM D

Please use the rating scales below to indicate for each item whether you think that you have experienced changes in comparison with one year ago. Remember there are no right or wrong answers, just answer as accurately as possible. If you feel the need to make an additional comment, please do so.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Tiredness **Compared with one year ago, I am:**

Much less tired than usual — Same as usual — Much more tired than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to find the right word when speaking

(Note that a difficulty here might be experienced as finding yourself with a word "on the tip of your tongue". You feel you know it but are not quite able to find it.) Compared with one year ago, I am:

Much more able than usual to find the right word — Same as usual — Much less able than usual to find the right word

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Absentmindedness **Compared with one year ago, I am:**

Much less absentminded than usual — Same as usual — Much more absentminded than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to make decisions **Compared with one year ago, I am:**

Much more able than usual to make decisions — Same as usual — Much less able than usual to make decisions

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Depression **Compared with one year ago, I am:**

Much less depressed than usual — Same as usual — Much more depressed than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Effectiveness at work **Compared with one year ago, I am:**

Much more effective at work than usual — Same as usual — Much less effective at work than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to concentrate **Compared with one year ago, I have:**

A much greater ability to concentrate than usual — Same as usual — Much more difficulty concentrating than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Memory **Compared with one year ago, I am:**

Much less forgetful than usual — Same as usual — Much more forgetful than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Anxiety **Compared with one year ago, I am:**

Much less anxious than usual — Same as usual — Much more anxious than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to drive a car **Compared with one year ago, when driving a car, I am:**

Much more skilled than usual — Same as usual — Much less skilled than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Preoccupation **Compared with one year ago, I am:**

Much less preoccupied than usual — Same as usual — Much more preoccupied than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Self esteem **Compared with one year ago, I have:**

Much higher self esteem than usual — Same as usual — Much lower self esteem than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to think clearly **Compared with one year ago, I am:**

Much more able than usual to think clearly — Same as usual — Much less able than usual to think clearly

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to divide attention **Compared with one year ago, when dividing my attention, (i.e. doing more than one thing at once), I am:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Happiness **Compared with one year ago, I am:**

Much happier than usual — Same as usual — Much less happy than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Organisational Ability **Compared with one year ago, when organising a complex event (such as a large family gathering), I am:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember names **Compared with one year ago, I am:**

Much more able to remember names than usual — Same as usual — Much less able to remember names than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember appointments, important dates etc. **Compared with one year ago, I am:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to learn **Compared with one year ago, I am:**

Much more able to learn than usual — Same as usual — Much less able to learn than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

PLEASE TURN OVER

Emotional stability **Since becoming pregnant I have:**

Far fewer mood swings than usual — Same as usual — Far more mood swings than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember what they have read **Since becoming pregnant I am:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

The items on this questionnaire relate to cognitive abilities (e.g. memory, concentration), or to emotional experiences (e.g. depression, happiness). Do you think there are any other cognitive or emotional changes during pregnancy that have not been included? Please list them below.

Do you have any personal examples of any cognitive or emotional changes you have noticed since becoming pregnant? If so, please describe them briefly below (and continue on a separate sheet if you need to do so).

Reasons **The final two questions relate to possible reasons for emotional and cognitive changes during pregnancy.**

If you believe you have experienced emotional changes since becoming pregnant (e.g. mood swings, depression, happiness), which of the following factors, if any, do you think might be responsible?

☐ I do not believe I have experienced emotional changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes
☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

If you believe you have cognitive changes since becoming pregnant (e.g. changes in momory, concentration, the ability to think clearly). which of the following factors, if any, do you think might be responsible?

☐ I do not believe I have experienced cognitive changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes
☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

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Thank you very much for your participation

Changes you have experienced since becoming pregnant

FORM E

Please use the rating scales below to indicate for each item whether you think that since you became pregnant, you have experienced changes in comparison to your usual, non-pregnant self. Remember there are no right or wrong answers, just answer as accurately as possible. If you feel the need to make an additional comment, please do so.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Tiredness **Since becoming pregnant I am:**

Much less tired than usual — Same as usual — Much more tired than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to find the right word when speaking

(Note that a difficulty here might be experienced as finding yourself with a word "on the tip of your tongue". You feel you know it but are not quite able to find it.) Since becoming pregnant I am:

Much more able than usual to find the right word — Same as usual — Much less able than usual to find the right word

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Absentmindedness **Since becoming pregnant I am:**

Much less absentminded than usual — Same as usual — Much more absentminded than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to make decisions **Since becoming pregnant I am:**

Much more able than usual to make decisions — Same as usual — Much less able than usual to make decisions

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Depression **Since becoming pregnant I am:**

Much less depressed than usual — Same as usual — Much more depressed than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Effectiveness at work **Since becoming pregnant I am:**

Much more effective at work than usual — Same as usual — Much less effective at work than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to concentrate **Since becoming pregnant I have:**

A much greater ability to concentrate than usual — Same as usual — Much more difficulty concentrating than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Memory **Since becoming pregnant I am:**

Much less forgetful than usual — Same as usual — Much more forgetful than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Anxiety **Since becoming pregnant I am:**

Much less anxious than usual — Same as usual — Much more anxious than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to drive a car **Since becoming pregnant, when driving a car, I am:**

Much more skilled than usual — Same as usual — Much less skilled than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Preoccupation **Since becoming pregnant I am:**

Much less preoccupied than usual — Same as usual — Much more preoccupied than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Self esteem **Since becoming pregnant I have:**

Much higher self esteem than usual — Same as usual — Much lower self esteem than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to think clearly **Since becoming pregnant I am:**

Much more able than usual to think clearly — Same as usual — Much less able than usual to think clearly

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to divide attention **Since becoming pregnant, when dividing my attention, (i.e. doing more than one thing at once), I am:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Happiness **Since becoming pregnant I am:**

Much happier than usual — Same as usual — Much less happy than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Organisational Ability **When organising a complex event (such as a large family gathering), I am:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember names **Since becoming pregnant I am:**

Much more able to remember names than usual — Same as usual — Much less able to remember names than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember appointments, important dates etc. **Since becoming pregnant I am:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to learn **Since becoming pregnant I am:**

Much more able to learn than usual — Same as usual — Much less able to learn than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

PLEASE TURN OVER

About you

We will now ask some questions about you. All information you give in this self-rating scale will be treated as confidential. If you would prefer to leave any of the questions blank, that is entirely up to you.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

Are you? ☐ Male ☐ Female

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children? ☐ Yes ☐ No

If Yes, how many? ☐ 1 ☐ 2 ☐ 3+

Are you single or do you have a partner? ☐ Single ☐ Have a partner

If you have a partner now, are they pregnant? ☐ Yes ☐ No ☐ Don't know

Your education:
Please indicate the stage at which you completed, or expect to complete your education.

☐ Left school at 16 or 17
☐ Left school at 18
☐ Study for college qualification
☐ Study for university or professional qualification

Have you ever had close daily experience of being with someone throughout their pregnancy? ☐ Yes ☐ No

If you answered yes to the above, could you please provide more details (e.g. how frequently you saw them, and in what capacity)

Thank you very much for your participation.

About you

We will now ask some questions about you. All information you give in this self-rating scale will be treated as confidential. If you would prefer to leave any of the questions blank, that is entirely up to you.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

Are you? ☐ Male ☐ Female

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children? ☐ Yes ☐ No

If Yes, how many? ☐ 1 ☐ 2 ☐ 3+

If you have been pregnant before, but not had a child, can you please indicate how many months you were pregnant for?

☐ Up to 3 months
☐ 3-5 months
☐ 6-8 months
☐ 8+ months

Are you pregnant now? ☐ Yes ☐ No ☐ Don't know

Are you single or do you have a partner? ☐ Single ☐ Have a partner

Your education:
Please indicate the stage at which you completed, or expect to complete your education.

☐ Left school at 16 or 17
☐ Left school at 18
☐ Study for college qualification
☐ Study for university or professional qualification

Have you ever had close daily experience of being with someone throughout their pregnancy? ☐ Yes ☐ No

If you answered yes to the above, could you please provide more details (e.g. how frequently you saw them, and in what capacity)

Thank you very much for your participation.

About you

We will now ask some questions about you. All information you give in this self-rating scale will be treated as confidential. If you would prefer to leave any of the questions blank, that is entirely up to you.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... | A | B | C | D |

Are you? ☐ Male ☐ Female

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Do you already have children? ☐ Yes ☐ No

If Yes, how many? ☐ 1 ☐ 2 ☐ 3+

Are you single or do you have a partner? ☐ Single ☐ Have a partner

How many weeks pregnant is your partner? ☐☐ weeks

Your education:
Please indicate the stage at which you completed, or expect to complete your education.

☐ Left school at 16 or 17
☐ Left school at 18
☐ Study for college qualification
☐ Study for university or professional qualification

Do you now, or have you ever had close daily experience of being with someone throughout their pregnancy? ☐ Yes ☐ No

If you answered yes to the above, could you please provide more details (e.g. how frequently you saw them, and in what capacity)

Thank you very much for your participation.

About you

We will now ask some questions about you. All information you give in this self-rating scale will be treated as confidential. If you would prefer to leave any of the questions blank, that is entirely up to you.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

Are you? ☐ Male ☐ Female

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children? ☐ Yes ☐ No

If Yes, how many? ☐ 1 ☐ 2 ☐ 3+

If you have been pregnant before, but not had a child, can you please indicate how many months you were pregnant for?

☐ Up to 3 months
☐ 3-5 months
☐ 6-8 months
☐ 8+ months

Are you pregnant now? ☐ Yes ☐ No ☐ Don't know

If Yes, how many weeks pregnant are you? ☐☐ weeks

Have you had significant complications during your pregnancy? ☐ Yes ☐ No

Are you single or do you have a partner? ☐ Single ☐ Have a partner

Your education:
Please indicate the stage at which you completed, or expect to complete your education.

☐ Left school at 16 or 17
☐ Left school at 18
☐ Study for college qualification
☐ Study for university or professional qualification

Do you now, or have you ever had close daily experience of being with someone throughout their pregnancy? ☐ Yes ☐ No

If you answered yes to the above, could you please provide more details (e.g. how frequently you saw them, and in what capacity)

Thank you very much for your participation.

Emotional stability **Pregnant women have:**

Far fewer mood swings than usual — Same as usual — Far more mood swings than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember what they have read **Pregnant women are:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

The items on this questionnaire relate to cognitive abilities (e.g. memory, concentration), or to emotional experiences (e.g. depression, happiness). Do you think there are any other cognitive or emotional changes during pregnancy that have not been included? Please list them below.

Do you have any personal examples of any cognitive or emotional changes associated with pregnancy, either from your own experience or that of someone you know? If so, please describe them briefly below (and continue on a separate sheet if you need to do so).

Reasons **The final two questions relate to possible reasons for emotional and cognitive changes during pregnancy.**

If you believe there are emotional changes during pregnancy (e.g. mood swings, depression, happiness), which of the following factors, if any, do you think might be responsible?

☐ I do not believe there are emotional changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes

☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

If you believe there are cognitive changes during pregnancy (e.g. changes in momory, concentration, the ability to think clearly). which of the following factors, if any, do you think might be responsible?

☐ I do not believe there are cognitive changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes

☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

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Thank you very much for your participation

Changes experienced by pregnant women

FORM A

Please use the rating scales below to indicate for each item whether you think that when women are pregnant, they experience changes in comparison with their usual, non-pregnant selves. Remember there are no right or wrong answers, just answer as accurately as possible. We are interested in what you believe about pregnant women in general throughout their pregnancies. If you feel the need to make an additional comment, please do so.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Tiredness **Pregnant women are:**

Much less tired than usual — Same as usual — Much more tired than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to find the right word when speaking

(Note that a difficulty here might be experienced as finding yourself with a word "on the tip of your tongue". You feel you know it but are not quite able to find it.) Pregnant women are:

Much more able than usual to find the right word — Same as usual — Much less able than usual to find the right word

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Absentmindedness **Pregnant women are:**

Much less absentminded than usual — Same as usual — Much more absentminded than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to make decisions **Pregnant women are:**

Much more able than usual to make decisions — Same as usual — Much less able than usual to make decisions

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Depression **Pregnant women are:**

Much less depressed than usual — Same as usual — Much more depressed than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Effectiveness at work **Pregnant women are:**

Much more effective at work than usual — Same as usual — Much less effective at work than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to concentrate **Pregnant women have:**

A much greater ability to concentrate than usual — Same as usual — Much more difficulty concentrating than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Memory **Pregnant women are:**

Much less forgetful than usual — Same as usual — Much more forgetful than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Anxiety **Pregnant women are:**

Much less anxious than usual — Same as usual — Much more anxious than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to drive a car **When driving a car, pregnant women are:**

Much more skilled than usual — Same as usual — Much less skilled than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Preoccupation **Pregnant women are:**

Much less preoccupied than usual — Same as usual — Much more preoccupied than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Self esteem **Pregnant women have:**

Much higher self esteem than usual — Same as usual — Much lower self esteem than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to think clearly **Pregnant women are:**

Much more able than usual to think clearly — Same as usual — Much less able than usual to think clearly

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to divide attention **When dividing their attention, (i.e. doing more than one thing at once), pregnant women are:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Happiness **Pregnant women are:**

Much happier than usual — Same as usual — Much less happy than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Organisational Ability **When organising a complex event (such as a large family gathering), pregnant women are:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember names **Pregnant women are:**

Much more able to remember names than usual — Same as usual — Much less able to remember names than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember appointments, important dates etc. **Pregnant women are:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to learn **Pregnant women are:**

Much more able to learn than usual — Same as usual — Much less able to learn than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

PLEASE TURN OVER

Emotional stability **Since becoming pregnant, she has:**

Far fewer mood swings than usual — Same as usual — Far more mood swings than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember what they have read **Since becoming pregnant, she is:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

The items on this questionnaire relate to cognitive abilities (e.g. memory, concentration), or to emotional experiences (e.g. depression, happiness). Do you think there are any other cognitive or emotional changes during pregnancy that have not been included here? Please list them below.

Do you have any personal examples of any cognitive or emotional changes associated with pregnancy, either from your partner's experience or that of someone you know? If so, please describe them briefly below (and continue on a separate sheet if you need to do so).

Reasons **The final two questions relate to possible reasons for emotional and cognitive changes during pregnancy.**

If you believe there are emotional changes during pregnancy (e.g. mood swings, depression, happiness), which of the following factors, if any, do you think might be responsible?

☐ I do not believe there are emotional changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes

☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

If you believe there are cognitive changes during pregnancy (e.g. changes in momory, concentration, the ability to think clearly). which of the following factors, if any, do you think might be responsible?

☐ I do not believe there are cognitive changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes

☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

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Thank you very much for your participation

Changes your partner has experienced since she become pregnant

FORM B

Please use the rating scales below to indicate for each item whether you think, that since becoming pregnant, your partner has experienced changes in comparison to her usual, non-pregnant self. Remember there are no right or wrong answers, just answer as accurately as possible. If you feel the need to make an additional comment, please do so.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Tiredness **Since becoming pregnant, she is:**

Much less tired than usual — Same as usual — Much more tired than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to find the right word when speaking

(Note that a difficulty here might be experienced as finding yourself with a word "on the tip of your tongue". You feel you know it but are not quite able to find it.) Since becoming pregnant, she is:

Much more able than usual to find the right word — Same as usual — Much less able than usual to find the right word

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Absentmindedness **Since becoming pregnant she is:**

Much less absentminded than usual — Same as usual — Much more absentminded than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to make decisions **Since becoming pregnant she is:**

Much more able than usual to make decisions — Same as usual — Much less able than usual to make decisions

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Depression **Since becoming pregnant, she is:**

Much less depressed than usual — Same as usual — Much more depressed than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Effectiveness at work **Since becoming pregnant, she is:**

Much more effective at work than usual — Same as usual — Much less effective at work than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to concentrate **Since becoming pregnant, she has:**

A much greater ability to concentrate than usual — Same as usual — Much more difficulty concentrating than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Memory **Since becoming pregnant, she is:**

Much less forgetful than usual — Same as usual — Much more forgetful than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Anxiety **Since becoming pregnant, she is:**

Much less anxious than usual — Same as usual — Much more anxious than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to drive a car **When driving a car, since becoming pregnant, she is:**

Much more skilled than usual — Same as usual — Much less skilled than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Preoccupation **Since becoming pregnant, she is:**

Much less preoccupied than usual — Same as usual — Much more preoccupied than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Self esteem **Since becoming pregnant, she has:**

Much higher self esteem than usual — Same as usual — Much lower self esteem than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to think clearly **Since becoming pregnant, she is:**

Much more able than usual to think clearly — Same as usual — Much less able than usual to think clearly

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to divide attention **Since becoming pregnant, when dividing her attention, (i.e. doing more than one thing at once), she is:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Happiness **Since becoming pregnant, she is:**

Much happier than usual — Same as usual — Much less happy than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Organisational Ability **Since becoming pregnant, when organising a complex event (such as a large family gathering), she is:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember names **Since becoming pregnant, she is:**

Much more able to remember names than usual — Same as usual — Much less able to remember names than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember appointments, important dates etc. **Since becoming pregnant, she is:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to learn **Since becoming pregnant, she is:**

Much more able to learn than usual — Same as usual — Much less able to learn than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

PLEASE TURN OVER

Emotional stability **Since becoming pregnant I have:**

Far fewer mood swings than usual — Same as usual — Far more mood swings than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember what they have read **Since becoming pregnant I am:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

The items on this questionnaire relate to cognitive abilities (e.g. memory, concentration), or to emotional experiences (e.g. depression, happiness). Do you think there are any other cognitive or emotional changes during pregnancy that have not been included? Please list them below.

Do you have any personal examples of any cognitive or emotional changes associated with pregnancy, either from your own experience or that of someone you know? If so, please describe them briefly below (and continue on a separate sheet if you need to do so).

Reasons **The final two questions relate to possible reasons for emotional and cognitive changes during pregnancy.**

If you believe there are emotional changes during pregnancy (e.g. mood swings, depression, happiness), which of the following factors, if any, do you think might be responsible?

☐ I do not believe there are emotional changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes

☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

If you believe there are cognitive changes during pregnancy (e.g. changes in momory, concentration, the ability to think clearly). which of the following factors, if any, do you think might be responsible?

☐ I do not believe there are cognitive changes ☐ Preoccupation with pregnancy/motherhood ☐ Hormonal changes

☐ Changes in nutrition/lifestyle ☐ Tiredness Other (please specify) _____

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Thank you very much for your participation

Changes you have experienced since becoming pregnant

FORM C

Please use the rating scales below to indicate for each item whether you think, that since you became pregnant, you have experienced changes in comparison to your usual, non-pregnant self. Remember there are no right or wrong answers, just answer as accurately as possible. If you feel the need to make an additional comment, please do so.

Put a cross in a box where a choice is required like this... ☐☒☐☐

Tiredness **Since becoming pregnant I am:**

Much less tired than usual — Same as usual — Much more tired than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to find the right word when speaking

(Note that a difficulty here might be experienced as finding yourself with a word "on the tip of your tongue". You feel you know it but are not quite able to find it.) Since becoming pregnant I am:

Much more able than usual to find the right word — Same as usual — Much less able than usual to find the right word

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Absentmindedness **Since becoming pregnant I am:**

Much less absentminded than usual — Same as usual — Much more absentminded than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to make decisions **Since becoming pregnant I am:**

Much more able than usual to make decisions — Same as usual — Much less able than usual to make decisions

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Depression **Since becoming pregnant I am:**

Much less depressed than usual — Same as usual — Much more depressed than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Effectiveness at work **Since becoming pregnant I am:**

Much more effective at work than usual — Same as usual — Much less effective at work than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to concentrate **Since becoming pregnant I have:**

A much greater ability to concentrate than usual — Same as usual — Much more difficulty concentrating than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Memory **Since becoming pregnant I am:**

Much less forgetful than usual — Same as usual — Much more forgetful than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Anxiety **Since becoming pregnant I am:**

Much less anxious than usual — Same as usual — Much more anxious than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to drive a car **Since becoming pregnant, when driving a car, I am:**

Much more skilled than usual — Same as usual — Much less skilled than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Preoccupation **Since becoming pregnant I am:**

Much less preoccupied than usual — Same as usual — Much more preoccupied than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Self esteem **Since becoming pregnant I have:**

Much higher self esteem than usual — Same as usual — Much lower self esteem than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to think clearly **Since becoming pregnant I am:**

Much more able than usual to think clearly — Same as usual — Much less able than usual to think clearly

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to divide attention **Since becoming pregnant, when dividing my attention, (i.e. doing more than one thing at once), I am:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Happiness **Since becoming pregnant I am:**

Much happier than usual — Same as usual — Much less happy than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Organisational Ability **When organising a complex event (such as a large family gathering), I am:**

Much more able than usual — Same as usual — Much less able than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember names **Since becoming pregnant I am:**

Much more able to remember names than usual — Same as usual — Much less able to remember names than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to remember appointments, important dates etc. **Since becoming pregnant I am:**

Much more able to remember than usual — Same as usual — Much less able to remember than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

Ability to learn **Since becoming pregnant I am:**

Much more able to learn than usual — Same as usual — Much less able to learn than usual

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

Additional comment:

PLEASE TURN OVER

About you

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children?
- ☐ Yes
- ☐ No

Are you pregnant now?
- ☐ Yes
- ☐ No
- ☐ Don't know

Are you single or do you have a partner?
- ☐ Single
- ☐ Have a partner

Your education:
- ☐ Left school at 16 or 17
- ☐ Left school at 18
- ☐ Study for college qualification
- ☐ Study for university or professional qualification

Have you been driving for at least 2 years?
- ☐ Yes
- ☐ No

Have you passed a Driving Standards Agency driving test (i.e. the standard driving test)?
- ☐ Yes
- ☐ No

When did you pass your test? ☐☐☐☐

Does your job involve driving?

☐ Yes

☐ No

Approximately how often do you drive?

☐ Every day

☐ 4 - 6 days per week

☐ 1 - 3 days per week

☐ Less e.g. once every two weeks/once a month

(please specify)

How often do you drive in dense traffic (i.e. during busy periods)?

☐ Frequently

☐ Sometimes

☐ Very rarely

☐ Never

Can you estimate your annual mileage?

☐ Less than 5,000 miles

☐ Between 5,000 - 10,000

☐ More than 10,000 miles

Are you aware of changes you have made to your driving habits compared with one year ago? (please refer to the list attached)

☐ Yes

☐ No

If you feel your driving habits have changed, please indicate either below, or on the attached list how you think they may have changed.

Thank you very much for your participation.

About you

Put a cross in a box where a choice is required like this... ☐☒☐☐

Please print text clearly using a black/dark blue pen in boxes provided like this..... A B C D

How old are you? ☐☐ years

What is your occupation? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Have you had children?
- ☐ Yes
- ☐ No

Are you pregnant now?
- ☐ Yes
- ☐ No
- ☐ Don't know

If Yes, how many weeks pregnant are you? ☐☐ weeks

If you are pregnant, have you had any significant complications during your pregnancy?
- ☐ Yes
- ☐ No

Are you single or do you have a partner?
- ☐ Single
- ☐ Have a partner

Your education:
- ☐ Left school at 16 or 17
- ☐ Left school at 18
- ☐ Study for college qualification
- ☐ Study for university or professional qualification

Have you been driving for at least 2 years?
- ☐ Yes
- ☐ No

Have you passed a Driving Standards Agency driving test (i.e. the standard driving test)?
- ☐ Yes
- ☐ No

When did you pass your test? ☐☐☐☐

Does your job involve driving?

☐ Yes

☐ No

Approximately how often do you drive?

☐ Every day

☐ 4 - 6 days per week

☐ 1 - 3 days per week

☐ Less e.g. once every two weeks/once a month

(please specify)

How often do you drive in dense traffic (i.e. during busy periods)?

☐ Frequently

☐ Sometimes

☐ Very rarely

☐ Never

Can you estimate your annual mileage?

☐ Less than 5,000 miles

☐ Between 5,000 - 10,000

☐ More than 10,000 miles

Are you aware of changes you have made to your driving habits since you became pregnant? (please refer to the list attached)

☐ Yes

☐ No

If you feel your driving habits have changed, please indicate either below, or on the attached list how you think they may have changed.

Thank you very much for your participation.