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A prospective study of self-efficacy expectancies and labour pain

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Abstract *Thirty-seven nulliparous women recruited from Lamaze classes rated their self-efficacy to use the pain coping strategies taught in these classes as well as the importance and anticipated outcome of using these strategies. Prior to labour, these ratings were obtained for each phase—early, active, and transitional—of the first stage of labour. During labour, women completed three pain inventories, one for each phase, with the help of their labour partner. Pre-labour ratings indicated that women's certainty of their ability to use coping strategies decreased as they anticipated each successive phase of the first stage of labour. Self-efficacy expectancies for the early and active phases of the first stage of labour predicted approximately 20% of the variance in pain levels for these phases, respectively. However, self-efficacy expectancies did not predict levels of transitional labour pain. After accounting for self-efficacy expectancies, importance and outcome ratings did not explain additional variance in pain levels for any phase of the first stage of labour. While higher self-efficacy ratings predicted lower levels of pain in early and active labour, it is unclear why women's beliefs in their ability to use coping strategies did not explain variance in transitional pain levels.*

Introduction

Modern psychoprophylactic preparation for childbirth has evolved from the work of 19th-century Russian and European physicians (Wideman & Singer, 1984). Today, women's certainty that they can use psychoprophylactic pain coping strategies and their belief that these strategies will help them cope with labour pain remains unclear. Women's beliefs regarding their labour pain coping skills and the actual pain they experience may be related (Fridh *et al.*, 1988; Lowe, 1987, 1989). Understanding the factors that predict pain levels experienced in labour can inform childbirth preparation training.

Some investigators have proposed psychological constructs to explain the large individual differences in women's reports of labour pain. These constructs incorporate notions of control, confidence, or preparedness to account for individual variations in reported labour pain. Studies investigating the links between psychological factors and levels of labour pain suggest that more childbirth training and greater control or confidence in coping with labour do not always predict lower levels of labour pain (Beck *et*

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al., 1980; Cogan *et al.*, 1976; Fridh *et al.*, 1988; Leventhal *et al.*, 1989; Lowe, 1987, 1989; Wuitchik *et al.*, 1990).

While indices of training, control, or confidence have intuitive appeal as predictors of labour pain, they lack a formal theoretical structure to support them. Bandura's self-efficacy theory (Bandura, 1977) may provide a theoretical framework for relating women's beliefs regarding their ability to perform techniques taught in childbirth preparation classes to their reports of labour pain. Two basic constructs comprise self-efficacy theory—self-efficacy expectancies and outcome expectancies—and a third construct, importance, has been proposed (Teasdale, 1978). Self-efficacy expectancies, which reflect an individual's belief that he or she can perform a given behaviour, differ from beliefs regarding control over outcome or outcome expectancies. Outcome expectancies reflect an individual's belief that performing a given behaviour will be helpful in producing the desired result. The importance or value an individual assigns to performing a behaviour may also be a significant factor in predicting whether a behaviour will be performed.

Few studies have investigated the link between labour and self-efficacy, and those that have either did not measure self-efficacy expectancies before women went into labour (Shiloh *et al.*, 1998), did not assess women's expectancies regarding their ability to use coping strategies during specific phases of labour (Dannenbring *et al.*, 1997; Lowe, 1993), or did not collect in-labour pain ratings (Manning &Wright, 1983). A recent study developing a scale to assess pain control during labour did not incorporate self-efficacy theory (McCrea *et al.*, 2000). One reason the authors chose not to use Bandura's theory is that self-efficacy expectancies change with each phase of labour. The authors of the current study agree that self-efficacy is likely to vary with each phase of labour. Thus, we obtained self-efficacy expectancies for each phase of the first stage of labour. To address the limitations of previous studies, participants in the current study were asked, before beginning labour, to rate self-efficacy theory variables as they related to the individual's pain coping beliefs. To further ensure reliable and valid measures of key variables, participants were asked to make pain ratings for a particular phase of labour while they were experiencing it (Fridh *et al.*, 1988; Lowe & Roberts, 1988; Niven & Brodie, 1996; Niven & Gjisbers, 1996; Norvell *et al.*, 1987; Ranta *et al.*, 1995; Terry & Gijsbers, 2000).

The purpose of the present study was to examine the relation between expectancy ratings made after Lamaze training and the subsequent level of labour pain women experienced. Study participants enrolled in Lamaze classes where they received information regarding the anatomy and physiology of childbirth, and training in respiration techniques, relaxation, and cognitive distraction. To establish that all women had similar experience knowledge and training regarding childbirth, only nulliparous, Lamaze-trained women were included in the study. Expectancy ratings for pain coping techniques were made with respect to the three variables: self-efficacy (ability) expectancies, importance, and outcome (helpfulness) expectancies. We examined these variables as predictors of pain levels experienced during each phase of the first stage of labour—early, active, and transitional.

Method

Participants

Sixty-five nulliparous women in their third trimester of pregnancy and their labour partners were recruited from Lamaze classes in two Midwestern US communities. Subjects were eligible for participation if they were expecting their first child, at least 18

years of age, and not planning to have epidural anaesthesia during labour. Of the 65 women recruited, 37 *completers* filled out the full battery of measures including the labour expectation measures and in-labour pain questionnaires. *Noncompleters* (n = 28) were those who failed to return all questionnaires. *Completers* and *noncompleters* did not differ on major demographic factors.

Measures

Expectations of Childbirth Questionnaire (ECQ). Labour expectations were collected using the ECQ, a 45-item inventory developed for this study based on Bandura's self-efficacy theory (1977). The ECQ asks women to rate self-efficacy expectancies, importance, and outcome expectancies regarding techniques taught in Lamaze classes. ECQ instructions provide a description of each phase of the first stage of labour. Instructions include the following information: (a) in the early phase, the cervix is dilated less than 3 cm, contractions last less than a minute and occur about 5–10 minutes apart; (b) in the active phase, the cervix is dilated 3–8 cm, contractions last about 1 minute and occur about 3–5 minutes apart; and (c) in the transitional phase, the cervix is dilated 8–10 cm, contractions last about 90 seconds and occur every 2–3 minutes.

For each of the three phases of the first stage of labour, women are asked to rate their general belief that they will be able to cope with pain during that phase and to rate their beliefs about using relaxation, breathing, and distraction techniques. For a particular phase, the techniques a woman deems useful are rated on visual analogue scales indicating (a) the extent to which she is certain that she will be able to use that particular technique and (b) the importance of using the technique during the particular phase of labour in question (see Figure 1). The ECQ visual analogue scale is a 15 cm straight line that represents a range of response. Visual analogue scale items assessing women's certainty of using a labour technique are anchored at each end ranging from 'not at all certain' to 'completely certain' and reflect women's self-efficacy expectancies. Visual analogue scale items assessing the importance of using a labour technique are anchored at each end with 'not at all important to me' to 'extremely important to me' (see Figure 1). Visual analogue responses are scored as the proportion of the line to the left of the respondent's mark. Thus, higher scores indicate that the respondent assigned greater certainty or importance to a particular item. Visual analogue scale items have been used to measure expectations of labour pain (Fridh & Gaston-Johansson, 1990).

Additionally women are asked to decide whether relaxation, breathing, and distraction techniques can help them to cope with pain during each of the three phases of the first stage of labour. Women are given statements (e.g. relaxation techniques can help a woman cope with the pain of early labour) and asked to select the ones with which they agree (see Figure 1). These items assess women's outcome expectancies or the extent they believe that performing a particular behaviour will help them to cope with pain (Bandura, 1977). Thus for each phase of first-stage labour, the ECQ provides a measure of three theoretical constructs: self-efficacy expectancies (visual analogue scale certainty ratings), importance (visual analogue scale importance ratings), and outcome expectancies (helpfulness ratings).

Self-efficacy expectancy composite scores for each phase of labour are computed by averaging VAS responses to the following items: certainty of using breathing, relaxation, and distraction techniques; and certainty of being able to cope with the pain of labour during that phase. Importance variables are calculated in a similar manner using VAS

Expectations of Childbirth Questionnaire

Please check each of the items below which you feel you will be able to perform while you are in labor. For each item you have checked, please complete the questions which follow

__(✔)__ I will be able to use the (relaxation/breathing/distraction) technique I learned in class during (early/active/transition) labor.

How *certain* are you that you can use the (relaxation/breathing/distraction) during (early/active/transition) labor? (Place a check mark above the line.)

0 — Not at all certain

100 — Completely certain

How *important* is it that you use (relaxation/breathing/distraction) techniques during (early/active/transition) labor? (Place a check mark above the line.)

0 — Not at all important to me

100 — Extremely important to me

__(✔)__ In general, I will be able to cope with the pain of (early/active/transition) labor.

How *certain* are you that you can cope with the pain of (early/active/transition) labor? (Place a check mark above the line.)

0 — Not at all certain

100 — Completely certain

How *important* is it that you cope with the pain of (early/active/transition) labor? (Place a check mark above the line.)

0 — Not at all important to me

100 — Extremely important to me

Outcome expectancy (helpfulness) ratings

Place a check mark by the statements with which you agree

__(✔)__ (Relaxation/breathing/distraction) techniques can help a woman cope with the pain of (early/active/transition) labor.

Figure 1. *Expectations of Childbirth Questionnaire*.

importance ratings. Outcome expectancy composite variables are calculated for each phase of labour by summing the number of techniques (breathing, relaxation, and distraction) women believed could be helpful during that phase.

Short-form McGill Pain Questionnaire (SF-MPQ) (Melzack, 1987). The original MPQ from which the short form was derived has been widely used in studies of labour pain (Dannenbring *et al.*, 1997; Lowe, 1987, 1989; Reading & Cox, 1985). Evidence that the McGill Pain Questionnaire is a valid and reliable measure of pain is extensive (Melzack & Katz, 1992). In a sample of women experiencing labour pain, Melzack (1987) found that SF-MPQ, designed for quick administration, and long-form MPQ scores were highly correlated (rs = 0.65 to 0.94). The SF-MPQ comprises an affective pain subscale, a sensory pain subscale, a visual analogue pain intensity rating, and a present pain intensity rating. The sensory pain subscale items (e.g. throbbing, sharp, cramping) and the affective pain subscale items (e.g. sickening, punishing-cruel) characterize pain severity with higher scores indicating greater severity.

The SF-MPQ features two items for measuring pain intensity. First women in the current study indicated the pain intensity of their most recent contraction using a visual analogue scale anchored at one end with 'no pain' and at the other with 'worst possible pain'. Visual analogue scale pain scores are computed as the percentage of the line to the left of the woman's demarcation. The second item, the Present Pain Intensity (PPI) scale, allows women to select the one statement that best characterizes their most recent contraction: 'no pain', 'mild', 'discomforting', 'distressing', 'horrible', or 'excruciating'. Labour partners administered the SF-MPQ to women once during early, active, and transitional labour, respectively.

Peripartum Events Scale (PES) (O'Hara et al.*, 1986).* The PES is an inventory assessing stressful events occurring during pregnancy, labour, and delivery. Peripartum stressful events are enumerated within the following categories: medical risk factors, obstetric risk factors, indication for admission to labour and delivery, progress in labour, method of delivery, duration of labour, foetal monitoring, delivery complications, and infant outcome. Research indicates the PES is a valid and reliable measure of peripartum stress (O'Hara *et al.*, 1986). In the postpartum period the authors received maternal and neonatal medical records and completed the PES accordingly.

Procedure

After receiving approval from the Institutional Review Board, female recruiters visited Lamaze classes, explained the study, and obtained informed consent from those wishing to participate. Participants also granted the investigators permission to obtain maternal and neonatal medical records. If they agreed to participate, women received two sets of questionnaires, one to return before delivery and one to return shortly after delivery. Approximately 4 weeks before their due dates, women were contacted by phone and asked to return the first set of questionnaires—a demographics form and a labour expectations questionnaire—in a postage-paid envelope. Before delivery, each participant's partner or labour coach was trained to assist her in completing one pain inventory during each of the three phases of first-stage labour: early (when the cervix is dilated less than 3 cm), active (when the cervix is dilated between 3 and 8 cm), and transition (as soon as possible once the cervix is dilated at least 8 cm). Nurses informed women and

coaches when each phase had been reached and what cervical dilation measurements were. Immediately before beginning the pain inventories partners noted the time, extent of cervical dilation, and whether the woman had received any pain medications. Pain information was collected between contractions and no inventories were completed once the participant reached the second, or pushing, stage of labour.

Participants who did not return pain questionnaires were contacted by phone 2 weeks following their due dates and asked to return the completed forms. Women who returned all questionnaires were compensated $20 for their participation.

ECQ responses were used to compute self-efficacy theory variables. Self-efficacy expectancy, and importance ratings were averaged respectively to form composite scores for each of the three phases of the first stage of labour. Outcome expectancies for each phase were summed according to the number of techniques women believed would be helpful for dealing with the pain of that phase (see Figure 1). Pain composite scores for each phase were generated based on SF-MPQ responses. Paired sample *t*-tests (alpha = 0.025) indicated whether significant changes in self-efficacy theory variables or pain levels occurred as labour progressed.

Block entry regression analyses were conducted for each phase of labour on pain composite scores for that phase (Cohen & Cohen, 1983). Self-efficacy theory variables were standardized (i.e. transformed into *z*-scores) and evaluated as predictors of pain for each of the three phases of labour. A statistical significance level of 0.05 was chosen due to the use of composite scores, which increases the chance of a type II statistical error, and the small number of subjects, which limits power. All reported correlations are Pearson product–moment correlations. The following analyses include *completer* data only.

Results

Characteristics of labour

Dilation measurement recorded by labour partners demonstrated that mean dilation increased from 2.5 cm in early phase labour, to 5.9 cm in active phase, to 8.8 cm in transitional phase, providing some indication that participants indeed completed pain questionnaires at the appropriate times. The first stage of labour lasted a mean of 10.1 hours. As expected, women were more likely to use medications as labour progressed. Only 2.9% of women reported that they used medication during the early phase, while 60.6% of women reported that they used medications by the transitional phase. Pain relief medications administered during labour included nalbuphine hydrochloride (Nubain) and butorphanol tartrate (Stadol).

Self-efficacy expectancy, importance, and outcome expectancy ratings

Paired sample *t*-tests (alpha = 0.025) indicated that self-efficacy expectancies significantly decreased from the early to the active phase and from the active to the transitional phase (see Table 1). That is, as women progressed through the first stage of labour, they became less certain they would be able to use pain coping techniques. Women's ratings of coping techniques' importance and outcome did not significantly differ from the early phase to the active phase of labour (see Table 1). However, women expected that coping techniques would be less important and helpful as they moved from the active to the transitional phase. In general, women were more apt to think that

Table 1. *Mean self-efficacy, importance, outcome, and pain ratings for each phase of the first stage of labour*

Rating	Phases		
	Early Mean (SD)	Active Mean (SD)	Transition Mean (SD)
Self-efficacy expectancy	73.6 (16.6)[a]	63.3 (17.7)[b]	45.8 (21.2)[c]
Importance	72.6 (15.7)[a]	74.2 (14.3)[a]	65.2 (18.2)[b]
Outcome expectancy	0.92 (0.18)[a]	0.86 (0.22)[a]	0.77 (0.28)[b]
Pain	50.1 (28.1)[a]	93.4 (20.1)[b]	114.1 (24.9)[c]

Note. Ratings in the same row with different superscripts are significantly different, two-tailed, $p < 0.003$.

coping techniques were important and helpful when they were more certain of using those techniques (i.e. had higher self-efficacy expectancies).

So that they could be evaluated as predictors of labour pain levels, self-efficacy ratings and importance ratings were transformed into standardized z-scores. Internal reliability for early, active, and transition self-efficacy composite scores was moderate to high (alphas = 0.72 to 0.82). Importance composite scores for each labour phase also exhibited good internal reliability (alphas = 0.69 to 0.83).

Pain ratings

Pain severity (affective and sensory) as well as pain intensity (visual analogue and present pain) subscale scores were calculated, respectively. Moderate to high correlations were obtained among individual pain subscales for each phase of labour, suggesting that the subscales were measuring a similar construct (see Table 2) (Turk *et al.*, 1985). Accordingly pain subscale scores were standardized (i.e. transformed into z-scores) and then aggregated (Rushton *et al.*, 1983) to form pain composite scores for each of the three phases of the first stage of labour. For each phase, pain composites displayed adequate internal reliability (alphas = 0.84 to 0.88). Repeated measures analyses of composite pain ratings suggested that pain levels significantly increased from the early to active phase of labour and from the active to the transitional phase of labour (see Table 1). Correlations between pain levels of adjacent phases were significant (rs = 0.66 to 0.79, ps < 0.01).

Regression of pain on medical variables and self-efficacy theory variables

Regression analyses examined self-efficacy theory variables and medical variables as predictors of pain during each of the three phases of the first stage of labour. Because events in the peripartum period may impact labour pain, medical variables were the first predictors entered. Although pain relief medication use was conceptualized as negatively related to labour pain, results indicated that medication use was unrelated to labour pain in the early and transitional phases, and positively related to labour pain in the active phase ($r = 0.57$, $p < 0.01$). Others have found that medication use during gynaecological procedures (Cooper *et al.*, 2000) and during the first stage of labour (Cogan *et al.*, 1976) is unrelated to pain reports. It was decided that medication use would not be a useful predictor of labour pain because it did not significantly decrease

Table 2. *Correlations among pain measures across three phases of first-stage labour*

	Early phase				Active phase				Transitional phase			
	1. Affective pain	2. Sensory pain	3. VAS intensity	4. PPI intensity	5. Affective pain	6. Sensory pain	7. VAS intensity	8. PPI intensity	9. Affective pain	10. Sensory pain	11. VAS intensity	12. PPI intensity
1.												
2.	0.67**											
3.	0.53**	0.64**										
4.	0.52**	0.53**	0.82**									
5.												
6.					0.61**							
7.					0.76**	0.62**						
8.					0.60**	0.52**	0.82**					
9.												
10.									0.58**			
11.									0.41*	0.54**		
12.									0.42*	0.69**	0.75**	

Note. *$p < 0.05$; **$p < 0.01$. VAS = pain rating on visual analogue scale; PPI = Present Pain Intensity (0–5 Likert-type scale).

pain ratings. Thus PES scores were the only medical predictor variable entering into pain regression equations. Next, standardized composite scores based on self-efficacy theory were entered as predictors of labour pain levels for each of the three phases: self-efficacy composite scores were entered in the second block, and importance composite and outcome composite scores in the third block.

After accounting for stressful peripartum events, self-efficacy accounted for a significant amount of the variance in early phase composite pain ($R^2 = 0.23$, $p = 0.013$), and active phase composite pain ($R^2 = 0.19$, $p = 0.016$). The remaining self-efficacy theory variables, importance and outcome expectancy, did not account for a significant proportion of the remaining variance in either early or active labour pain. None of the transitional phase predictors adequately accounted for transitional pain levels.

Discussion

Regression analyses indicated that no self-efficacy theory variables were significant predictors of transitional pain levels. Women's pre-labour expectations of their ability to use pain coping techniques (i.e. self-efficacy expectancies) significantly predicted a modest proportion of early and active phase pain levels. Women's expectations of the importance and helpfulness of using these techniques did not provide additional explanation of in-labour pain experiences.

Investigating the utility of self-efficacy theory with regard to labour, other researchers have also found that self-efficacy expectancies were useful predictors of labour indices. Manning and Wright (1983) found that self-efficacy expectancies for controlling pain predicted labour time elapsed before women requested pain relief medications. They too found that importance and outcome ratings did not account for significant additional variance in their criterion variable. If requesting pain medication can be construed as a measure of pain experience, then Manning and Wright's results link self-efficacy expectancies to labour pain experiences. Furthermore, their findings parallel our own: self-efficacy expectancies predict women's mastery of pain behaviour (i.e. requesting pain medication or reporting elevations in pain levels).

Dannenbring and colleagues concluded that self-efficacy (measured both before labour and during labour) was unrelated to labour pain (Dannenbring *et al.*, 1997). This conclusion runs counter to Manning and Wright's findings as well as our own. The approach used by the Dannenbring group was atheoretical as they entered self-efficacy in a predictor block with other variables including outcome expectancy and time spent practising childbirth coping techniques. Variables were evaluated as predictors of affective pain, sensory pain, and pain intensity, respectively. It is important to note that the Dannenbring group evaluated self-efficacy as a predictor of pain experienced during the first stage of labour rather than examining whether self-efficacy predicted pain levels for a particular phase of that stage. To compare our data to those of Dannenbring and colleagues, we entered self-efficacy theory variables—self-efficacy expectancy, importance, and outcome expectancy—as predictors of affective pain, sensory pain, and pain intensity ratings, respectively. To be consistent with the previous study's analyses, we aggregated data for all phases of the first stage of labour to produce composite variables for the different aspects of pain that the Dannenbring group investigated. We found that none of our self-efficacy theory variables aggregated across the first stage of labour predicted sensory pain, affective pain, or pain intensity for that stage. Thus, when the first stage of labour is treated as a single entity, our results and the results of Dannenbring and

colleagues suggest that self-efficacy expectancies are not significant predictors of labour pain. Women's ratings of their ability to use strategies to cope with pain are significant predictors of that pain only when they are assessed for each phase of the first stage of labour separately. If the data are aggregated over the first stage in its entirety, the significance of self-efficacy in predicting early and active labour pain is obscured.

Other researchers employing psychological constructs to predict labour pain have found these constructs to be significant predictors for some but not all phases of the first stage of labour (Fridh & Gaston-Johansson, 1990; Lowe, 1987). Lowe found that confidence in ability to handle labour accounted for approximately 30% (active phase) to 60% (early phase) of the variance in labour pain (1987). Lowe did not measure confidence in ability to handle transitional phase labour; however, when she examined active phase confidence ratings as predictors of transitional pain levels, no regression equation was significant. Women in Lowe's study rated their confidence in handling labour while they were experiencing labour, whereas participants in the current study made self-efficacy ratings before going into labour. Although confidence and self-efficacy are different psychological constructs, the findings from our study and Lowe's suggest that women's beliefs regarding their ability to cope with labour pain significantly predict a portion of the pain they later experience. Furthermore, both sets of data indicate that women's expectations for labour do not predict the pain experienced in the transitional phase of the first stage of labour.

Our results and the results of others suggest that transitional labour presents primiparous women with an experience incongruous with their expectations for pain and beyond their belief that they can cope with that pain. Yet our findings also suggest that the actual pain experienced in early labour was significantly associated with levels of pain experienced in active labour ($r = 0.45$, $p = 0.01$), which in turn is related to transitional pain levels ($r = 0.53$, $p < 0.01$). Thus, women's pain experiences from one phase of labour to the next were significantly related. While transitional phase pain is significantly greater than the pain experienced in earlier phases, there is no inherent reason for beliefs regarding coping strategies to be unrelated to pain levels only during this phase. In a study of active labour, Shiloh and colleagues (1998) found that women's beliefs in their general ability to cope with labour pain was strongly related to active labour pain ($r = -0.59$, $p < 0.01$). After controlling for use of pain coping techniques, they found that ability to cope with pain was less strongly related to active labour pain ($r = -0.28$, $p < 0.05$). These findings suggest that women's use of coping techniques as well as women's beliefs in their ability to cope with labour pain were significantly linked to their pain experiences. If such relations also hold for transitional labour, then giving women reason to believe they can successfully use pain coping strategies during this phase may impact the level of pain they subsequently experience.

Limitations of this study include a relatively high attrition rate and the use of a new instrument, the ECQ, to assess efficacy expectations. It is possible that women who did not complete the labour pain ratings were different from study completers in ways unknown to the investigators. There were no demographic differences between the women who completed and did not complete the study; however, verification of these findings awaits replication. With respect to the ECQ, data from the study itself provide evidence for its reliability and validity. The instrument showed good internal consistency (evidence for reliability) and several of the predictions using this measure were confirmed in the study (e.g. association between efficacy expectations for pain control diminishing across the phases of stage 1 labour). Nevertheless, this study represents only the first empirical validation of ECQ.

Results of the current study show that women's expectations for coping with labour pain vary with each phase of the first stage of labour. Following participation in Lamaze classes, women's ratings of their ability to use pain coping strategies accurately predicted a proportion of the labour pain they experienced in two out of three phases. Because our findings suggest that women expect to be less able to cope with pain as they move into the transitional phase and because transitional expectations are not related to transitional pain levels, we conclude that Lamaze classes may not be adequately preparing women to handle transitional labour pain. It may be that self-efficacy beliefs directly influence the pain women experience. Alternatively, self-efficacy beliefs may affect women's efforts to use coping strategies, which may in turn influence pain levels. How or why self-efficacy relates to labour pain cannot be determined from this study. These hypotheses and questions can only be addressed in future studies, which experimentally manipulate self-efficacy expectations.

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