

The impact of parental gender, catastrophizing, and situational threat upon parental behaviour to child pain: a vignette study

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Bulleted statements:

- Accumulating evidence demonstrates that parental behaviours impact children's pain outcomes. In particular, both solicitous and discouraging parental behaviours are generally related to detrimental child outcomes.
- This study aimed at investigating *which* parents engage in these behavioural patterns and *when* parents do so.

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Abstract

Background. This study examined which parents report to be solicitous or discouraging in response to their child's pain, and when they do so. **Methods.** Using a vignette methodology, mothers ($N=472$) and fathers ($N=271$) imagined their child in pain situations varying in duration (one day or several weeks) and cause of pain (known or unknown biomedical cause). **Results.** In general, fathers demonstrated similar tendencies toward solicitousness than mothers, but reported to engage more in discouraging behaviours. In line with expectations, parents who catastrophized about their child's pain reported a higher inclination to engage in solicitous behaviours. Only for fathers, high catastrophizing was also related to a higher report of discouraging behaviours. However, the effects of catastrophizing differed across situations varying in duration and cause of pain. Specifically, the effect of parental catastrophizing upon self-reported solicitous behaviours was particularly strong when imagining their child in pain with unknown biomedical cause. Further, high catastrophizing in fathers only translated in a higher inclination for discouraging responses when imagining their child in pain of short duration. **Conclusions.** The findings of the current study highlight the importance of parental catastrophizing in explaining parental behavioural tendencies in response to their child in pain. Further, reported behaviours were found to vary across pain situations, attesting to the importance of studying parental behaviour "in context".

1. Introduction

Accumulating evidence demonstrates the importance of parental behaviours in understanding childhood pain and disability (Palermo and Eccleston, 2009). Although parents may engage in a broad repertoire of behaviours, most studies focused upon solicitous and discouraging behaviours, which are generally (although often moderated by child characteristics) associated with negative child outcomes. For example, studies have shown that children, particularly children experiencing high levels of distress, are more disabled and report more somatic symptoms when their parents report high levels of solicitous behaviour (Peterson and Palermo, 2004; Claar et al., 2008).

Although these studies increased our knowledge about which parental behaviours are associated with children's pain outcomes, limited research has yet examined which parents (*“who”*) engage in these behavioural patterns, and *when* they do so. Parental characteristics, such as parents' representations about child's pain, may be particularly important in explaining *who* engages in certain types of behaviours. Research has shown that parents who have an exaggerated negative focus (i.e., catastrophize) on their child's pain experience more distress (Goubert et al., 2008; Caes et al., 2011) and have children who are more disabled by pain (Goubert et al., 2006). It is therefore reasonable to assume that parental catastrophizing translates into behaviours that have a negative impact upon children's disability. Considering that solicitous responses toward their children's pain behaviour may increase sick-role behaviours and disability (Palermo and Eccleston, 2009), it is plausible that the association between parental catastrophizing and children's disability may be explained by parents' solicitous behaviours. Previous findings indeed showed that catastrophizing (about *own* or *child* pain) is related with more solicitousness toward their child in pain (Langer et al., 2009; Hechler et al., 2011).

At present, however, no systematic investigation is available whether the reflection of parent characteristics, such as parents' catastrophizing, into particular behaviours differs according to situational (pain) characteristics. Insight into moderating variables may explain *when* parents engage in particular behaviours (Goubert et al., 2005). Particularly situations that enhance the threat value of pain may strengthen the impact of parental catastrophizing upon parents' behaviours. Pain situations with unknown biomedical cause (Williams et al., 2009) or of longer duration (Eccleston et al., 2004) are likely candidates; both may add to perceptions of uncontrollability and feelings of helplessness, and hence, increase the threat value of pain (Eccleston and Crombez, 1999).

The present study used an experimental vignette paradigm to investigate *which* parents are inclined to engage in solicitous versus discouraging behaviours and *when* this is the case. Parents reported on their behaviours while imagining their child in different pain situations, varying in duration and cause of pain. Specifically, we examined the impact of parental gender and tendency to catastrophize about child's pain ("who") upon parents' reported behaviours, across varying levels of situational threat ("when"). We hypothesized that parents who catastrophize about child's pain report to be strongly inclined to engage in solicitous behaviours, particularly when pain has a high threat value (i.e., unknown biomedical cause; longer duration). Further, we explored the impact of parents' characteristics and situational threat upon discouraging responses.

2. Methods

2.1. Participants

Twenty-three Flemish schools (grades 4 through 9) were contacted, with eleven schools agreeing to participate. Of the 2016 children and their parents who were approached, parental informed consent and child assent were obtained for 1376 children (response

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rate=68.25%). Consent was given for two studies: one study regarding questionnaires administered in the children at two different time points (these results have been previously reported in Vervoort et al., 2010), and one study pertaining to questionnaires (i.e., vignette questionnaire assessing parental behaviours and questionnaire measuring parents' catastrophizing thoughts about their child's pain) administered to parents, of which the results are presented in the current manuscript. As three children were ill at the time of questionnaire administration (time 1; see Vervoort et al., 2010), questionnaires for parents were sent home with 1373 children. If parents had more than one child who participated in the Vervoort et al. (2010) questionnaire study, they were instructed to choose one of their children to imagine in the different pain situations, and fill out only 1 set of parent questionnaires. For 748 (359 boys; 389 girls) of the 1373 children, 1285 parents (727 mothers and 558 fathers) filled out and returned the questionnaires. The mean age of the children was 12.41 years ($SD=1.50$, range 9.33-16 years). The mean age of the mothers and fathers was, respectively, 40.90 ($SD=3.92$) and 42.81 years ($SD=4.15$). The majority (86.9%) of the parents were married or co-habiting. Almost half of the parents (48.7%) had a higher education (beyond the age of 18 years). Almost all (98%) families were Caucasian. No data are available on non-responders. This study was approved by the ethical committee of the Faculty of Psychology and Educational Sciences of Ghent University.

2.2.Measures

Vignettes describing hypothetical common pain situations that a child might experience were presented to parents. Parents were instructed to imagine each situation as if it concerned their own child (the child taking part in the present study, or, in case multiple children participated, one child chosen by parents to imagine when answering questionnaires), and this as vividly as possible. Parental behavioural responses were assessed by asking parents to report on an 11-point scale (0 = 'not at all', 10 = 'extremely') to what extent they

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would engage in various behaviours when their child would be in the particular situation. Two types of parental behaviours were assessed: solicitous responses (4 items; i.e., “I let my child rest more”, “I let my child doing things which he/she is usually not allowed to, like staying up late or watching more TV”, “I spend more time with my child”, “I show my child that I sympathize with him/her”) and discouraging responses (2 items; i.e., “I get angry at my child or get irritated”, “I try not to pay attention to my child”). These two types of responses are in line with conceptualisations of parental behavioural responses as measured by validated questionnaires (Hermann et al., 2008; Huguet et al., 2008; Walker et al., 2002; Walker et al., 2006). Cronbach’s alphas were $\alpha = .90$ for solicitous responses and $\alpha = .86$ for discouraging responses.

To investigate the impact of situational threat value of pain upon reported parental behaviours, pain characteristics were manipulated in a 2 (duration: short versus longer duration) x 2 (biomedical cause: known versus unknown) design. Short pain duration was defined as pain that started the same day (e.g., “Since this morning, my child has been troubled with abdominal pain”), longer duration as pain lasting for several weeks (e.g., “My child has already been troubled with headaches for a number of weeks”). Pain for which a biomedical cause was present was defined as pain caused by the flu (e.g., “The doctor said that the headaches were caused by the flu”). The flu was selected as the only cause for the pain, as this has the benefit of allowing variations in pain complaints, thereby enhancing generalizability across various types of pain. The flu can be considered as an acceptable biomedical cause for all four types of pain complaints (i.e., headache, abdominal pain, muscle pain, back pain). Unexplained pain was defined as pain for which the doctor was unable to determine the cause (e.g., “The doctor was not able to determine the cause of the back pain”).

To ensure that the effects would not be attributable to one type of pain symptom (and thus, allowing generalization of findings), four different pain symptoms were used that were

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balanced between parents. Specifically, each combination of “pain duration” and “cause of pain” was associated with one type of pain complaint within parents, resulting in 4 vignettes per parent. Between parents, type of pain complaint was balanced over the different combinations of “pain duration” and “cause of pain”, resulting in 4 versions of the vignette questionnaire. In other words, a particular cell (e.g., short pain duration – unknown cause) was combined with headache in version 1, abdominal pain in version 2, etc.) (see Appendix S1 for 1 version of a vignette questionnaire). The 4 different versions of the vignette questionnaire were equally distributed and randomly assigned to parents. Mothers and fathers from a same family received the same version of the vignette questionnaire. The order of the vignettes was randomized across the 4 versions of the vignette questionnaire. The vignettes were piloted in a sample of 15 parents to ensure comprehension and feasibility.

To assess parental catastrophic thinking about their child’s pain, the Dutch version of the Pain Catastrophizing Scale for Parents (PCS-P; Goubert et al., 2006) was administered. This instrument is an adaptation of the adult Pain Catastrophizing Scale (PCS; Sullivan et al., 1995; Van Damme et al., 2002) and the Pain Catastrophizing Scale for Children (PCS-C; Crombez et al., 2003). The PCS-P consists of 13 items describing different thoughts and feelings that parents may experience when their child is in pain. Parents are requested to rate on a 5-point scale (0 = ‘not at all’; 4 = ‘extremely’) how strongly they have each thought when their child is in pain (see Goubert et al., 2006). The PCS-P yields a total score that can range from 0 to 52, and three subscale scores for rumination (e.g., “When my child is in pain, I can’t keep it out of my mind”), magnification (e.g., “When my child is in pain, I become afraid that the pain will get worse”), and helplessness (e.g., “When my child is in pain, there is nothing I can do to stop the pain”). The PCS-P has been shown to be reliable and valid (Goubert et al., 2006). Cronbach’s alpha in this study was $\alpha=.92$.

2.3.Procedure

Schools were contacted first by letter, then by phone or a visit. After consent was obtained from the school director for this study, a letter explaining the purpose of the study was distributed to the teachers, the children and the parents. Written informed parental consent, and child assent, was obtained. Child questionnaires (of which the results have been discussed previously, see Vervoort et al., 2010), were administered during regular school hours. Parents were asked to complete the questionnaires at home and to return them by mail.

2.4.Data analysis

The present data comprised of a multilevel (or hierarchically nested) data structure in that parental behavioural responses to different manipulations of pain characteristics (Level 1) were nested within individuals (parents; Level 2). Multilevel modelling was chosen over ordinary-least-squares (OLS) methods such as repeated measures ANOVAs because it provides better parameter estimates than OLS methods with nested data (Nezlek, 2001; Raudenbush and Bryk, 2002). The data were analyzed with a series of multilevel regression analyses using the program HLM (Version 6.01; Raudenbush et al., 2004). The Level 1 variables pain duration and cause and Level 2 variable parents' gender were dummy coded and were entered into the equations as uncentred (pain duration: 1 = long duration, i.e. a number of weeks, 0 = short duration, i.e. since this morning; biomedical cause: 1 = unknown, 0 = known; parents' gender: 1 = mother, 0 = father). The scores on parental catastrophizing, a continuous Level 2 variable, were standardized and grand mean centred to allow for comparisons across Level 2 units (i.e., parents) and for clearer interpretation of coefficients. Full maximum likelihood estimation was used for all models. Furthermore, effect sizes r were calculated according to the formula provided by Kenny et al. (2006), with $r=.10$ indicating a small effect, $r=.30$ a medium effect, and $r=.50$ a large effect (Cohen, 1988).

Prior to multilevel analyses, ANOVA's were performed to investigate differences in solicitous and discouraging behaviours between mothers and fathers, and between boys and girls. Also differences between mothers and fathers in catastrophizing about their child's pain were assessed. For these analyses, Cohen's d was calculated to indicate effect sizes. Subsequently, multilevel analyses were run. For both solicitous and discouraging behaviours, the following set of analyses was executed. First, a baseline model was run to calculate how much variance in solicitous/discouraging behaviours was attributable to variation between parents (Level 2) and to variation within parents (Level 1). Second, Level 1 variables (pain characteristics as manipulated in the vignettes) were entered into the model to investigate the effects of situational threat value of pain upon mothers' and fathers' behavioural tendencies. Finally, parental catastrophizing about their child's pain (Level 2) was entered into the model to investigate the impact of mothers' and fathers' catastrophizing upon reported solicitous/discouraging responses, and to examine whether the effect of catastrophizing differed across pain situations varying in duration (i.e., short versus longer duration) and cause (i.e., biomedical cause known versus unknown). Separate analyses were performed for mothers and fathers. We assumed that parents differed randomly in their overall level on the dependent variables (random intercepts), and we allowed that parents differed randomly in the regression coefficients of Level 1 variables (random slopes). If a random error term was detected to be nonsignificant, it was deleted from the model and the independent variable constrained to be fixed across persons (Nezleck, 2001).

3. Results

3.1. Descriptive and correlational statistics

Complete parental data for the vignette questionnaire and PCS-P were available for 743 children. For 73% of the children ($N = 542$), data from both parents (542 mothers; 542

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fathers) were available. For each of these children, data from either the mother or the father were randomly selected by means of computerized randomization, to avoid effects of nonindependence of mothers' and fathers' responses (i.e., catastrophizing or self-reported behaviours). This resulted in a final sample of 472 mothers and 271 fathers. Parents' catastrophic thinking about the pain of their child (PCS-P) was low to moderate, and comparable to previous school surveys (Goubert et al., 2006; Goubert et al., 2008) ($M=16.48$; $SD=9.19$; Quartile 50). No differences were found between mothers and fathers in catastrophizing thoughts about their child's pain ($t(741) = -.24$), and in reported solicitousness ($t(738) = -1.93$). However, fathers reported a higher inclination to engage in discouraging responses ($M=1.42$; $SD=1.14$) compared to mothers ($M=.98$; $SD=1.26$; $t(510.73)=4.25$, $p<.0005$; $d=0.38$). Mothers and fathers engaged in equal amounts of solicitous and discouraging behaviours towards girls and boys (all $ts < |1.39|$). Furthermore, including child gender into the multilevel analyses reported below showed no main or moderating effects of child gender on parental behaviours. Table 1 further shows that mothers' and fathers' catastrophizing about their child's pain was related to more solicitousness across vignettes. Only for fathers, catastrophizing was also related to more discouragement. Finally, mothers' and fathers' behavioural responses were not associated with child age (see Table 1).

- INSERT TABLE 1 ABOUT HERE-

3.2. Parental solicitous behaviours

Mothers' solicitous responses. The baseline model without predictors indicated that 73% of the variance in solicitous responses was due to variation between mothers and 27% of the variance to variation within mothers. A model with Level 1 variables included showed that biomedical cause (Coefficient=-.08; $t(1868)=-2.83$; $p=.005$; effect size $r=.03$) but not pain duration (Coefficient=.09; $t(468)=1.92$, ns) impacted upon mothers' solicitous behaviours. Mothers reported a lower tendency for solicitous behaviours in vignettes

describing pain with unknown cause. Entering mothers' catastrophizing about their child's pain into the model showed that mothers with a higher degree of catastrophizing thoughts reported a higher inclination to engage in solicitous behaviours (Coefficient=.58; $t(467)=9.57$; $p<.0005$; $r=.37$). Furthermore, the impact of mothers' catastrophizing was particularly strong in vignettes describing pain with unknown biomedical cause (Coefficient=.06; $t(1865)=2.25$; $p<.05$; $r=.03$). Pain duration did not moderate the effects of mothers' catastrophizing (Coefficient=-.01; $t(467)=-.26$; ns) (see Table 2).

Fathers' solicitous responses. The baseline model without predictors indicated that 77% of the variance in solicitous responses was due to variation between fathers and 23% of the variance to variation within fathers. A model with Level 1 variables included showed that pain duration (Coefficient=.24; $t(269)=4.64$; $p<.0005$; $r=.13$) but not biomedical cause (Coefficient=.02; $t(269)=.42$, ns) impacted upon fathers' reported solicitous behaviours. Furthermore, fathers reported a higher inclination to be solicitous in situations describing pain of longer duration (i.e., persisting several weeks). Findings from the model with fathers' catastrophizing entered revealed that, similar to mothers, fathers with a higher frequency of catastrophizing thoughts reported to be more inclined to engage in solicitous behaviours than low catastrophizing fathers (Coefficient=.58; $t(268)=6.95$; $p<.0005$; $r=.37$). Also in line with findings in mothers, the effect of fathers' catastrophizing was particularly strong in pain situations without biomedical cause (Coefficient=.10; $t(268)=2.18$; $p<.05$; $r=.06$). Pain duration did not moderate the effects of fathers' catastrophizing (Coefficient=-.06; $t(268)=-1.07$; ns) (see Table 2).

-INSERT TABLE 2 ABOUT HERE-

3.3. Parental discouraging behaviours

Mothers' discouraging responses. A similar set of analyses was performed with parental discouraging responses as dependent variable. Initial analyses showed that 64% of

the variance in mothers' discouraging responses was attributable to differences between mothers, and 36% to differences within mothers. A main effect of pain cause was found, indicating that mothers reported to engage more in discouraging behaviours when a biomedical cause for the child's pain was unknown (Coefficient=.08; $t(1864)=2.11$; $p<.05$; $r=.03$). No main effect was found of pain duration upon reported discouraging responses (Coefficient=.08; $t(468)=1.57$, ns). When entering PCS-P, results showed that catastrophizing about their child's pain had no effect upon mothers' report of discouraging behaviours (Coefficient=.01; $t(467)=.16$, ns). Also, no differential effects of maternal catastrophizing were found depending upon situational threat value of pain (see Table 3).

Fathers' discouraging responses. Baseline analyses showed that 74% of the variance in fathers' discouraging responses was attributable to differences between fathers, and 26% to differences within fathers. For fathers, no main effects of situational (pain) characteristics upon reported discouraging responses were found. In contrast to mothers, fathers reported to engage more in discouraging behaviours when they catastrophized more about their child's pain (Coefficient=.32; $t(268)=2.93$; $p<.005$; $r=.16$). However, the effect of fathers' catastrophizing upon reported discouraging responses was smaller in vignettes describing pain persisting over several weeks than in vignettes describing acute pain (Coefficient=-.17; $t(268)=-2.85$; $p=.005$; $r=.09$) (see Table 3 for an overview of the results).

-INSERT TABLE 3 ABOUT HERE-

4. Discussion and conclusions

Using vignettes, we investigated the impact of catastrophizing thoughts about their child's pain and parents' gender upon parents' self-reported tendencies to engage in solicitous and discouraging responses when imagining their child in pain. Furthermore, the moderating role of situational threat value of pain (i.e., pain duration; biomedical cause) was examined. In

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general, fathers indicated similar tendencies toward solicitousness than mothers, but reported to engage more in discouraging behaviours. In line with our expectations, mothers and fathers who engaged more frequently in catastrophizing about their child's pain demonstrated a higher inclination to engage in solicitous behaviours. Only for fathers, catastrophizing was also related to more self-reported discouraging behaviours. As expected, the impact of parental catastrophizing was also dependent upon situational threat value of pain. Mothers' and fathers' catastrophizing appeared to be more strongly related to self-reported solicitousness in pain situations with unknown cause. Further, the impact of fathers' catastrophizing upon self-reported discouraging behaviours was less pronounced in pain situations of longer duration. Finally, situational threat value of pain differentially impacted upon mothers' and fathers' self-reported behaviours, independent of their level of catastrophizing. Mothers reported to be less solicitous and more discouraging in pain situations with unknown biomedical cause than in situations with known biomedical cause. Fathers reported to be more solicitous in pain situations of longer duration compared to short duration.

In line with previous research (Langer et al., 2009; Hechler et al., 2011), we found that, in both mothers and fathers, catastrophizing about child pain was related to a higher inclination to engage in solicitous behaviours. The translation of catastrophizing thoughts into higher levels of reported solicitousness towards their child, provides support for the hypothesis that catastrophizing by parents may, through associated behaviours, exert its influence upon child outcomes. From an operant perspective, solicitous behaviours (e.g., spending more time with child) are expected to reinforce children's pain behaviours thereby leading to decreases in child activity (Connelly et al., 2010) and higher disability. The present findings suggest that this tendency toward solicitousness is already present in a non-clinical sample of catastrophizing parents. Although underlying processes accounting for these

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parental tendencies require further investigation, it is possible that parental attentional processing of their child's pain may be important (Goubert et al., 2009). In a recent study using the dot-probe paradigm, Vervoort et al. (2011a) found that parental attention to child pain faces was enhanced with greater child pain expressiveness and particularly when parental catastrophizing was high. Accordingly, it is reasonable to assume that parents who catastrophize about the pain of their child highly focus upon their child's pain behaviour, prioritize pain-related information and hence, are more motivated to engage primarily in behaviours expressing care and concern.

Furthermore, high catastrophizing fathers, but not mothers, were also inclined to engage more in behaviours discouraging their child's pain behaviours (e.g., getting angry at child). These findings suggest that high catastrophizing fathers may engage, as compared to mothers, in more diverse behaviours. Also, fathers reported in general a higher inclination towards discouraging behaviours than mothers. The differences between mothers and fathers in self-reported behaviour might be explained by differences in emotional responses toward their child in pain (Goubert et al., 2008; Caes et al., 2011). Recent findings indicated that, when being faced with their child in pain, fathers respond with equal levels of distress than mothers, but experience less sympathy (Goubert et al., 2008). Accordingly, it is possible that fathers are, compared to mothers, less sensitive to their child's needs and feel less compassion when their child is in pain, thereby making it more likely for them to also engage in behaviours discouraging their child's pain behaviours.

In line with our expectations, our findings further demonstrated that the impact of parental catastrophizing upon self-reported behaviours varied across different pain situations. Specifically, the impact of both mothers' and fathers' catastrophizing upon reported solicitousness was particularly pronounced in vignettes describing pain with unknown cause.

This suggests that pain situations lacking a biomedical explanation might further increase

high catastrophizing parents' need to express attentive care toward their child. One potential explanation why this might be the case is through increased levels of distress that may be elicited by inexplicable pain (Williams et al., 2009). Our findings suggest that this might become particularly pronounced for parents who already perceive their child's pain as threatening.

Furthermore, the impact of fathers' catastrophizing upon reported discouragement was smaller in pain situations of longer duration. This suggests that fathers who highly catastrophize about their child's pain might feel less inclined to discourage their child's pain behaviours when pain lasts for several weeks. This is in line with the study of Hechler et al. (2011) in parents of children with chronic pain, in which no association between fathers' catastrophizing and discouragement was found. Possibly, in acute pain situations, high catastrophizing fathers might try to encourage their child's engagement in daily activities and discourage pain behaviour. However, when pain persists, catastrophizing fathers may downgrade their discouraging responses. This is in line with the finding that fathers reported to become more solicitous when imagining their child having pain for several weeks, suggesting that fathers might take up a more compassionate role particularly when pain becomes longer lasting. Future research is needed to investigate the differences between mothers and fathers in self- versus other-oriented emotions in response to their child's pain over time, and how this, in turn, differentially impacts caregiving behaviours.

A number of limitations of the current study deserve consideration, each of which point to directions for future research. First, although the use of vignettes is an efficient methodology for examining situational variations in parental behaviours, the results may differ from "real-life" situations. Therefore, future studies should also consider using (repeated) measurements of parental behaviours in daily life, such as ecological momentary assessment methodologies (Connelly et al., 2010). Furthermore, as self-reported behaviour

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may differ from actual parental behaviour (Cohen et al., 2000), replication of the current findings using observational coding systems is warranted. Second, effect sizes were small, except for the impact of parental catastrophizing upon self-reported solicitousness. The small effects of situational threat may be due to the fact that the vignettes described quite common pain situations; i.e. pain described as “longer pain” did not have a chronic character and the biomedical cause (i.e., flu) used was a common cause without a strong clinical impact. Third, we aimed at examining the effects of parental catastrophizing and situational threat value of pain *across* different pain symptoms, to enhance generalizability of the findings. Our design, in which type of pain was balanced between but not within parents, did not allow us to investigate the differential effects of type of pain upon self-reported parental behaviours. Furthermore, findings may not be generalized toward other biomedical causes, as only one biomedical cause - the flu - was used, which is considered as an acceptable biomedical cause for all four types of pain complaints. Fourth, vignette conditions regarding unexplained pain were presented as a physician’s inability to identify a biomedical cause, without an additional reassuring message (e.g., “results are normal”) often used in clinical practice. This may potentially explain the small effects of biomedical cause, as it has been suggested that reassurance may give rise to more worry and distress (McMurtry et al., 2006; Linton et al., 2008). Fifth, parents were instructed to choose one of their children (in case they had more than one child who participated in the Vervoort et al., 2010, study) to imagine in the different pain situations. This might potentially represent bias.

A final limitation of the present study is that only parental behaviours were assessed originating from an operant perspective upon pain, i.e., measuring promotion (solicitousness) or punishment (discouragement) of children’s pain behaviours. These parental behaviours have commonly been shown to have detrimental effects on child’s outcomes. It is likely that parents engage in a much broader repertoire of behaviours, including behaviours having a

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positive effect on children's pain outcomes. Investigating other types of parental responses, such as parental encouragement of child coping behaviour (e.g., encourage the child to use distraction or encourage their child to remain active) (see e.g. Hermann et al., 2008; Huguet et al., 2008) may shed light on parental behaviours protecting the child from otherwise more negative outcomes (Vervoort et al., 2011b). It is likely that fathers, as compared to mothers, engage more often in the promotion of well-behaviours (Hechler et al., 2011) given their role in encouraging the child's independence (Power and Shanks, 1989; Kenny and Gallagher, 2002).

In spite of these limitations, the results of this study broaden our understanding of *who engages* in certain types of behaviours in response to their child's pain, and *when* they do so. Specifically, our findings attest to the importance of parental catastrophizing in understanding parental behaviour towards their child's pain. Furthermore, findings also demonstrated the importance of taking into account situational variability of parental behaviours. Finally, the inclusion of fathers demonstrated differences between mothers and fathers in how they report to behave in response to their child's pain.

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Author contributions

The first author, Liesbet Goubert, conceived the study, was involved in data collection, analysed the data, and wrote the manuscript. Tine Vervoort contributed to the design of the study, data collection, and writing of the manuscript. Geert Crombez contributed to the interpretation of the results and writing of the manuscript. Lies De Ruddere was involved in data preparation and analysis. All authors discussed the results and commented on the manuscript.

References

- Caes, L., Vervoort, T., Eccleston, C., Vandenhende, M., Goubert, L. (2011). Parental catastrophizing about child's pain and its relationship with activity restriction: The mediating role of parental distress. *Pain* **152**,212-222.
- Claar, R.L., Simons, L.E., Logan, D.E. (2008). Parental responses to children's pain: The moderating impact of children's emotional distress on symptoms and disability. *Pain* **138**,172-179.
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (San Diego, CA: McGraw-Hill).
- Cohen, L.L., Manimala, R., Blount, R.L. (2000). Easier said than done: What parents say they do and what they do during children's immunizations. *Childrens Health Care* **29**,79-86.
- Connelly, M., Anthony, K.K., Sarniak, R., Bromberg, M.H., Gil, K.M., Schanberg, L.E. (2010). Parent pain responses as predictors of daily activities and mood in children with juvenile idiopathic arthritis: The utility of electronic diaries. *J Pain Symptom Manage* **39**,579-590.
- Crombez, G., Bijttebier, P., Eccleston, C., Mascagni, T., Mertens, G., Goubert, L., Verstraeten, K. (2003). The child version of the pain catastrophizing scale (PCS-C): a preliminary validation. *Pain* **104**,639-646.
- Eccleston, C., Crombez, G. (1999). Pain demands attention: A cognitive-affective model of the interruptive function of pain. *Psychol Bull* **125**,356-366.
- Eccleston, C., Crombez, G., Scotford, A., Clinch, J., Connell, H. (2004). Adolescent chronic pain: patterns and predictors of emotional distress in adolescents with chronic pain and their parents. *Pain* **108**,221-229.

Goubert, L., Craig, K.D., Vervoort, T., Morley, S., Sullivan, M.J.L., Williams, A.CdeC., Cano, A., Crombez, G. (2005). Facing others in pain: the effects of empathy. *Pain* **118**,285-288.

Goubert, L., Eccleston, C., Vervoort, T., Jordan, A., Crombez, G. (2006). Parental catastrophizing about their child's pain. The parent version of the Pain Catastrophizing Scale (PCS-P): a preliminary validation. *Pain* **123**,254-263.

Goubert, L., Vervoort, T., Crombez, G. (2009). Pain demands attention from others: The approach/avoidance paradox. *Pain* **143**,5-6.

Goubert, L., Vervoort, T., Sullivan, M.J.L., Verhoeven, K., Crombez, G. (2008). Parental emotional responses to their child's pain: The role of dispositional empathy and catastrophizing about their child's pain. *J Pain* **9**,272-279.

Hechler, T., Vervoort, T., Hamann, M., Tietze, A.L., Vocks, S., Goubert, L., Hermann, C., Wager, J., Blankenburg, M., Schroeder, S., Zernikow, B. (2011). Parental catastrophizing about their child's chronic pain: Are mothers and fathers different and does this matter for the child? *Eur J Pain* **15**,515.e1-515.e9.

Hermann, C., Hohmeister, J., Zohsel, K., Tuttas, M.L., Flor, H. (2008). The impact of chronic pain in children and adolescents: Development and initial validation of a child and parent version of the Pain Experience Questionnaire. *Pain* **135**,251-261.

Huguet, A., Miro, J., Nieto, R. (2008). The inventory of parent/caregiver responses to the children's pain experience (IRPEDNA): Development and preliminary validation. *Pain* **134**,128-139.

Kenny, M.E., Gallagher, L.A. (2002). Instrumental and social/relational correlates of perceived maternal and paternal attachment in adolescence. *J Adolesc* **25**,203-219.

Kenny, D.A., Kashy, D.A., Cook, W.L. (2006). *Dyadic data analysis* (New York: Cambridge University Press).

- Langer, S.L., Romano, J.M., Levy, R.L., Walker, L.S., Whitehead, W.E. (2009). Catastrophizing and parental response to child symptom complaints. *Children's Health Care* **38**,169-184.
- Linton, S.J., McCracken, L.M., Vlaeyen, J.W.S. (2008). Reassurance: Help or hinder in the treatment of pain. *Pain* **134**,5-8.
- McMurtry, C.M., McGrath, P.J., Chambers, C.T. (2006). Reassurance can hurt: Parental behavior and painful medical procedures. *J Pediatrics* **148**,560-561.
- Nezlek, J.B. (2001). Multilevel random coefficient analyses of event and interval contingent data in social and personality research. *Pers Soc Psychol Bull* **27**,771-785.
- Palermo, T.M., Eccleston, C. (2009). Parents of children and adolescents with chronic pain. *Pain* **146**,15-17.
- Peterson, C.C., Palermo, T.M. (2004). Parental reinforcement of recurrent pain: the moderating impact of child depression and anxiety on functional disability. *J Pediatr Psychol* **29**,331–341.
- Power, T.G., Shanks, J.A. (1989). Parents as socializers - maternal and paternal views. *J Youth Adolesc* **18**,203-220.
- Raudenbush, S.W., Bryk, A.S. (2002). *Hierarchical Linear Models. Applications and data analysis methods* (Newbury Park, CA: Sage).
- Raudenbush, S.W., Bryk, A.S., Congdon, R. (2004). *HLM 6: Hierarchical Linear and Nonlinear Modeling* (Lincolnwood, IL: Scientific Software International).
- Sullivan, M.J.L., Bishop, S.R., Pivik, J. (1995). The Pain Catastrophizing Scale: development and validation. *Psychol Assess* **7**,524-532.
- Van Damme, S., Crombez, G., Bijttebier, P., Goubert, L., Van Houdenhove, B.A. (2002). Confirmatory factor analysis of the Pain Catastrophizing Scale: Invariant factor structure across clinical and non-clinical populations. *Pain* **96**,319-324.

- Vervoort, T., Eccleston, C., Goubert, L., Buysse, A., Crombez, G. (2010). Children's catastrophic thinking about their pain predicts pain and disability 6 months later. *Eur J Pain* 14,90-96.
- Vervoort, T., Caes, L., Crombez, G., Koster, E.H.W., Van Damme, S., Dewitte, M., Goubert, L. (2011a). Parental catastrophizing about child's pain and selective attention to varying levels of facial pain expression in children: A dot-probe study. *Pain* 152,1751-1757.
- Vervoort, T., Huguet, A., Verhoeven, K., Goubert, L. (2011b). Mothers' and fathers' responses to their child's pain moderate the relationship between the child's pain catastrophizing and disability. *Pain* 152,786-793.
- Walker, L.S., Claar, R.L., Garber, J. (2002). Social consequences of children's pain: When do they encourage symptom maintenance? *J Ped Psychol* 27,689-698.
- Walker, L.S., Levy, R.L., Whitehead, W.E. (2006). Validation of a measure of protective parent responses to children's pain. *Clin J Pain* 22,712-716.
- Williams, S.E., Smith, C.A., Bruehl, S.P., Gigante, J., Walker, L. (2009). Medical evaluation of children with chronic abdominal pain: Impact of diagnosis, physical practice orientation, and maternal trait anxiety on mothers' responses to the evaluation. *Pain* 146,283-292.

Table 1

Means, standard deviations (*SD*), internal consistency (Cronbach's alpha) and intercorrelations of all measures. Correlation coefficients above the diagonal are for mothers, coefficients beneath for fathers.

	<i>M (SD)</i>	α	1	2	3	4
Solicitous behaviours	42.61 (47.13)	.90	---	.001	.43 ^c	-.01
Discouraging behaviours	6.18 (2.53)	.86	-.08	---	.02	-.09
PCS-P	174.99 (23.49)	.92	.40 ^c	.13 ^a	---	.03
Child age	29.49 (11.24)	---	.02	.03	.03	---

Note. PCS-P = Pain Catastrophizing Scale – Parent version (Goubert et al., 2006)

^a $p < .05$; ^b $p < .01$; ^c $p < .0005$

Table 2

Final hierarchical linear models assessing the impact of catastrophizing about their child's pain and the moderating effects of children's (imagined) pain characteristics upon mothers' and fathers' solicitous behaviours

	Mothers				Fathers			
	<i>Coefficient</i>	<i>SE</i>	<i>t</i>	<i>Effect size r</i>	<i>Coefficient</i>	<i>SE</i>	<i>t</i>	<i>Effect size r</i>
Intercept (γ_{00})	6.08	.07	90.27 ^c		5.87	.08	73.93 ^c	
PCS-P (γ_{01})	.58	.06	9.57 ^c	.37	.58	.08	6.95 ^c	.37
Pain duration (γ_{10})	.09	.05	1.91	.05	.24	.05	4.65 ^c	.13
Biomedical cause (γ_{20})	-.08	.03	-2.83 ^b	.03	.02	.04	.41	.01
Pain duration x PCS-P (γ_{11})	-.01	.04	-.26	.01	-.06	.05	-1.07	.03
Biomedical cause x PCS-P (γ_{21})	.06	.03	2.25 ^a	.03	.10	.05	2.18 ^a	.06

Note. PCS-P = Pain Catastrophizing Scale – Parent version (Goubert et al., 2006)

Level 1 variables accounted for 1% respectively 4% of the Level 1 variance in mothers' and fathers' solicitous responses to their child's pain. The level 2 variable PCS-P accounted for 20% (mothers) respectively 17% (fathers) in solicitous responses to their child's pain. For both mothers and fathers, the model including all Level 1 and Level 2 predictor variables explained the data better than a model including no predictors, $\chi^2(7)=219.75$; $p<.0005$ respectively $\chi^2(10)=110.77$; $p<.0005$.

^a $p < .05$; ^b $p < .01$; ^c $p < .0005$

Table 3

Final hierarchical linear models assessing the impact of catastrophizing about their child's pain and the moderating effects of children's (imagined) pain characteristics upon mothers' and fathers' discouraging behaviours

	Mothers				Fathers			
	<i>Coefficient</i>	<i>SE</i>	<i>t</i>	<i>Effect size r</i>	<i>Coefficient</i>	<i>SE</i>	<i>t</i>	<i>Effect size r</i>
Intercept (γ_{00})	.90	.06	14.37 ^c		1.37	.09	15.82 ^c	
PCS-P (γ_{01})	.01	.06	.16	.01	.32	.11	2.93 ^b	.16
Pain duration (γ_{10})	.08	.05	1.57	.04	.04	.06	.80	.02
Biomedical cause (γ_{20})	.08	.04	2.12 ^a	.03	.04	.05	.80	.01
Pain duration x PCS-P (γ_{11})	-.03	.05	-.52	.01	-.17	.06	-2.85 ^b	.09
Biomedical cause x PCS-P (γ_{21})	.05	.03	1.39	.02	-.07	.04	-1.81	.03

Note. PCS-P = Pain Catastrophizing Scale – Parent version (Goubert et al., 2006)

Level 1 variables accounted for .60% respectively 1.88% of the Level 1 variance in mothers' and fathers' discouraging responses to their child's pain. The level 2 variable PCS-P accounted for .02% (mothers) respectively 1.86% (fathers) in discouraging responses to their child's pain. For both mothers and fathers, the model including all Level 1 and Level 2 predictor variables explained the data better than a model including no predictors, $\chi^2(7)=76.36$; $p<.0005$ respectively $\chi^2(7)=39.48$; $p<.0005$.

^a $p < .05$; ^b $p < .01$; ^c $p < .0005$

APPENDIX S1:

EXAMPLE VIGNETTES

Vignette describing pain situation with short duration and known biomedical cause

“Since this morning my child has been troubled with muscle pain. Just now, I went to the doctor with my child. The doctor said that the muscle pain is caused by the flu.”

Vignette describing pain situation with short duration and unknown biomedical cause

“Since this morning my child has been troubled with back pain. Just now, I went to the doctor with my child. The doctor was not able to determine the cause of the back pain.”

Vignette describing pain situation with longer duration and known biomedical cause

“My child has already been troubled with headaches for a number of weeks. Because of this, I have been to the doctor with my child a few weeks ago. The doctor said that the headaches were caused by the flu. At present, my child still is troubled with headaches.”

Vignette describing pain situation with longer duration and unknown biomedical cause

“My child has already been troubled with abdominal pain for a number of weeks. Because of this, I have been to the doctor with my child a few weeks ago. The doctor was not able to determine the cause of the abdominal pain. At present, my child still is troubled with abdominal pain.