Summary, discussion
and future perspectives
This thesis aims to give insight into some diagnostic aspects and the clinical course of pelvic pain in women. We evaluated the reliability of videotaped compared to real-time laparoscopy and investigated the moderating and/or mediating factors of sexual functioning in women suffering from CPP. Further, we focused on the course of acute abdominal pain and predictors of pain persistence. We also evaluated the course of chronic pelvic pain and possible predictors of recovery from pain. Finally, we suggested a method for assessment of women with CPP that could be beneficial for pain management.

This chapter summarizes the main results of our studies, discusses our findings in the light of our research questions and compares the results with previous reports in literature. Thereafter, we address the limitations of our studies and discuss which implications our results have for clinical practice and future research.

The main results of our studies can be recapitulated as follows:

We observed (chapter 2) that for endometriosis scorings the evaluations of videotaped laparoscopies were reliable. However, special attention must be given to the assessment of ovarian lesions because observers tended to disagree on the severity and extent of ovarian endometriotic disease. As a result of the high number of disagreements between the scorings of adhesions during real-time and videotaped laparoscopies, we concluded that videotaped laparoscopies were not reliable to assess adhesions properly.

Furthermore, in concordance with the results in other studies [Mathias 1996; Collett 1998; Zondervan 2001; Grace 2004; Verit 2006; Florido 2008; Pitts 2008] more sexual problems were reported by women with CPP in comparison with pain free controls (chapter 3). Sexual abuse, anxiety and depression were associated with sexual problems in all women, but given that women with CPP recorded more anxiety and depression than controls did, they stated more sexual problems. A sexual abuse history was a non-specific predictor of sexual functioning.

Considering the studies on the course of abdominal and pelvic pain, we demonstrated that abdominal pain persisted in one out of three women 2 years after an acute episode of abdominal pain (chapter 4). Pain persistence was only associated with a low education level and an abuse history < 16 years of age, but not with any of the other sociodemographic variables or pain related characteristics. We also found that suffering from CPP was associated with impaired quality of life (chapter 3 - 6). No more than one out of four to five women with chronic pelvic pain recovered from pain over time (chapter 5 and 6). Furthermore, only a decrease in catastrophizing thoughts about pain was associated with an improvement from baseline in pain and adjustment to pain, whereas other psychological factors were not related to recovery from CPP complaints (chapter 6). Moreover, none of the sociodemographic variables, pain related characteristics and/or clinical factors predicted recovery (chapter 5 and 6).
Comparing our results with findings from other studies, we note remarkable similarities. First, pain persistence after an acute episode of abdominal pain was not only demonstrated in our sample of women but also in women after Pelvic Inflammatory Disease (PID) [Haggerty 2005], in patients with non-specific abdominal pain (NSAP) [Jess 1982] and in women with NSAP in the right hypogastric area [Morino 2006]. Our study results showed that 30% of the women reported a continuation of pain symptoms. A similar percentage of pain persistence is noticed in women after Pelvic Inflammatory Disease (36%) and a somewhat lower percentage in patients with NSAP (16% and 20% respectively). In other pain conditions such as acute neck and back pain the percentages of patients who develop chronic pain after an acute episode, have a wide range varying from 3% to 70% dependent on the population studied, the design and the measurements used [Hestbaek 2003; Pengel 2003]. Moreover, physical and psychological risk factors for a continuation of pain have been studied, especially in neck and back pain. Findings highlight the importance of psychological factors like anxiety, depression and cognitive variables [Linton, 2000; Williamson 2008] but do not support physical factors such as injury characteristics [Harris 2007] as important contributors to future pain.

Second, our studies revealed that only a minority of women with CPP recovered from pelvic pain. This phenomenon is also observed in studies on the course of chronic pain conditions in general like in chronic back pain [Pengel 2003] and late whiplash syndrome [Hendriks 2005; Kamper 2008]. That our recovery rate of a maximum of 25% at a 3 years’ follow-up was relatively low in comparison with the report of a 46% improvement in women with CPP 1 year after they visited a CPP specialty clinic [Lamvu 2006], is probably due to differences in the definition of improvement, the composition of the study sample and the kind of measurements used. In line with our results, Lamvu's study also reported that sociodemographic, clinical or pain related variables did not predict recovery. In studies on the course of other chronic pain conditions such as back pain [Hestbaek 2003; Mallen 2007], late whiplash syndrome [Scholten-Peeters 2003; Kamper 2008] and irritable bowel syndrome [Janssen 1998] findings are similar.

Third, the association between chronic abdominal and pelvic pain in women on the one hand and higher levels of anxiety and depressive symptoms and lower levels of health related quality of life on the other hand, is not only observed in our 4 studies but also indicated by others [Savidge 1997; Stones 2000] investigating pain related physical and mental health in women with CPP. A similar impact of chronic pain on adjustment to pain is demonstrated in patients with chronic abdominal pain and adhesions [Swank 2003] and in patients from pain specialty clinics suffering from all kinds of chronic pain conditions [Lame 2005].

Finally, the potential role of (changes in) catastrophizing associated with pain experience and adjustment to pain as illustrated in one of our studies, is thoroughly demonstrated in experimental and clinical studies in diverse patient groups suffering from acute and chronic pain [Sullivan 2001] as well as in treatment outcome studies in patients suffering
SUMMARY, DISCUSSION AND FUTURE PERSPECTIVES

from for instance chronic low back pain [Spinhoven 2004], chronic pain in general [Jens-

Subsequently our main conclusion is that CPP in women has to be considered as a chronic

Therefore, in chapter 7 we presented a vignette of a woman suffering from CPP and ex-

Limitations
The studies in this thesis have a number of limitations and methodological concerns that already have been discussed in the discussion sections of the respective chapters. Two important issues, the external validity and the correlational nature of the findings, will be discussed below in more detail.

The external validity [Dekkers 2009] of our findings could be limited by the setting from which the study samples were retrieved. However, there are indications to assume that the results of our study about the course of acute abdominal pain performed in a secondary care medical center, can be generalized to the whole population of women with acute abdominal pain. In concordance with our study, a similar 30% of a population-based cohort suffering from acute pain reported pain persistence at a 6 months follow-up [Leiknes 2007]. In addition, the samples of women with CPP eligible for the case-control study about sexual functioning and for the follow-up studies, were selected from all women who had visited the CPP-team of the LUMC, a tertiary referral centre. We estimate that our results are also valid for a gynaecological department in secondary medical care as the baseline characteristics reflected in levels of pain and adjustment to pain, did not differ between women enrolled in our study and people suffering from abdominal pain who were assessed in a Dutch secondary medical care setting [Swank 2003].
In addition, specifically in the 3 follow-up studies the interpretation of results could have been limited by the potential for non-participation bias. However, in these studies we used a similar way to ask former patients to participate in the studies and the response rates across studies were comparable, respectively 58% (chapter 4), 60% (chapter 5) and 64% (chapter 6). Regarding sociodemographic, clinical and pain related variables no remarkable differences were found between study participants and refusers, except for one item. In comparison with those who refused to participate, a significantly larger percentage of study participants reported to have had a surgical intervention as a consequence of their diagnosis made at the emergency department. Moreover, participants reported more visits to other medical specialists and gynaecological surgical interventions before attending the CPP team than refusers. The reason for this difference is still unclear, although it can be suggested that treatment offered in the past has influenced the willingness to consent in a follow-up study.

Finally, because the control group used in the case-control study on sexual functioning consisted of women who responded to an advertisement in a local newspaper, we are not sure whether this sample is representative for women of the Dutch population without pelvic pain. However, their responses on the questionnaires for physical impairment, anxiety and depression were comparable with the norms of the control groups for the specific measures we used.

All in all, after this reflection on various factors involved in the assessment of the external validity of our studies, we conclude that our results can be generalized to women suffering from acute abdominal or chronic pelvic pain other than the study populations used.

The correlational nature of the findings between outcome (chronicity, recovery or improvement in pain intensity) and sociodemographic, clinical and pain related variables at baseline found in our follow-up studies (chapter 4-6) precludes conclusions concerning the causality of relationships between these variables. The same is true for the association between sexual function and anxiety and depression as observed in our case-control study (chapter 2). For instance, one of our follow-up studies showed that a decrease in pain intensity between baseline and follow-up in women with CPP was significantly related to a decrease in the levels of catastrophizing pain, but it could also be that the latter change was a consequence of the pain alleviation over time or that the decrease in pain severity could be explained by an interaction with another factor such as neuroticism [Goubert 2004]. Also as another example, we observed that the report of sexual abuse experiences at a younger age was associated with a perpetuation of abdominal pain following an acute episode. However, it is also possible that the development of a chronic pain condition is a result of a higher vulnerability of a person, caused by early trauma associated changes in cortisol levels [Gatchel 2007].

**Clinical implications and further research**
The results of our studies regarding the diagnostic aspects and the course of acute abdominal and chronic pelvic pain have clinical implications and encourage further research.
Regarding the reliability of videotaped laparoscopies, the results indicate that in case of endometriosis apart from ovarian lesions, the use of videotaped laparoscopies is justified. With regard to adhesions, the evaluations during videotaped laparoscopy are not reliable and therefore these evaluations should be interpreted with caution. Subsequently, if advice on any surgical consequence of findings is warranted, repeated surgery i.e. performance of a diagnostic laparoscopy may be sometimes necessary. In addition, studies are required to improve internal consistency between measurements in order to score adhesions properly.

When sexual functioning is addressed in women with CPP, one has to bear in mind that sexual problems are more strongly associated with pain related psychological variables as depression and anxiety and to a lesser degree with somatic pain characteristics such as pain severity and physical impairment. In addition, women with CPP report more sexual problems because they have higher levels of anxiety and depression than women without pain. These findings indicate that gynaecologists have to assess not only the somatic aspects of CPP but also the presence of anxiety and depressive symptoms. In subsequent treatment these factors have to be accounted for. Furthermore, in our study the percentages of women who reported a sexual abuse history are similar in women with as well without pelvic pain. And also, such a history is associated with sexual problems in all women, irrespective of CPP suffering. This result implies that sexual abuse does not play a specific role in the report of sexual problems by women with CPP but that it represents an important factor in the development of sexual disfunctions in women with and without CPP.

The clinical consequences of our main conclusion that chronic pelvic pain can be considered as a chronic pain condition in general, have been demonstrated in chapter 7 addressing the assessment of women with CPP. Our findings about the clinical course of acute abdominal or chronic pelvic pain and its predictors of outcome (i.e., persistence or recovery) can be valuable information for health care providers and patients [Croft 2006]. Other implications for clinical practice need further research in women with CPP, based on what is known from studies in other chronic pain conditions. Because data about the clinical course and prognosis of acute pain and about the risk factors for persistence of pain may lead to early identification of patients at risk for the development of chronic pain after an acute episode [White 1997], new prospective studies are needed in a population of women suffering from acute pelvic pain. Moreover, future studies have also to elucidate the potential role of catastrophizing pain in pain persistence or recovery from pain. Further knowledge about predictors of recovery from or continuation of pain will increase our understanding of women suffering from pain in the pelvic region. Thereafter, appropriate interventions could be elaborated to reduce risks for pain persistence after an acute episode or to enhance recovery from chronic pelvic pain.

Furthermore, we have characterized women suffering from CPP with special attention for not only the somatic factors associated with CPP but also to adjustment to pain (anxiety
and depressive symptoms and health related quality of life) as well as to important psychological factors (i.e., pain appraisals and pain coping strategies) [Gatchel 2007]. These findings underline a biopsychosocial perspective on chronic pain and should guide the development of interventions focused not only on improvement of pain but also on distress and disability. Future treatment outcome studies in chronic pelvic pain in women need to use standardized measurements for the assessment of this outcome [Dworkin 2005].

Finally, considering chronic pelvic pain as a chronic pain condition in general, implementing current and future research topics from the field of chronic pain [Gatchel 2007] is warranted. Noteworthy developments in this field cover for instance basic neuroscience processes of pain and studies on the interaction between chronic pain related psychological factors and brain processes.