

Internet-Delivered Acceptance and Commitment Therapy for Chronic Pain

Feasibility, patients' experiences and implementation process



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Till minne av Birgit Karlén

If you're being met with resistance, that probably means you're doing something new. If
you're experiencing turbulence or pressure, that probably means you're rising.

— Taylor Swift

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ABSTRACT

Chronic pain represents a major burden for individuals and society. Internet-delivered psychological interventions are evidence-based treatments that enable patients to access qualified care at a time and place convenient for them. Internet-delivered Acceptance and commitment therapy (IACT) has shown promising treatment effects for chronic pain patients on pain-related outcomes such as disability, pain intensity, and interference, and on psychological outcomes such as catastrophizing, fear-avoidance and acceptance. Interdisciplinary pain rehabilitation programs (IPRP) are multimodal interventions given by synchronized teams of health care professionals from different disciplines. With moderate treatment effects on many outcomes, IPRP is the best evidence treatment for chronic pain to date.

IACT may add to IPRP's effectiveness by providing individual psychological treatment via the internet. However, IACT has not yet been implemented in routine care in a larger scale. In this thesis, the aim was to study if IACT may be acceptable for chronic pain patients and if it is feasible and effective as an addition to IPRP. Three methodological approaches were used: qualitative analysis, implementation science and a controlled trial of effectiveness in a clinical context.

Study I showed that an internet-delivered aftercare intervention enabled chronic pain patients to change their perception of their body and pain and their attitude about their future and self. Furthermore, self-motivating goals and acceptance strategies appeared to influence autonomy. The results gave promise to the feasibility of IACT as aftercare following IPRP. **Study II** showed that chronic pain patients' experiences of IACT vary, with respect to being in treatment and the consequences of treatment. Specifically, e-therapist feedback and deadlines for homework may have an impact on autonomy and change. Patients' expectations, motivations, and restraints could explain treatment engagement and experiences. In **Study III**, IACT added during IPRP enhanced the treatment effects on pain acceptance and affective distress. Furthermore, IACT added as aftercare strengthened the long-term effect of IPRP on psychological flexibility and self-efficacy. However, unsatisfactory completion rates complicated the interpretation of the findings. **Study IV** showed that implementing IACT in an IPRP setting may be facilitated by contextual alignment and modifications based on patients' needs. Thorough testing of the application and matching the intervention's aim with the host's needs are important not to challenge the process. An implementation framework may ease planning and evaluation of implementation processes.

In conclusion, IACT could be feasible as an addition to IPRP. IACT can help chronic pain patients self-manage their pain and improve pain acceptance and self-efficacy. However, chronic pain patients' varying experiences may need to be considered to improve treatment engagement and help patients benefit from treatment. In addition, implementation of IACT in IPRP settings is likely to depend on both flexibility to changing host needs and continuity of known pivotal components in IACT.

SVENSK SAMMANFATTNING

Långvarig smärta medför ett lidande för den drabbade individen och konsekvenser för samhället. Internetbaserade psykologiska behandlingar är evidensbaserade insatser som ger patienter tillgång till kvalificerad vård vid den tid och på den plats som passar dem. Internetbaserad Acceptance and commitment therapy (IACT) kan påverka smärtintensitet samt hur mycket smärtan hindrar individen. IACT påverkar också psykologiska faktorer som katastrofiering, rädsla/undvikande och smärtaacceptans. Multimodala smärtherehabiliteringsprogram (MMR) består av flera behandlingsinsatser som ges parallellt av ett team där vårdpersonal från olika professioner samarbetar. MMR har medelstor påverkan på flera faktorer och är den rekommenderade behandlingen för personer med långvarig smärta.

IACT skulle kunna vara hjälpsamt för smärtpatienter som komplement till MMR, genom att ge individuell psykologisk behandling via internet. IACT har ännu inte implementerats rutinmässigt i sjukvården. I denna avhandling är syftet att studera om IACT uppskattas av smärtpatienter och om IACT är tillämpbart och effektivt som tillägg till MMR. Tre olika metoder används, nämligen kvalitativ analys, implementeringskunskap och en kontrollerad studie av effektivitet på en smärtherehabiliteringsklinik.

Studie I visade att internetbaserad eftervård hjälpte smärtpatienter att förändra sin uppfattning om sin kropp och sin smärta samt sin attityd till sin framtid och sig själva. Därtill tycktes patienternas autonomi påverkas av motiverande mål och acceptansstrategier. Resultatet talar för att IACT är tillämpbart som eftervård efter MMR. **Studie II** visade att smärtpatienters upplevelser av IACT varierar, både avseende att vara i behandling och behandlingens konsekvenser. Kontakten med en terapeut via internet (e-terapeut) och deadlines för hemuppgifter tycktes påverka patienternas förändring och autonomi. Patienternas förväntningar, motivation och begränsningar kan förklara deras upplevelser och hur de deltar i behandling. **Studie III** visade att IACT som tillägg kan förbättra den effekt som MMR har på patienters smärtaacceptans och hur påverkade de är av känslor. IACT som tillägg efter MMR kan förstärka den långsiktiga effekten av MMRP på psykologisk flexibilitet och self-efficacy. **Studie IV** visade att implementering av IACT på en smärtherehabiliteringsklinik kan underlättas av likriktning med kontextfaktorer och anpassningar utifrån patienters behov. Noggrann testning av tekniken bakom IACT och att matcha syftet med IACT med klinikens behov är viktigt för att inte försvåra implementeringen. Ett ramverk för implementering kan underlätta såväl planering som utvärdering av processen.

Sammantaget kan IACT bidra som komplement till MMRP. IACT kan hjälpa smärtpatienter att hantera sin smärta samt förbättra smärtacceptans och self-efficacy. För att hjälpa smärtpatienter att delta i och dra nytta av IACT kan deras varierande upplevelser behöva tas hänsyn till. Därtill är det troligt att implementeringen av IACT behöver ske med flexibilitet inför smärrehabiliteringsklinikers föränderliga förutsättningar samt med fokus på att behålla de verksamma komponenterna i IACT.

LIST OF PAPERS

- I. Bendelin N, Gerdle B, Andersson G. Internet-delivered aftercare following multimodal rehabilitation program for chronic pain: A qualitative feasibility study. *Journal of Pain Research*. 2018;11:1715-28.
- II. Bendelin N, Björkdahl P, Risell M, Nelson KZ, Gerdle B, Andersson G, Buhrman M. Patients' experiences of internet-based Acceptance and commitment therapy for chronic pain: a qualitative study. *BMC Musculoskeletal Disorders*. 2020;21:212.
- III. Bendelin N, Gerdle B, Blom M, Södermark M, Andersson G. Internet-delivered Acceptance and commitment therapy added to multimodal pain rehabilitation: A cluster randomized controlled trial. *Journal of Clinical Medicine*. 2021;10:24.
- IV. Bendelin N, Gerdle B, Andersson G. Hurdles and potentials when implementing internet-delivered Acceptance and commitment therapy for chronic pain: a retrospective appraisal using the quality implementation framework. Submitted.

ABBREVIATIONS

ACP	Aftercare program
ACT	Acceptance and commitment therapy
ANCOVA	Analysis of covariance
BEVS	The bull's eye values survey
CBT	Cognitive behavioural therapy
CPAQ	Chronic pain acceptance questionnaire
IACT	Internet-delivered Acceptance and commitment therapy
IASP	International Association for the Study of Pain
ICBT	Internet-delivered cognitive behavioral therapy
IPRP	Interdisciplinary pain rehabilitation program, previously named MMRP
MMRP	Multimodal pain rehabilitation program, presently referred to as IPRP
MPI	Multidimensional Pain Inventory
PDF	Portable document format
PIPS	Psychological inflexibility in pain scale
PSEQ	Pain self-efficacy questionnaire
QIF	Quality Implementation Framework
RCT	Randomized controlled trial
TMF	Theory, model and framework
VAS	Visual Analogue Scale

INTRODUCTION

Chronic pain is a globally widespread condition affecting approximately 20 % of the population during a lifetime (Breivik et al., 2006, Goldberg and McGee, 2011). Chronic pain can be a symptom of another disease and is then categorized as secondary. Chronic primary pain, on the other hand, is a disease in itself, interfering with daily activities and causing emotional distress (Treede et al., 2019). Chronic pain is also classified based on dominant pain mechanism; nociceptive, neuropathic or nociplastic with sensitization as an underlying mechanism (Kosek et al., 2016). Chronic pain patients display a range of comorbid symptoms and conditions (Adams and Turk, 2018). The consequences of chronic pain manifest in multiple areas of life, such as work performance, social roles, mental health, sleep, stress and other somatic symptoms (Gerdle et al., 2016). Pain is seen as chronic when it persists beyond the expected time to heal. Taken together, chronic pain represents a major burden for individuals and society.

Interdisciplinary pain rehabilitation programs

Effective and evidence-based treatments for chronic pain to date include, among others, multimodal pain rehabilitation programs (MMRP) (Kamper et al., 2015). Since 2018 MMRPs are called interdisciplinary pain rehabilitation program (IPRP) (IASP, 2018). These group-based pain management programs are conducted in both primary care and specialized care in developed countries (Gerdle et al., 2016, Dragioti et al., 2018).

Although professions of team members and the overall aim may differ, there are some features that characterize IPRPs.

- A focus on quality of life, physical and psychological functioning, and/or return-to-work (Kamper et al., 2015).
- The content consists of multiple modalities given synchronized by a team of several professionals (Nordin et al., 2016).
- The team collaborates extensively during assessment and treatment planning and continuously evaluates treatment processes throughout the rehabilitation phase.
- The group-based psychology sessions incorporate components from cognitive behavioural therapy (CBT) (Eccleston et al., 2009) or Acceptance and commitment therapy (ACT) (Eccleston et al., 2013, Hann and McCracken, 2014) and target catastrophizing, coping, experiential avoidance, goals, values, motivation, and sometimes sleep interventions.

- IPRP may include individual sessions with interventions for comorbid psychiatric conditions such as anxiety, depression, insomnia, and trauma (Gerdle et al., 2016).

Following IPRP, a majority of patients are routinely referred to their respective primary care centre, with various degrees of aftercare. Although IPRP is an established treatment, it has recently been suggested that a more diverse range of rehabilitation approaches may be required to meet the growing needs of different pain populations (Gerdle et al., 2022). One such area of development is closer collaboration with primary care (McGeary et al., 2016). Another possible complement can be early interventions to prevent chronicity (Nicholas et al., 2020). Third, to specify and evaluate the impact of the included CBT techniques (McCracken et al., 2022). Addressing the diverse needs of people with chronic pain, improving adherence, and improving effectiveness, may require a multi-method approach, learning the perspectives of patients, caregivers, and the host environment.

The biopsychosocial model

Overarching profession-specific models of pain, IPRPs are also given from a biopsychosocial perspective, which enables integration of theories and perspectives from different disciplines (Adams and Turk, 2018). The biopsychosocial model considers biological, social, psychological, and contextual factors (Engel, 1977). It sheds light on the dynamic and interactive process of chronic pain and shifts the focus towards contributing factors rather than the cause of pain (Adams and Turk, 2018). Cognition, emotions, and social learning are examples of psychological factors that may help explain pain and pain behaviour.

The emergence of the biopsychosocial model, however, was preceded by the development of the Gate control theory (Melzack and Wall, 1965), which explains how both physical and psychological factors interplay and contribute to a person's perception of pain. Following the Gate control theory, behavioural treatments for chronic pain, building on operant conditioning, were introduced to pain rehabilitation as a way to reactive patients with chronic pain (Fordyce et al., 1973). The biopsychosocial model allows for a wider scope in attempt to understand the maintenance of chronic pain, also including social aspects such as roles, economy, social context and work. In addition, illness, rather than disease, was introduced as a concept to illustrate the effect of pain on a person's life (Engel, 1980).

The biopsychosocial model still influences comprehensive assessments and the synchronized multimodal interventions in pain management programs today (Gatchel et al., 2007). First, the biopsychosocial model guides the clinician to elaborate on the symptom panorama of chronic pain patients (Figure 1A). Second, it explains the variation of symptoms among chronic pain patients, (Figure 1B case 1-4), where biological, social, and psychological components may play a larger or minor role in itself or paired with a second component. Third, the model facilitate clinician-patient communication concerning pain rationale and treatment rationale (Dong and Bäckryd, 2023).

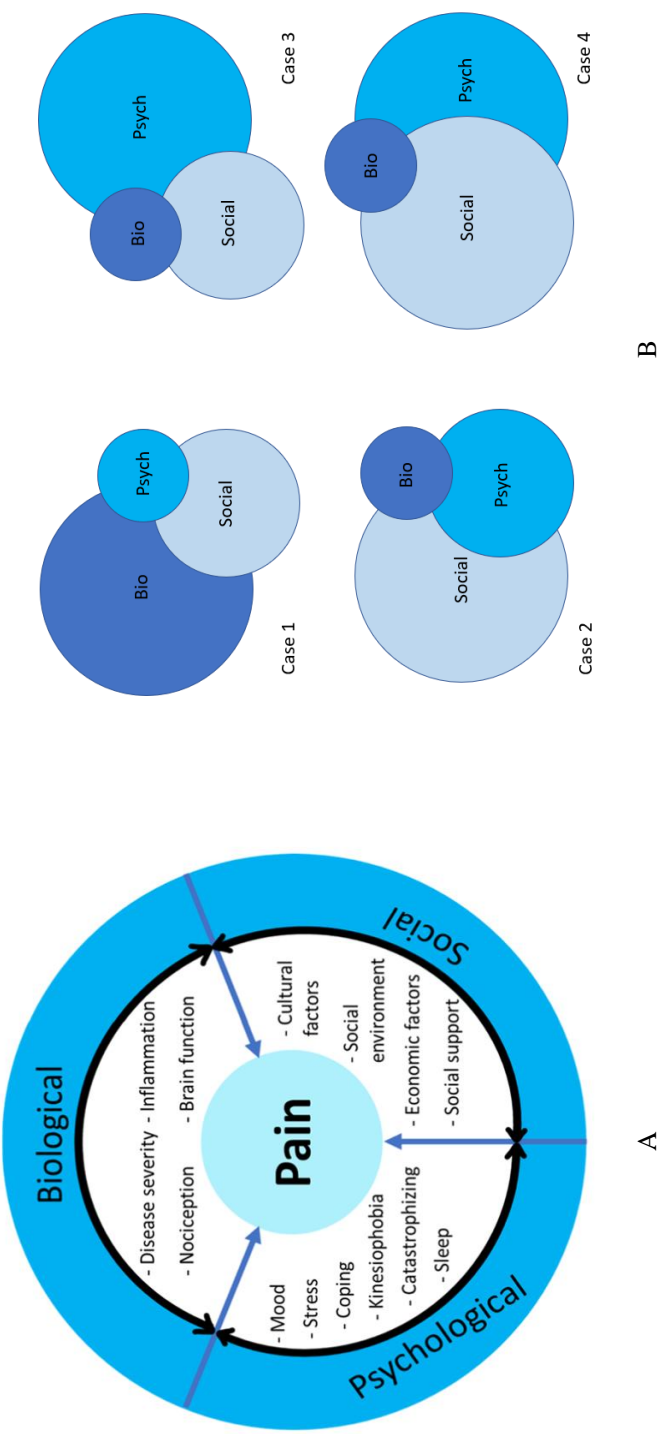


Figure 1A. Illustration of the biopsychosocial model by (Dong and Bäckryd, 2023). Previously adapted from (Fillingim, 2017). 1B: Four cases that illustrate examples of variation of symptom display in chronic pain patients. Adapted from (Dong and Bäckryd, 2023). Previously adapted from (Jull, 2017).

The contribution of psychological models in pain rehabilitation is widely acknowledged (Jensen and Turk, 2014). One area in pain management where there is still room for improvement of psychological interventions is relapse management (Buzasi et al., 2022), in the form of self-management (Devan et al., 2018). Self-management is a comprehensive set of actions relating to monitoring and managing one's condition and its consequences and in addition maintaining a change process (Barlow et al., 2002). According to the current available best evidence, psychological treatments still produce only moderate treatment effects (Turk et al., 2011, Bodenheimer et al., 2002). Hence, it is important to facilitate self-management among chronic pain patients.

Pain self-management

Relapse prevention has been described as a neglected area in pain rehabilitation (Gogovor et al., 2017, Morley, 2008). About 30–60 % of patients relapse in some form after completion of traditional face-to-face pain rehabilitation (Turk and Rudy, 1991), although relapse rates vary widely (Nicholas et al., 2017). Relapse can be attributed to several factors, – e.g., increased pain, medication use, sick-leave compensation, perceived disability, or quality of life. A central part of relapse prevention following IPRP is helping patients continue practicing the self-management skills they have learnt (Gandy et al., 2016). Low adherence to self-management strategies lowers the effectiveness of IPRPs at follow-up (Jordan et al., 2010) (Hayden et al., 2005). Meanwhile, improvements in depression, pain, and disability have been found to be related to ongoing practice of skills learnt in IPRPs (Nicholas et al., 2012, Nicholas et al., 2014).

Chronic pain patients referred to specialist care may have had pain for a shorter or longer duration. Although pain intensity and interference may vary over time, pain is unlikely to go in complete remission. Therefore, chronic pain is regarded as a lifelong condition. It is important to build autonomy in pain self-management programs. A qualitative systematic review with meta-analyses of 33 studies found factors that either facilitated or hindered self-management of pain (Devan et al., 2018). Self-discovery, empowerment, and a supportive ambience were outlined as enabling factors, whereas declined motivation, symptom distress, and an unsupportive ambience were described as barriers to self-management.

The maintenance of chronic pain is a dynamic process involving physical, psychological, and social factors (Meints and Edwards, 2018). As with other life-long conditions, chronic pain also requires lifestyle changes (Friedberg et al., 2012). Treatment gains following IPRPs and other related interventions must be sufficiently self-reinforcing for patients to engage in self-management throughout their lives (Skinner et al., 2012). A growing body of research points to the influence of self-efficacy, self-exploration, sustained motivation, and a supportive social environment on patients' ability to self-manage pain (Devan et al., 2018). Aftercare and booster interventions may be helpful for patients to apply pain management

strategies and stay committed as their context changes. A need for booster sessions and aftercare interventions has been expressed (Gogovor et al., 2017, Morley, 2008). To date, however, there is no sufficient evidence that booster sessions and other similar aftercare interventions are effective in prolonging or maintaining treatment gains following pain rehabilitation (Buzasi et al., 2022).

Specialist level clinics for patients with complex chronic pain including both somatic symptoms and psychological distress, are almost exclusively located in larger cities, limiting access to trained therapists (Ehde et al., 2014). Accessibility may be limited due to geographical distances (Kloek et al., 2017), financial restrictions (Feliu-Soler et al., 2018), or mobility difficulties (De Boer et al., 2014). Combined with traditional aftercare, internet-delivered interventions may have the potential to prolong treatment effects, reduce admission, and improve outcomes, including lower use of health care (Loucas et al., 2014). Considering the need for relapse prevention, internet-delivered interventions as an addition to IPRP may improve accessibility to individual psychological pain treatment and function as a way to deliver aftercare following IPRP to prevent relapse (Skinner et al., 2012, Andersson, 2009, Jensen and Turk, 2014).

Acceptance and commitment therapy

The purpose and content of psychological interventions in pain management programs such as IPRPs have shifted over time along with the development of new models of chronic pain. The understanding of the process from acute to chronic pain was further elaborated as the fear-avoidance model was developed (Lethem et al., 1983) and later applied to musculoskeletal pain syndromes (Vlaeyen and Linton, 2000). The model describes how avoidance as a response to pain-related fear leads to disuse, disability, and depression. The fear-avoidance model has until recently been at the core of CBT-based pain management programs, with an emphasis on catastrophizing, coping, and avoidance behaviour. Recent advancements in CBT focuses on transdiagnostic treatment processes such as emotional regulation and acceptance (McCracken et al., 2022). One of these process-based psychological treatments is ACT (Hayes et al., 2006).

ACT builds on cognitive behavioural therapy also targeting experiential learning and different facets of psychological flexibility (Hayes et al., 2006). ACT focuses on the function of pain behaviour within its specific context (McCracken and Vowles, 2014). The theoretical underpinnings of ACT are operant behavioural theory (Fordyce, 1976) and relational Frame theory (Hayes et al., 2001). Systematic and clinical reviews (Hann and McCracken, 2014, Hughes et al., 2017, Simpson et al., 2017, Veehof et al., 2011, Veehof et al., 2016, McCracken et al., 2022, Du et al., 2021, Eccleston et al., 2009) suggest that ACT can be an effective treatment for chronic pain. Low to moderate quality studies have shown significant effects on pain interference, disability, catastrophizing, and intensity, comparable to those found in studies of CBT for chronic pain (Du et al., 2021). As the evidence for ACT to treat chronic pain is growing, it has now been recommended as an

alternative to CBT (Hughes et al., 2017, Veehof et al., 2016). Also, ACT has been listed as an empirically supported treatment for chronic pain (APA Task force 12, 2016).

Recent work on functional contextualism has expanded the theoretical basis of behaviourism, focusing on verbal behaviour and learning (Hayes, 2004, Ruiz, 2012). One prominent target in ACT is experiential avoidance – i.e., a person's attempt to avoid physical sensations and other internal experiences such as memories, thoughts, and feeling (McCracken et al., 2004, Vowles and McCracken, 2010). Experiential avoidance is associated with higher pain intensity, pain-related anxiety, depression, and physical and psychosocial disability (McCracken and Vowles, 2006). A willingness to experience pain and associated thoughts and emotions helps people be more present in the moment with awareness of inner sensations, which enables actions in line with what one values in life (Wetherell et al., 2011, McCracken et al., 2004).

It has been suggested that a treatment may count as ACT if it contains at least two of the six core processes in ACT: values, acceptance, cognitive defusion, self-as-context, mindfulness and committed action (Swain et al., 2013). However, in the literature, there are examples of mixed treatments such as ACT-inspired CBT and acceptance-based CBT (Kelson et al., 2019). Such treatments are built on CBT although ACT interventions are embedded, for example, mindfulness rather than relaxation (Ljótsson et al., 2014) or acceptance rather than cognitive restructuring (Dahlin et al., 2016). In line with the definition suggested (Swain et al., 2013), these treatments count as ACT if they include at least two core processes. The term ACT-inspired, however, may still fill an important role in settings where ACT is part of a larger treatment concept, for example, multimodal rehabilitations programs for chronic pain (IPRP) (Gerdle et al., 2016). As such, the psychological treatment parts may be ACT-consistent, although physiotherapy interventions and occupational therapist interventions may be ACT-inspired or congruent with other theoretical traditions.

Internet-delivered Acceptance and commitment therapy

The transdiagnostic approach in ACT together with its focus on function, flexibility, and adaptive behaviour patterns makes it especially suitable for interventions aimed at enhancing resilience and autonomy (Moens et al., 2022). Also, the emphasis on homework, daily practice, and experiential learning from real-life experiences (Hayes et al., 2006) makes ACT suitable for a guided self-help intervention as an internet-delivered intervention. Even single-session ACT interventions have been feasible for chronic health conditions, such as chronic pain (Dochat et al., 2021).

Internet-delivered psychological interventions offer new possibilities for chronic pain treatment (Eccleston et al., 2012). They can diminish barriers as geographical distances (Titov et al., 2018) and physical limitations. Location of treatment, time, language, and level of e-therapist contact can be adjusted based on patients' needs (Andersson, 2016). Alternative tools for learning such as audio or video recordings can be added to suit different learning needs (Andersson, 2015). Such multimedia formats and pictures may be used in IACT to enable experiential learning from exercises, although treatments with only text exist as well (Kelson et al., 2019). Preceding the development of IACT, ICBT showed small to moderate effects on chronic pain-related outcomes such as depression, catastrophizing, and anxiety, suggesting that internet-delivered psychological interventions may be as effective as face-to-face multimodal rehabilitation for psychological outcomes in chronic pain (Buhrman et al., 2016).

Some of the benefits of internet-delivered interventions for chronic pain patients are that it enables access to qualified care in patients' homes (Buhrman et al., 2016) and may possibly support self-help after rehabilitation. Home-based rehabilitation extends the care of the professionals (Kloek et al., 2017) and enables repeated training with support from a social network at a time convenient for the individual (Andersson et al., 2019). Also, internet-delivered interventions may stimulate self-management and facilitate engagement due to its flexibility, anonymity, and emphasis on autonomy.

So far, IACT for chronic pain has shown small to large effect sizes on pain-related outcomes such as disability, pain intensity, and pain interference and on psychological outcomes such as acceptance, anxiety, depression, catastrophizing, and fear-avoidance at post treatment and at follow-up (Vugts et al., 2018). Also, an increase in effects on pain interference, pain intensity, mindfulness, and anxiety from post treatment to follow-up has been found (Trindade et al., 2021). Additional reviews have shown similar findings, although internet-delivered CBT and ACT are sometimes reviewed together (Buhrman et al., 2016, Eccleston et al., 2014, Terpstra et al., 2022, Martorella et al., 2017, Heapy et al., 2015, Gandy et al., 2022) as are chronic pain with other somatic disorders (Van Beugen et al., 2014, Mehta et al., 2019, Rask et al., 2023). Although IACT has shown promising results for patients with chronic pain, there are questions that need further research (Buhrman et al., 2016). Effectiveness studies of internet-delivered psychological interventions have nevertheless given promise to its feasibility on their own or as a part of stepped care in regular health services (Andersson et al., 2019).

Delivery in specialist pain care

Effectiveness

With regards to specialist level pain care, a non-randomized trial of IACT (n = 99) with individualized coaching given as a stand-alone treatment showed

improvements on self-efficacy, activity engagement, pain intensity, pain interference, and treatment satisfaction (Sullivan et al., 2018). Another uncontrolled trial of IACT provided in a tertiary care setting ($n = 39$) showed significant improvements on depression, anxiety, and disability for a subgroup of participants (Dear et al., 2018). In addition, a wait-list control trial on IACT for chronic pain patients in tertiary care ($n = 113$), although self-referred, showed treatment effects on pain interference, depression, anxiety, pain intensity, and insomnia (Rickardsson et al., 2021). Also, IACT as a standalone treatment given to patients recruited from a tertiary care centre ($n = 33$), although without an active comparison, showed significant improvements on depression and pain intensity (Yang et al., 2017).

Finally, for ICBT with tenets of ACT for chronic pain, there are examples of evidence-based treatments that have been deployed in publicly funded health care showing not only significant improvements on outcome but also satisfying completion rates and client satisfaction (Hadjistavropoulos et al., 2018). To further improve IACT for chronic pain patients, a focus on feasibility in effectiveness studies has been suggested, as has targeting user experiences and patient characteristics that may help optimize treatment engagement (Terpstra et al., 2022).

Blended format

Concerning integration of internet-delivered interventions in regular care, both qualitative studies (Erbe et al., 2017) and quantitative feasibility studies (Nordin et al., 2016, Calner et al., 2017) have suggested a combination of internet-delivered interventions with traditional face-to-face sessions. Such blended initiatives, however, have so far shown varying results, although they reveal factors that might play a role in implementation success (Calner et al., 2017, Buhrman et al., 2016).

One of these factors is adherence to treatment. Knowledge is growing on factors effecting pain patients' adherence (Devan et al., 2018) and uptake of evidence-based treatments in clinical settings (Lin et al., 2018). The influence of contextual factors and explicit implementation strategies have, however, so far been sparsely studied. What is known, is that internet-delivered interventions combined with face-to-face treatment may be promising in behaviour change treatments for chronic somatic disorders as the setup enables patients take an active role in self-management (Kloek et al., 2017). The most effective composition is still unclear (Kloek et al., 2017, De Boer et al., 2014). However, booster sessions, a multiple behaviour approach, and multimedia have been suggested as important parts (Kloek et al., 2017, Kelders et al., 2012).

Patients' experiences

Knowledge of how patients experience internet-based self-help treatments has emerged rapidly the last decade, elaborating on factors such as expectations, usability, motivation (Andersson and Titov, 2014), and adverse events of treatment (Andersson et al., 2019). Qualitative studies of IACT for chronic pain patients are slowly growing (van de Graaf et al., 2021, Terpstra et al., 2022). One area to further

explore is whether the format or frequency of e-therapist communication could impact treatment outcome or engagement. Further support on demand has, for example, not been seen to influence outcome positively, but its effects on engagement is yet unclear (Baumeister et al., 2014).

Second, ways to facilitate adherence to treatment may be important to prevent attrition and low compliance. One detailed problem in published trails of IACT for chronic pain is attrition and its consequences on continuous treatment engagement. Different ways to address attrition have been suggested (Buhrman et al., 2016), and the need for additional research on patients' experiences has been repeatedly voiced (van de Graaf et al., 2021).

Third, the contribution of tailored internet-delivered interventions for chronic pain patients is yet unclear. Adjustments based on comorbidities and cultural adaptations may be of interest (McCracken et al., 2022). Also, growing knowledge suggests that tailored treatment might be necessary for self-managing pain over time (Devan et al., 2018). However, whether tailored interventions may improve treatment engagement or outcome is still unclear.

E-therapist communication

One component that distinguishes internet-delivered psychological interventions such as IACT from un-guided online self-help programs is the structured treatment format with high-quality content, homework assignments, and deadlines, similar to face-to-face CBT. A second characteristic is the online communication through individualized messages from an e-therapist, often a psychologist skilled in CBT or ACT. This guidance and support are given as feedback on completed treatment assignments and constitute a pivotal part of treatment for many participants. Evidence suggests that results are often better in guided ICBT compared to un-guided (Baumeister et al., 2014). There are also patients' reports that e-therapist contact may enhance treatment engagement and self-management (Devan et al., 2018) and may be a necessity for patients to benefit from essential interventions (Duggan et al., 2015).

How to deliver feedback (Andersson and Titov, 2014) and the role of the therapist is a current research question (Dear et al., 2015). It has, for example, been suggested that e-therapist communication may play a different role in relation to ACT interventions compared to CBT interventions (Duggan et al., 2015). Patients in qualitative studies have voiced that additional support might facilitate treatment engagement (Johansson et al., 2015). Results are indeed better in guided compared to un-guided ICBT (Baumeister et al., 2014). However, e-therapist contact on demand has so far not been shown to be more effective compared to regular therapist contact (Dear et al., 2015). ICBT for chronic pain has yielded positive results without individual adjustments of frequency of e-therapist contact (Buhrman et al., 2016, Dear et al., 2018). Additional treatment time and therethrough additional therapist contact has been suggested to prevent attrition among adolescents with chronic pain (Flink et al., 2016). More knowledge is needed about the role of e-

therapist feedback and how it affects adherence, compliance, attrition, and treatment satisfaction from a patient's perspective.

Noteworthy, however, e-therapist feedback in IACT trials has sometimes been given with online feedback messages only and at other times complemented with telephone calls. Comparisons of therapeutic feedback format are sparse, and mode of contact (telephone or online messages) has so far not been seen to influence outcome. Some evidence suggests that telephone communication or mixture of online messages and telephone communication may have a positive effect on self-efficacy (Terpstra et al., 2022). The optimal delivery mode, however, is to date, unclear.

Treatment engagement

There are challenges when implementing ICBT in routine practice. Although acceptance of ICBT among clinical populations has been found to be high, adherence to treatment may vary (Lin et al., 2018, Dear et al., 2015). Likewise, although feasibility studies have yielded positive results (Scott et al., 2018), patient attrition is a hurdle (MacEa et al., 2010).

Patient attrition in internet interventions is an under-researched area (Buhrman et al., 2011, MacEa et al., 2010). Attrition, and consequently adherence, may be operationalized in various ways, for example, by completed modules or compliance with treatment regimens, such as meeting deadlines for homework assignments as intended (van de Graaf et al., 2021). How many modules or how high a percentage of treatment that must be completed for a patient to be regarded as a completer may vary depending on intended use or pivotal modules.

Adherence to treatment is important to measure to evaluate effectiveness of internet-delivered interventions. Nonetheless, non-adherence may also be due to reasonable and adequate decisions to drop out of treatment, for example, sufficient improvements or competing life events. The most common reasons for dropout from internet-delivered interventions are lack of time, health issues, technical problems, and insufficient computer skills (Terpstra et al., 2022). Regardless of reason, declining adherence constitutes a challenge for IACT as well as face-to-face treatment. Ways to handle attrition is crucial not only to prevent dropout but also to help patients benefit from IACT (van de Graaf et al., 2021).

Attrition in ICBT has been found higher among patients with long pain duration, high pain intensity, overuse (of analgesic, opioids, and alcohol), social withdrawn-ness, comorbid depression, and previous failed treatment attempts (Karekla et al., 2019). As the risks of attrition might be difficult to discover prospectively (Karekla et al., 2019), more knowledge is needed about the reasons behind attrition and its negative effects (Andersson et al., 2019), early detection, and successful adjustments. In wider research, knowledge is growing about patients' ability to stay engaged in self-management interventions, specifically pointing to self-discovery, acceptance, and self-efficacy as enablers, and symptom distress and declined

motivation have been described as hindrances (Devan et al., 2018). Considering the often lifelong need of self-management in chronic pain, different means to enable greater self-efficacy are essential in this context.

A growing body of evidence speaks to the necessity to design content and format of IACT that consider the fit between user, intervention content, and technical features (van de Graaf et al., 2021). One of the earliest qualitative studies of drop-outs from ICBT pointed to the same, – i.e., attrition might be explained by a mismatch of patient's characteristics with treatment features (Johansson et al., 2015). Recently, further light has been shed on the importance of matching treatment assignments and format with patients' needs and expectations (van de Graaf et al., 2021). However, it is not yet formalized how to design, choose, and fit treatment content or format to patient groups or needs. However, plausible positive effects of adjusting treatment setup after individual wants and needs to improve engagement and prevent attrition are mentioned in qualitative studies (Devan et al., 2018, Duggan et al., 2015). These tailored interventions may also be a way to help patient with comorbid syndromes such as anxiety and depression (Andersson et al., 2019).

Tailored treatment

Tailored treatment might be relevant when there is a variation of pain symptoms or their consequences on patients' lives or when pain is one of comorbid syndromes (Andersson et al., 2019, Păsărelu et al., 2017). Tailored internet-delivered interventions can refer to individualization of communication in messages and feedback to patients (Martorella et al., 2017). Tailored treatments may include optional interventions (Bérubé, 2018) or be blended with face-to face-contact (Andersson et al., 2019). Patients' experiences differ with respect to quantity and difficulty of treatment content in ICBT.

Balancing cognitive demands while covering all relevant interventions is sometimes difficult (Vereenoghe et al., 2017, Beukes et al., 2018). Tailored content, however, may also refer to content matching or adjustment of delivery format based on patients' preferences, motivations or expectations or based on clinical assessment of patients' needs (Andrews and Williams, 2014, Buhrman et al., 2015, Gasslander et al., 2022b). For example, adjustments based on a patient's learning needs might balance cognitive restraints so that all pivotal interventions are still covered although in an accessible manner (Beukes et al., 2018, Vereenoghe et al., 2017).

Tailored internet-delivered interventions have so far not shown consistent advantages compared to un-tailored internet-delivered interventions on pain intensity or disability or psychological functioning, except for a small effect on pain catastrophizing (Martorella et al., 2017). However, it is still unclear whether tailored interventions might improve treatment engagement rather than outcome. Growing knowledge suggests that adjusted treatment might be necessary to elicit self-management of chronic pain over time (Devan et al., 2018). Recent studies of tailored IACT/ICBT focusing on pain and comorbid conditions such as depression

(Buhrman et al., 2015) and psychiatric disorders (Gasslander et al., 2022b) have suggested that tailored interventions may be a credible alternative. They do, however, suggest that further research is needed on who may benefit from this treatment, how to individualize the treatment, and ease adherence from the patients' perspective (Gasslander et al., 2022a).

So far, ICBT for chronic pain has been successfully delivered without tailored treatment (Buhrman et al., 2016) (Dear et al., 2018), although tailoring could potentially affect motivation, adherence and satisfaction rather than outcomes (Martorella et al., 2017). For example, matching treatment format with patients' expectation, requests and characteristics could enhance adherence (Gasslander et al., 2021). However, recent studies suggest that the need to customize content and format of internet-delivered interventions might not be important, considering evidence-based protocols have been translated and transferred to new populations without considerable adjustments (van de Graaf et al., 2021, McCracken et al., 2022) other than cultural adaptations of language and phrasing (Lindegaard et al., 2021). This view would suggest that one size may fit all.

Taken together, the efficacy of IACT for chronic pain has been described in meta-analysis and data on its effectiveness are also emerging. The literature has begun to identify lessons learned from implementation of internet-delivered interventions in regular care. However, few clinical studies have investigated the effectiveness of IACT for chronic pain patients in specialist level care. Attempts to implement IACT in regular care for chronic pain patients exist (Calner et al., 2017, Hadjistavropoulos et al., 2018), although they are few and not spread beyond the clinics that carry the tradition of developing internet-delivered interventions. In wider research, lessons from building and maintaining services delivering internet-delivered interventions are summarized (Titov et al., 2019). Also, descriptions of factors that either contribute to success or constitute barriers have been detailed (Folker et al., 2018, Titov et al., 2018), emphasizing a range of elements as funding, organizational structure, technical solutions, competence and content.

Implementation in interdisciplinary pain rehabilitation programs

One possible barrier for the transition to internet-delivered interventions in IPRPs or similar specialist level pain management services may be the complex format of IPRP where multiple caregivers offer synchronized multimodal interventions to a group of patients, compared to the more straightforward setup where one CBT-therapist gives a protocol-based treatment for one disorder to one patient at a time. One other possible explanation is that chronic pain patients' expectations and needs for psychological interventions may differ, which might further challenge implementation in a broader scale. Psychiatric comorbidities and cognitive restraints may call for individual adjustments, also called patient-tailored interventions. Third, reports from mature clinics with years of experience of internet-delivered interventions have stressed the important of appropriate governance to ensure maintenance of safe and high-quality interventions (Titov et al., 2019).

To move implementation science forward, studies should preferably target one or several of outlined implementation outcomes when evaluating the process (Proctor et al., 2011). This perspective may also be beneficial on a minor scale when evaluating an implementation progress. IACT for chronic pain has been tested in several settings and formats and most outlined implementation outcomes have been studied.

Chronic pain patients have perceived eHealth interventions in general as agreeable, acceptable and potentially helpful in meeting patients' needs of knowledge and support through its accessibility, individualization and usability (Solem et al., 2019). However, the acceptability among health professionals has been found low to moderate, potentially influencing uptake and adherence negatively (Philippi et al., 2021). It has been voiced from the caregivers' perspective that staff involvement is important for successful implementation (Varsi et al., 2021), possibly influencing acceptability positively.

Attrition and low uptake (Lin et al., 2018) have hampered clinical trials and compose a problem that needs to be addressed to facilitate implementation. However, in a study of mobile-based pain treatment (Lin et al., 2018), both uptake (64.5% logged on) and adherence (participants completed in average 1.09 modules) were found low even though acceptance among the participants was moderate to high. Authors recommended further research on how to improve adherence. Uptake in everyday life may be sensitive to patients' expectations. Also, an active approach to treatment has been suggested to facilitate self-help strategies (Bendelin et al., 2011).

A willingness to practice acceptance strategies (Halmetoja et al., 2014) and a curiosity about inner events, called self-discovery, have been suggested as important for patients to acquire new experiences and continuously practice self-management strategies (Devan et al., 2018). However, that is not what all patients seek. In fact, although all patients in specialist level care experience some psychological distress, not all patients expect or seek psychological interventions to improve their functioning (Gerdle et al., 2019).

As use of internet-delivered interventions has been found higher among other patient groups, questions remain concerning uptake of IACT in pain clinical settings. Chronic pain patients have perceived IACT as satisfactory, appropriate and helpful (Hadjistavropoulos et al., 2018). More knowledge is needed about how to implement IACT to the clinical setting of chronic pain patients to raise uptake. Treatment credibility, depressive symptoms, and falling behind the schedule early on have been found to influence uptake (Gasslander et al., 2021).

Several feasibility studies suggest that internet-delivered interventions may help chronic pain patients on pain interference, catastrophizing, and psychological functioning (Buhrman et al., 2016). These interventions may be app based only

(Buhrman et al., 2013b, Dear et al., 2018) or blended (Bostrom et al., 2020). They can be given before treatment (Beck et al., 2020), during treatment (Nordin et al., 2016), or following routine care in the form of relapse prevention (Buhrman et al., 2013a) to persons recruited from the public (Dear et al., 2013) or at specialist clinics (Hadjistavropoulos et al., 2018).

Concerning fidelity, certain factors have been suggested as crucial for chronic pain patients' self-management, namely eliciting self-efficacy, self-discovery and a supportive ambience (Devan et al., 2018). Patient motivation, ability, and symptom panorama have been suggested to effect adherence to ICBT (Nordin et al., 2016). Finally, the cost of implementation (Hedman et al., 2012, Lin et al., 2015) and the spread of ICBT/IACT in clinical settings have been studied, although not particularly for chronic pain patients (Eccleston et al., 2014, van de Graaf et al., 2021). However, to evaluate efficiency compared to other treatments, implementation needs to move forward in a larger scale.

Sustainable implementation

Sustainability of internet-delivered interventions for chronic pain is a novel research field, although knowledge may be found in wider research. To ease durability and ensure an ongoing implementation process, a review of successful ICBT clinics for psychiatric disorders, suggested built-in routines, governance, alignment and ongoing involvement (Titov et al., 2018). For example, the alignment with other mental health services facilitated acceptability and raised fidelity as new therapists were trained. Appropriateness and feasibility were influenced both by close engagement with consumers and routines for looping feedback back to the organization as well as alignment with universities. In addition, uptake was ensured by carefully choosing ICBT programs, and providing training and supervision for e-therapists (Titov et al., 2018).

In wider research, there are also examples of how ICBT has sustainably been integrated blended with routine psychological practice, leading to reduced waitlists and improved the care for complex patients in need of face-to-face treatment (Newby et al., 2021). However, challenges have arisen, and successful clinics have shared guidelines on how to adapt ICBT to fit in the organization and handle risks relating to specific conditions and settings. For example, there is a recommendation to screen for risk for attrition (Newby et al., 2021). Also, infrastructure relating to referrals, communication, and recruiting has been highlighted (Folker et al., 2018).

Although an initiative may be found acceptable and feasible, this alone does not promise a successful implementation. The addition may not match an organization's vision, setting, or funding structure. One implementation outcome less studied regarding IACT for chronic pain is appropriateness of the organization. Therefore, this thesis aims to target facets of implementation from both the perspective of the patients and the clinical host setting.

Aims

General aim

The general aim of this thesis was to investigate if an internet-delivered acceptance-based psychological treatment may be acceptable for chronic pain patients and if it is feasible and effective on pain-related psychological outcomes as an addition to IPRP.

Study aims

Study I

The aim was to describe how chronic pain patients work in an internet-delivered acceptance-based CBT aftercare program. The study explored two research questions: 1) What do participants describe as important when initiating behaviour change in aftercare? 2) What do participants describe as important for ongoing practice of self-management skills in aftercare?

Study II

The aim was to explore chronic pain patients' experiences of participating in an 8-week internet-delivered ACT as a stand-alone treatment.

Study III

The aim in this cluster randomized controlled trial, was to investigate the treatment effects of adding IACT for chronic pain patients, during and after IPRP in specialist care, on pain-related psychological outcomes.

Study IV

The aim was to investigate actions and their impact, during implementation of IACT for chronic pain in public health service, in the purpose to develop a logic model to guide future implementation.

METHODS

Study I

An aftercare program (ACP) was given via the internet to chronic pain patients who has completed an IPRP, previously called MMRP. The program was accessed via a website, where the patients downloaded and uploaded writable PDF files containing treatment interventions as information, tasks, and worksheets. The text in the worksheets conveyed their plans to maintain pain-management on their own after the end of IPRP. The text also included diary-like notes of their day-to-day work with pain-management. Finally, the text also included self-evaluations of their efforts and communication with their e-therapist. Latent content analysis was used to explore the written text with the aim to learn about how patients use an internet-delivered relapse prevention program.

Study II

A stand-alone treatment program focusing on the psychological impact of chronic pain was given to patients awaiting IPRP. ACT interventions were provided through text and audio tracks via a university-based website with shell application. Patients were invited to in-depth semi-structured interviews via telephone 9 months after completing treatment. The interview transcripts were analysed using a grounded theory-based method. A person-based approach for understanding how patients perceive and engage in the intervention was used to guide future intervention development and apply the results to enhance feasibility and acceptance.

Study III

An internet-delivered psychological treatment was given to patients admitted to IPRP. The intervention was designed to align with IPRP and was blended with face-to-face group interventions in IPRP. The treatment consisted of text, multimedia, and worksheets and was accessed via an application reachable from different tablets. The study was a 2-year cluster-randomized controlled trial with two intervention arms. The intervention group received IACT during and after the end of IPRP. The control group received IPRP. The trial had two phases. First, IACT added during IPRP was compared with IPRP alone given for six weeks. Thereafter, IACT as aftercare was compared to aftercare as usual following IPRP for 11 weeks. Measurements were collected before and after IPRP, after the end of the aftercare intervention and 1 year after end of IPRP.

Study IV

In a hybrid 1 effectiveness-implementation study (Curran et al., 2012) co-aligned with Study III, IACT was implemented in a specialty care setting. Data consisted

of text documents with information concerning the implementation process. These were evaluated retrospectively using a deductive approach. The data was coded in line with the Quality Implementation Framework (QIF). The aim was to describe the process of implementation to guide future initiatives. The outcome in focus was appropriateness of IACT for chronic pain in the context of an IPRP at specialty care level. Different facets of appropriateness were of interest such as suitability, usefulness, and practicability. Also, certain aspects of uptake were of interest.

To guide future initiatives, the result was synthesized with lessons learned from the emerging literature on implementation of IACT and ICBT in different settings.

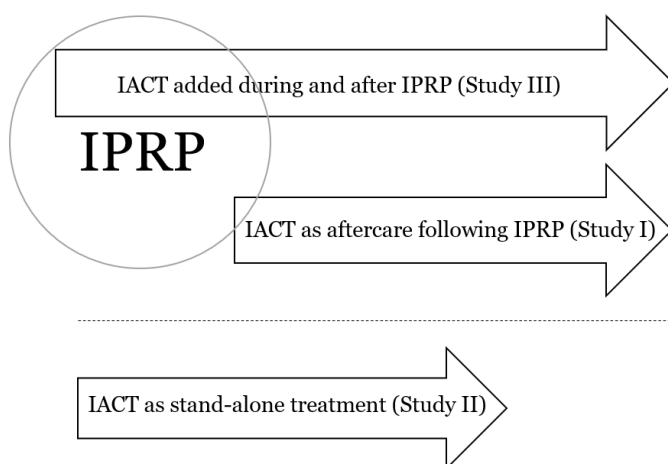


Figure 2. The three interventions studied in the thesis are presented in timely relation to IPRP: IACT added during and after IPRP (Study III), IACT as aftercare following IPRP (Study I) and IACT as a stand-alone treatment as an alternative to IPRP (Study II) .

Participants

Study I

In total, text from 29 patients were included in the analysis. These patients had completed an IPRP, had access to a computer and the internet and had completed the most essential chapters of the aftercare program. Participants were mainly females (89.7%, $n=26$) and their mean age was 37 years old (22–53 years old). The mean time of pain duration was 6 years (1–21 years). Thirty-four percent of participants were working to some extent, and 41% were on full time sick leave. The remaining 25 % was in the process of applying for jobs, studying, or had municipal support. Sixty-nine percent of participants had high school education, 17% had college education, and the remaining 14 % had elementary school education.

Study II

Following the participation in an IACT as a stand-alone treatment for chronic pain (Buhrman et al., 2013b), 11 participants were interviewed about their experiences with treatment. Their mean age was 46 years old (27–86 years old) and the majority of them were women (72.7%, $n=8$). Their pain duration varied from 2.5 to 22 years. A wide range of pain diagnoses were represented, and they all had chronic pain in at least two bodily localizations. All participants received compensation from the social insurance agency. Four participants (36.4%) also worked part-time or studied. An equal number had high school education (45.5%, $n=5$) as had a college education (55.5%, $n=6$).

Study III

Over 2 years, this study included 103 patients who had been accepted to participate in an IPRP. They had chronic pain with a duration longer than 6 months and mild to moderate psychiatric symptoms. Most participants were women (85.4%, $n = 88$). The mean age at enrollment was 36.13 years (SD 9.68) and the mean pain duration was 7.1 years (SD 7.0). Their mean rating of pain intensity last week was 7.05 (SD 1.64), measured using a visual analog scale (VAS) ranging from 0 “no pain” to 10 “worst pain imaginable”. A total of 36.9% ($n = 38$) received sickness benefits. Educational attainment was elementary school for 8.7% ($n = 9$) of the participants, high school for 58.3% ($n = 60$) and college for 23.3% ($n = 24$). Participants had different common chronic pain conditions such as widespread pain including fibromyalgia, low back pain, and neck-shoulder pain. Medication use was prevalent. At enrollment, 86.2% ($n = 75$) of the participants reported prescribed pain medication, 23.0 % ($n = 20$) reported prescribed mental health medication and 57.5% ($n = 50$) reported prescribed medication for other somatic conditions.

Treatment components

Study I

The provided aftercare program resembled a self-help book based on the structure of ICBT, although also focused on values-based behavioural activation (McCracken and Yang, 2006, Hooker et al., 2020) from ACT (Hayes, 2004) with components from motivational interviewing (Miller and Rollnick, 2012). The ACP consisted of eight modules, delivered once a week, except for module 5, which comprised an assignment to be done repeatedly by participants during several weeks (The bull’s eye values survey, BEVS) (Lundgren et al., 2012). The modules consisted mainly of text and worksheets based on selected parts of the psychology group sessions in the IPRP, which they had previously attended. Additional worksheets with repetition from physiotherapy sessions and occupational therapy sessions were available.

Participants were given extensive online weekly feedback from a pain psychologist (i.e., an e-therapist) during the first four modules. During the latter four modules, participants continued working more independently, although e-therapist support was available upon request. The online communication from the pain psychologist consisted of on average 618 words per participant (ranging from 53 to 1185). The function of the feedback was all through the ACP to enhance self-efficacy, for example, by acknowledging and highlighting helpful behaviours, skills, and actions that led to goal fulfilment (Andersson, 2015). The participants knew their respective e-therapist from the IPRP. In addition, a consulting team with physiotherapist, occupational therapist, and pain-specialist physician were available for consultation.

Study II

All participants had participated in IACT as stand-alone treatment for chronic pain, evaluated and described in (Buhrman et al., 2013b), nine months before the interviews. The treatment program was based on ACT principles (Hayes et al., 2006) and consisted of seven chapters of different themes, for example, Alternative to control, Willingness, Thoughts and Emotions, and Life values. Each chapter consisted of a written part and audio tracks with metaphors and present moment exercises. All chapters also included several exercises for the participants to do by themselves.

Participants had weekly therapist contact via the internet and telephone contact at two occasions to ease treatment engagement. The online feedback was given by clinical psychology graduate students trained in CBT and ACT. The two phone calls were structured, approximately 30 minutes long, and occurred as module three was completed and seven weeks from start.

Study III and IV

All participants took part in a 6-week long group-based IPRP including approximately 108 h of 60–120 min long treatment sessions on site focused on return-to-work (Gerdle et al., 2016). The IPRP stretched over four days a week, approximately 5.5 h, from 8.30 to 14.00. One day a week was reserved for home-based activities. Psychologists, physicians, physiotherapists and occupational therapists gave synchronized interdisciplinary treatments with a CBT/ACT approach and collaborated extensively during assessment, individual treatment planning, and continuous process evaluation. IPRP (previously called MMRP) constituted the control condition in Study III.

Participants allocated to the intervention condition, MMRP-IACT, participated in the same face-to-face IPRP as in the control condition. In addition, they received individual IACT adjusted to fit with IPRP. The IACT addition supplied participants with weekly educational material and additional exercises in line with current face-to-face sessions, although enriched with multimedia. Educational texts

were approximately half an A4 page. The texts focused on a theme and presented therapeutic exercises, mindfulness exercises, and guiding questions to help participants apply the theme. There were also interactive work sheets for homework administration, a physical exercise diary, and extra clarifying educational texts and exercises. The chapters were brief, comprehensive, and easy to read or listen to. They required about 15 min to complete.

The e-therapists were psychologists trained in ACT, with clinical experience from IPRP. They gave weekly feedback on exercises and homework and were available online for questions. The feedback focused on continuous practice, problem-solving, and goal fulfilment. Although new material was posted once a week, participants were encouraged to log on repeatedly throughout the week to report homework assignments, read e-therapist feedback, and practice mindfulness repeatedly.

Data and data analysis

Study I

In all, 138 chapters of written text (all together 50,999 words) were included in the qualitative analysis. The participants wrote on average 1759 words (ranging from 191 to 6842). The texts were diary-like notes, plans, and evaluations from work-sheets, providing a detailed picture of participants feelings, thought, fears, and strains at the time. An in-depth exploration was chosen, following latent content analysis (Graneheim and Lundman, 2004) to show the underlying meanings relating to change and motivation.

The analysis resulted in a rich material of group categories, reflecting the participants' views. When adding a latent perspective to the group categories, six central themes emerged from a time perspective. Similarities, differences, and nuances then came to light. Four of the categories showed, to a large extent, similarities between participants views (The body, Pain, Future, Myself). Two categories revealed differences between participants' descriptions of their changes made (Motivation, Strategies).

Study II

The in-depth semi-structured telephone interviews gave 11 transcripts of data and interviewers' notes. The mean length of interviews was 43.7 minutes (33–57 minutes). Considering the novel state of research, a grounded theory-based method for analysis was chosen (Charmaz, 2016) combined with a constructivist approach to find complexity, variations and changeableness.

In addition to exploring how chronic pain patients experienced participation in IACT, another purpose from a larger perspective was to generate ideas on how to

ease treatment engagement and usability in future IACT. Therefore, the person-based approach was applied to guide the interpretation of data. The person-based approach has evolved as a qualitative approach that aids the development of internet-delivered interventions (Yardley et al., 2010). Although it may be applied at different stages of development, it serves well for identifying user reactions, needs, and challenges when evaluating acceptability and feasibility (Yardley et al., 2015). The specific awareness of the user perspective in the person-based approach may limit the generalizability of the findings. However, in early stages of implementation research, a detailed focus on user experiences may be beneficial, and a focus on the larger population may be more suitable in later stages of implementation, such as when studying sustainability and cost (Proctor et al., 2011).

Study III

Data from self-report forms was collected at four occasions – before and after IPRP, after the aftercare intervention, and 1 year after end of IPRP. The forms consisted of psychological outcome measures used in pain rehabilitation covering pain acceptance (CPAQ) (McCracken et al., 2004), psychological inflexibility (PIPS) (Wicksell et al., 2010), self-efficacy (PSEQ) (Asghari and Nicholas, 2001), and psychosocial, cognitive, and behavioural components relevant for chronic pain (MPI) (Kerns et al., 1985). The IBM SPSS version 26.0 (IBM Corporation, Route 100 Somers, New York, NY, USA) was used for descriptive statistics: Mann–Whitney U-test, Student’s t-test, and Pearson’s Chi-squared test. All statistical tests were considered significant at $p < 0.05$. Effect sizes for paired observations were calculated using a web-calculator (Lenhard and Lenhard, 2016). Effect sizes were considered small if between 0.20 and 0.49, medium if between 0.50 and 0.79, and large if >0.80 . All eligible data were included in the analyses.

Variances were large due to outliers and data were not found to be normally distributed. Therefore, we reached the conclusion to perform non-parametric tests using Mann–Whitney U-test for pair-wise comparisons. Independent samples t-test complete cases analysis was used as complementary control. As regression slopes were heterogenous, one assumption for ANCOVA was violated. Also, due to large number of missing in a relatively small sample, mixed models were found less optimal as the data were not considered robust enough (Jakobsen et al., 2017). In addition, Little’s MCAR test indicated that the missing data were not random. Finally, as missing data were too extensive to ignore, an intention to treat analysis was not motivated and we decided not to impute for missing data (Jakobsen et al., 2017).

In this trial, IPRP was used as the control condition as an active comparator. Since IPRP constitutes a specific component comparator, we estimated treatment effect sizes of $d = 0.30$ (Gold et al., 2017). The sample size calculation indicated that 90 participants in each treatment group were needed to obtain 80% power and a 5% significance level. We estimated a 50% dropout rate based on previous findings (Cuijpers et al., 2008, Ringqvist et al., 2019), and concluded that it would be sufficient with a sample size of 135 participants in each group. The plan was to

include 300 participants. However, due to problems with recruiting and missing data, fewer than 300 complete cases were included.

Study IV

The data in this qualitative implementation study consists of reports, applications, communication with stakeholders, in-house evaluations, planning documents, and notes taken at team and unit meetings. The Quality Implementation Framework (QIF) (Meyers et al., 2012) was used to extract relevant information, which was coded based on the steps in the QIF. Codes were grouped into two categories: facilitators and challengers for the implementation process. These categories were elaborated on for each of the four phases in the QIF. Conclusions were then summarised in a logic model.

The QIF is a synthesis of 25 implementation frameworks from several research areas, focusing on 14 crucial steps for implementation (Meyers et al., 2012). The steps are structured in four phases describing important implementation actions while planning, capacity building, executing, and evaluation. Compared to other theories, models and frameworks (TMFs), (Birken et al., 2018), the QIF was found usable because of its focus on actions and its applicability for implementation of a novel intervention in a fixed context. A second advantage of the QIF is that it addresses several relevant analytical levels such as patients, providers, care team, and organization. Third, its four sequential phases and the context components highlighted in the 14 steps enable a review of the implementation process from planning to evaluation. Lastly, a benefit of the QIF is that its 14 steps can be used as a guide in future implementation projects, which makes findings transferable to a clinical context.

Table 1. Summary of data, methods of data analysis, and brief description of main findings

Data		n	Methods of analysis	Results	
Study I	Participants' written text	138 chapters with 50 999 words in total. Mean: 1759 words /participant (range 191-6842 words).	29	Latent content analysis	6 themes described from a time perspective: The body; Pain-related symptoms, The future, Myself, Motivation, Therapeutic intervention.
Study II	Interview transcripts	Mean interview time: 43.7 min (range 33 to 57 min).	11	Grounded theory based with a person-based approach	2 main categories and 8 sub-categories: In treatment: Physical and cognitive restraints, Time and deadlines, Self-exploration, Therapist contact. After treatment: Attitudes to pain, Image of pain, Acting with pain, Control or command.
Study III	Self-report measures	Pain acceptance (CPAQ), Psychological inflexibility (PIPS), Affective distress (MPI), Pain- self-efficacy (PSEQ).	122	Mann-Whitney U-test, Student's t-test, Pearson's Chi-squared test	Medium effect on CPAQ total scale and pain willingness subscale at post treatment and at post aftercare. Large effect on PIPS total scale, avoidance subscale and fusion subscale at post aftercare. Medium effect on MPI affective distress subscale at post aftercare. Large effect on PSEQ at post aftercare and a medium effect on PSEQ at 1 year follow up.
Study IV	Project documents	Funding applications, stake-holder reports, published manuscript, meeting notes.	n/a	Quality Improvement Framework	2 categories of actions affecting the process: Facilitators and barriers for implementation.

RESULTS

Study I

Study I resulted in six themes. Taken together, results showed that an internet-delivered aftercare intervention may help chronic pain patients focus on themes essential for self-management, which also occur in IPRP – i.e., their pain, their bodies, themselves and their future. The results also showed that the participants expressed motivation in different ways and that they applied strategies they had previously learned during the IPRP, before the ACP.

The body

A shift in perception of or attitude towards the body occurred during the aftercare program (ACP). For example, when participants wrote about their body in the beginning of the ACP, they described it as a limitation that hindered them from managing important things in their lives. However, throughout the program, the participants appeared to be more attentive to their body. By the end of the ACP, positive words were expressed regarding their body along with an awareness of its needs and abilities.

Pain

A similar shift was described concerning participants' view on their pain. At the beginning of the ACP, pain was described as a hindrance similar to the way participants wrote about their body overall. During the ACP, participants started writing about their pain from a wider perspective, not as the only problem but rather as one problem among others that needed their attention.

The most significant change in perspective regarding pain was evident by end of the ACP. The participants described new experiences of having pain while staying focused on their plan and not being held back by pain. One conclusion based on these findings is that patients in the ACP were helped to gain new perspectives as their behaviour change plan created opportunities for them to shift focus from pain as a hindrance to pain as a possibility to learn about their body's needs. Also, having gained new experiences from acting with pain appeared to be important for those participants who by end of treatment described a more confident and curious attitude towards their pain and body.

The future

Uncertainty towards the future goes hand-in-hand with chronic pain. This was also evident in the participants' texts as they expressed frustration and asked themselves which work tasks and physical activities that could suit

them. Thoughts about the future were present as participants worked on their aftercare plan. However, by end of the ACP, participants wrote about the future with more confidence and determination. Some appeared to have raised their expectations about life. One participant wrote that she did not want to wait any more for her life to start. This positive attitude towards the future suggests that guided self-help via the internet may influence self-efficacy and sense of autonomy.

My self

The way participants wrote about themselves also changed during the ACP. In the beginning, they expressed confusion and doubts concerning their abilities. During the ACP, they started to act differently towards people who mattered to them and took their own needs and wishes seriously. By the end of the ACP, they expressed reconciliation with previous pain-related experiences and their ways of coping.

Motivation

In addition to shifts in perspectives and attitudes regarding their pain, body, future, and self, two other themes emerged from the data. Stating and motivating goals were a prominent part in the beginning of the ACP. Patients who motivated their goals by describing long-term visions and wishes appeared to be helped by their motives when obstacles occurred. They differed as they expressed persistence in times of setbacks and maintained an optimistic view of their change process. Hence, it was concluded that strong feelings, symptoms, a perceived lack or longing may encourage pain patients to seek treatment. However, being able to vocalize a desire for change, may contribute to keeping focus during setbacks or when struggling to achieve goals.

Strategies

Study I also revealed how participants' uses different therapeutic techniques. Defusion techniques were used while expressing life values. Present moment strategies were applied while confronting pain and uncertainty with willingness. Also, experiences of a helpful effect of willingness strategies were for some a comfort when staying consistent to their plan in their day-to-day work with self-management.

Taken together, the results suggest that an internet-delivered aftercare program following IPRP is helpful for chronic pain patients. Specifically, self-motivating goals and the practice of acceptance strategies might be important for autonomy in continuous self-management. The results indicate that declaring motives for goals by linking these to life values may be important to initiate self-management of pain.

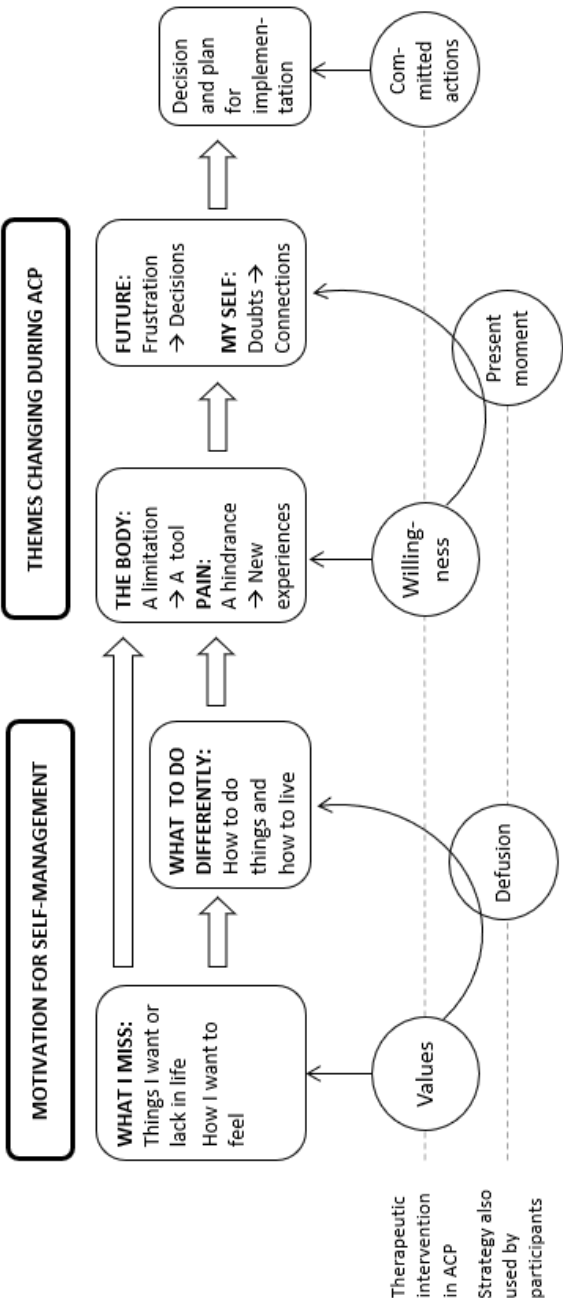


Figure 3. A model of self-management from Study I.

Study II

Study II showed that chronic pain patients' experiences of IACT may vary, both relating being *In treatment* and its consequences, *After treatment*, which emerged as two core categories.

In treatment

The patients' experiences of being in treatment were affected by four features, presented as subcategories: *Physical and cognitive restraints*, their perception of *Time and deadlines*, *Therapist contact*, and their views on *Self-confrontation*.

Time and deadlines

Results showed that deadlines motivated participants to complete treatment assignments. However, deadlines were by some perceived as stressful. Deadlines also provided structure and gave participants a sense of autonomy.

Therapist contact

Participants' experiences of the communication with the e-therapist were diverse. For most, the e-therapist was described as very helpful in clarifying pain-related thoughts and feelings, evaluating previous coping skills, and stating life values. However, some paid little notice to the feedback from the e-therapist.

Self-confrontation

Patients had different expectations of treatment, which reflected how much of treatment content that they applied and how interested they were in change. Some patients were looking for strategies to ease pain, and others were curious about a new way of living with pain.

Physical and cognitive restraints

Patients' restraints, such as pain symptoms and cognitive or executive needs, could also help explain how treatment was deployed and experienced.

After treatment

Patients' experiences of the treatment's consequences are presented in the subcategories *Attitudes to pain*, *Images of pain*, strategies to *Control or command pain*, and different ways of *Acting with pain*.

Attitudes to pain

While in treatment, participants were confronted with their attitudes to pain. After treatment, some participants had not shifted their attitudes. These participants described a more passive approach to treatment, searching for specific coping strategies to ease pain. On the opposite, others described a changed attitude or even a new view on life. Practicing treatment assignments were mentioned as inspiration for change. Also, acknowledging that pain would not be cured helped patients refocus.

Image of pain

As with attitude to pain, image of pain changed for some but not for all. The participants who described a modified image of pain experienced life to become easier as a consequence. They also described a sense of freedom, reduced self-blame, and had a greater ability to act on their wishes rather than their pain. Engaging in visualization exercises made this possible.

Control or command

All participants described skills learned in treatment. Mindfulness was repeatedly mentioned as one such skill. However, differences appeared concerning how skills were applied and to what end. Some acquired skills to manage pain to not cause fear or panic in an attempt to stay calm and maintain a sense of control. Some applied skills to stop pain from taking over life, for example, practicing mindfulness to shift focus when experiencing pain. Mindfulness was also used to open up to pain to test new ways of doing activities with pain. Some applied skills to be in command of life rather than controlling pain. Participants who had been using control strategies for many years found it hard to open up to experiencing pain in new ways and rather practiced specific coping techniques such as breathing exercises.

Acting with pain

All participants searched for ways to be active; however, as a consequence of treatment, some stopped being active as a way to distract from pain. Some started to prioritize activities based on their values. Others started to be active instead of waiting for pain to go away. These changed behaviours led to confronting others' reactions and experiencing setbacks. However, some participants experienced pain to be too tough and did not change their way of acting although they knew they needed to. For the ones who found ways to act differently, such skills as flexibility and being present in the moment were helpful. For example, instead of excluding activities, participants problem-solved how to practice them by adjusting their pace or when to practice the activity.

To sum up, patients' overall experiences of treatment fit on a spectrum spanning from a life evolving experience to learning one new coping strategy. The substantial variations in experiences applied both to being in treatment and consequences after treatment. For example, some participants shifted into a more willing and present approach to life, while others were curious but chose to continue as before. Based on these results, one conclusion is that both patients' characteristics and the specifics of the treatment affected how treatment was experienced. For example, patients' interest in self-discovery may explain engagement in specific assignments. Also, experiences of therapist communication and deadlines for homework may have an impact on autonomy and change.

Considering patients' opinions differed, further elaboration of format and extent of therapist communication in IACT may be needed. To sum up, the study motivates further research on patients' expectations before treatment. Matching treatment format or content with a patient's expectations, for example means for therapist contact, may help patients engage in and benefit from IACT.

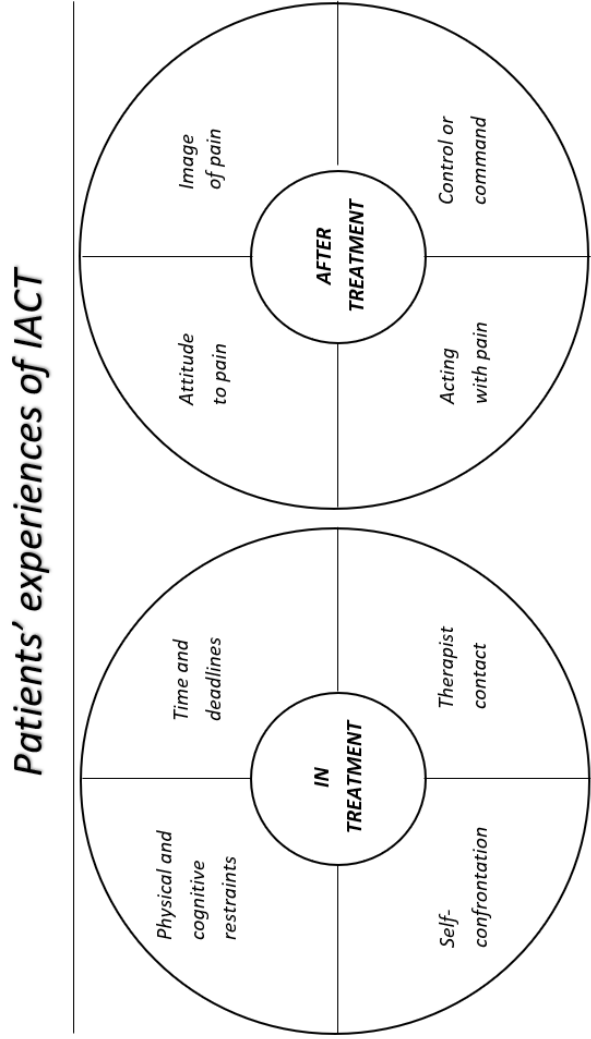


Figure 4. Results from Study II presented in core categories and sub-categories.

Study III

Study III showed that internet-delivered Acceptance and commitment therapy added to IPRP may enhance the treatment effects on pain acceptance and affective distress directly after IPRP. Also, IACT added as aftercare following IPRP may strengthen the long-term effects of IPRP on pain acceptance, psychological flexibility, and self-efficacy. Furthermore, there was a treatment effect on self-efficacy at the one-year follow-up.

Impact

The medium effect on pain acceptance and pain willingness after treatment and after the aftercare part may be seen as a validation of treatment as an ACT addition should lead to better outcome on pain acceptance and pain willingness. The effect on psychological flexibility, however, is more promising as this implies a change in attitude towards pain. The effect on pain-specific self-efficacy was large after the aftercare intervention and moderate at the one-year follow-up. This result is promising and may indicate that an internet-delivered psychological treatment added to IPRP may help increase autonomy and patients' perceptions of their skills and possibilities to cope with pain.

Data loss

However, data loss was substantial. Drop-out rate did not differ statistically between the intervention group and the control group at any measurement point. Looking at baseline measures, completers differed from non-completers in the intervention group on psychological flexibility. There were no differences regarding gender, age, pain severity, educational attainment, reported medication use, occupational degree, or sick-leave compensation.

Extensive data loss, large variances, and non-normally distributed standard errors complicate interpretation of the results. Missing data was found not to be random. As data loss was extensive, imputing for missing data was not deemed suitable. Also, mixed models was not seen as relevant due to the small sample and unrobust data. ANCOVA could have been a suitable means of analysis. However, regression slopes were found heterogeneous.

Implications

As completion rate was un-satisfactory, we conclude that further research on adverse events and negative effects of treatment may be essential to improve adherence. We also suggest that IACT may contribute more before or after IPRP compared to during, due to the comprehensiveness of these two extensive treatments. Patients' expectations and previous experiences of pain management may indicate when blending face-to-face rehabilitation, such as IPRP, with internet-delivered interventions may be suitable.

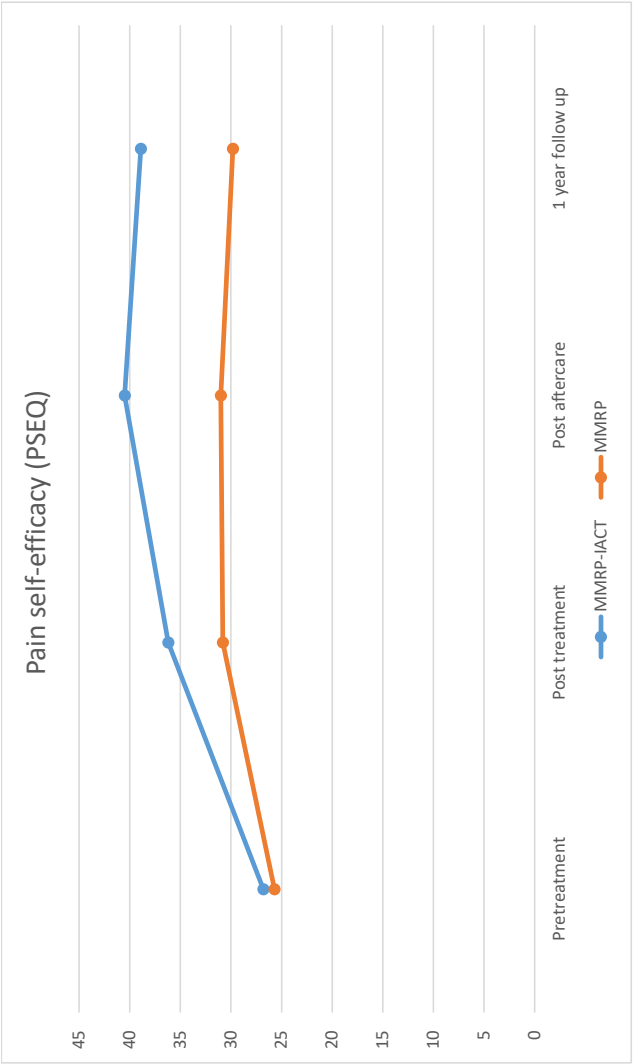


Figure 5. Participants' ratings of pain-specific self-efficacy (PSEQ) (mean) for each treatment arm in Study III.

Study IV

Study IV resulted into two categories – Facilitators and Challenges – that detailed which implementation actions that either eased or hindered the implementation process. The specific facilitators and challenges are presented for each of the four phases covered in the Quality Implementation Framework (QIF).

Phase 1: Initial consideration regarding the host setting

The process was facilitated by buy-in from leadership, accessibility of staff, and infrastructure for staff feedback. The problem that the initiative sought to solve was defined. In addition, the intervention was adapted, to fit the organisation's vision, and the patients' benefits were outlined. However, the benefits for staff and organisation were not outlined. This challenged the process, likely related to lack of alignment with organisation's needs, too few included staff champions and staff incentives not being outlined. Taken together, the organisation was in one of the earliest stages of readiness, not yet aware of the need to monitor the implementation, for example, by a controller, the need to document adaptations, pro-see barriers, outline competence, and optimize infrastructure for interdisciplinary communication. Specifically, insufficient time for testing and host feedback challenged the implementation process and led to consequences in later phases.

Phase 2: Creating a structure for implementation

In this phase, the process was facilitated by a detailed time plan including frequent team meetings and outlined tasks for dedicated team members according to roles and accountability. However, competing responsibilities in the clinical service and subsequent irregular meetings hampered the process. Also, lack of experience of hybrid effectiveness-implementation trials may have caused foreseen challenges not to be proactively addressed.

Phase 3: Ongoing structure once implementation begins

Supervision and technical assistance facilitated the process and so did additional resources. A routine for communication and patient recruitment also facilitated the process. However, the process was challenged by the absence of a plan for ongoing evaluation of the implementation process, for example, documentation of adaption, fidelity, and feedback. Also, occupational-specific language barriers caused by cultural differences challenged problem-solving activities.

Phase 4: Improving future applications

Future implementation processes will likely be facilitated by oral and written reports based on experiences and lessons learned. Additional collaborative relationships might also facilitate future initiatives as will additional attention to staff needs and incentives. One challenger for future implementation initiatives is the lack of user data from the tested application.

Taken together, the results from Study IV showed that implementation of IACT in an IPRP settings is facilitated by activities relating to host-related factors, such as alignment with current infrastructure. Furthermore, intervention modifications based on patients' preferences and requisites may be one way to ease treatment engagement. Third, the study also highlights the importance of thorough testing of the application and a need to match the intervention's aim with the organisation's needs. Finally, staff attitudes and the contribution of champions who speak for the intervention are likely to play an important role in easing implementation.

Framework for implementation

A theory, model, or framework may contribute positively to the implementation of IACT in IPRP as this is a context where multiple systems are intertwined, for example, sickness benefits system, employment services, and pharmaceutical follow-ups. Logic models may facilitate learning from previous implementation processes as the model summarizes influential factors and helps with focusing on key process challenges. However, to advance the use of IACT in IPRP and aid sustainable implementation, we suggest that research on adverse events from treatment may help enhance understanding of why patients decline participation in IPRP or IACT, reasons for relapsing and not completing the full treatment course.

Impact

Considering the comprehensiveness of both IACT and IPRP, a sequential approach may be more beneficial for chronic pain patients. IACT before IPRP could focus on individual psychological interventions that would potentially ease participation on IPRP. IACT after IPRP could help maintain skills and allow participants to repeat parts of the IPRP. However, IACT can be blended with IPRP in several ways. The results of Study IV highlight the importance of matching the application not only to patients' needs but also to the aim and features of the host setting to maintain implementation.

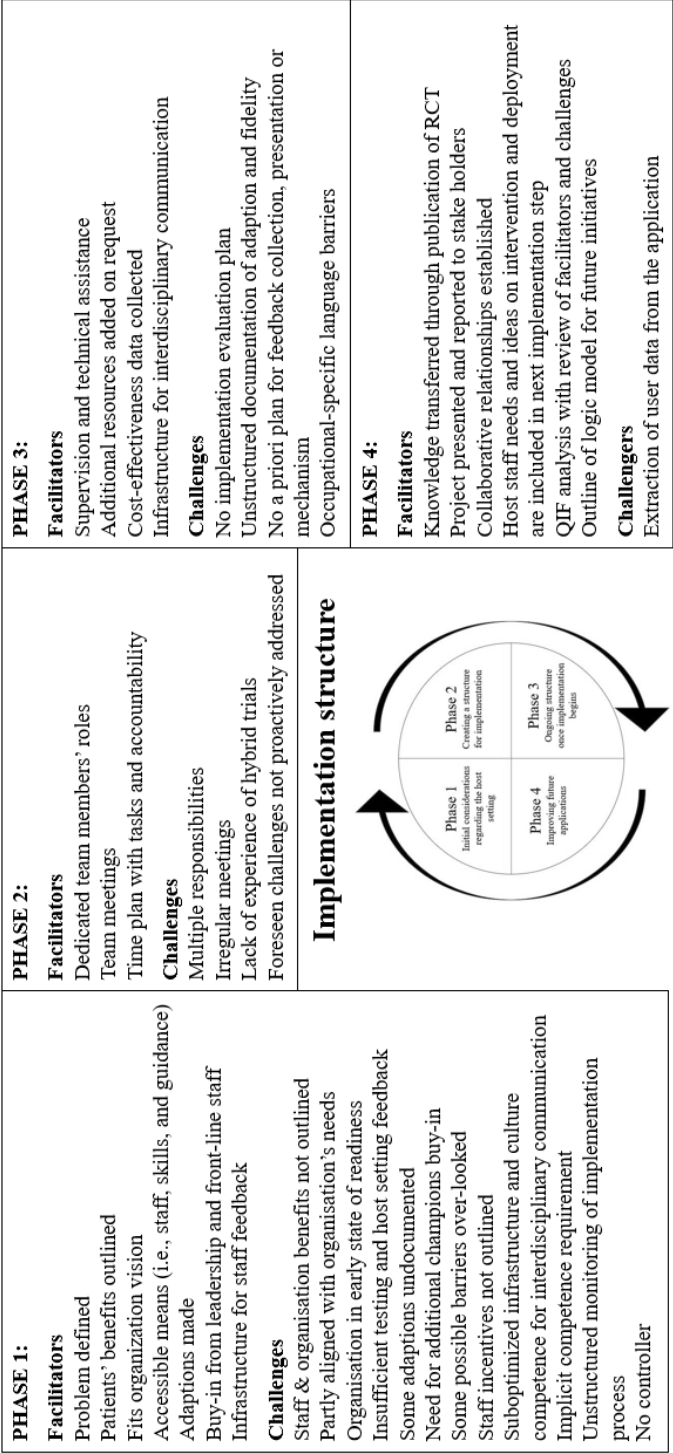


Figure 6. Results from Study IV presented under the two categories Facilitators and Challenges for each of the four phases in the Quality Implementation Framework.

DISCUSSION

The suitability of the three intervention formats studied in this thesis – aftercare (Study I), stand-alone (Study II), and add-on (Study III) – were evaluated using different methodologies. Study I explored feasibility by looking at the participants’ written text and study III tested feasibility using self-report measures. Study II focused on appropriateness and acceptability. However, facets of feasibility also came to light as participants shared their views on their needs and requests from IACT. Lastly, Study IV focused on the appropriateness and uptake of IACT in an IPRP context. Studies I– IV point to specific changes that could better the fit of IACT for chronic pain patients in IPRP and areas in need of further research, which are discussed below.

Feasibility

The feasibility of the aftercare intervention in Study I was studied by exploring how participants described the process of initiating behaviour change and maintaining behaviour change. The goals that participants chose to put in their aftercare plans resembled topics that pain management programs often focus on as they carry potential to raise competence, confidence, and autonomy in self-management. The results indicated that participating in an aftercare program (ACP) might lead to new experiences that change how participants experience their pain and their body. Also, patients’ perspectives about themselves and their future may shift. Furthermore, persistence, maintenance, and continuation of self-management practice may be positively influenced using defusion and willingness interventions and values-based goals. Similar results were found in a previous qualitative study of patients’ experiences with ICBT (Halmetoja et al., 2014).

Besides the results from the qualitative analysis, some other aspects are interesting when evaluating feasibility. Internet-delivered interventions should be fitted to patients’ needs (Heapy et al., 2005), and Study I speaks for a possible fit between IPRP and IACT given as aftercare. Second, chronic pain patients appear to find the ACP usable and practical in everyday life, which has been high-lighted as important for continuous engagement in life-long self-management (Skinner et al., 2012). Third, the internet format may be a suitable format for health care providers to deliver aftercare. Therefore, it may be concluded that an internet-delivered ACP with ACT interventions could be feasible for chronic pain patients as a means to continue their behaviour change process after IPRP.

Study II primarily explored the acceptability and appropriateness of IACT for chronic pain patients. However, the participants’ accounts also touched on

treatment features – deadlines, self-confrontation, and e-therapist feedback – that influenced their engagement in treatment. Treatment engagement is a necessity for feasibility and the results highlights three things that might help patients stay engaged in treatment. First, since participants' experiences and perceived changes varied widely, assessment of a patients' expectations and restraints before treatment may shed light on possible adjustments to enhance treatment engagement and uptake.

A second suggestion was to focus e-therapist feedback on processes important for autonomy in self-management, such as values work and exploration of pain-related thoughts and feelings. These processes have been outlined as pivotal for fostering ability to self-manage pain (Devan et al., 2018). Third, deadlines for treatments assignments were described as both helpful and stressful, as well as important for patients to complete tasks. The feedback given by the e-therapists on completed assignments was much appreciated. The same was found in another qualitative study of internet-delivered acceptance interventions for chronic pain (Duggan et al., 2015), suggesting e-therapist feedback to be especially important for patient to complete ACT-assignments.

The results in Study III suggest that IACT added during IPRP may enhance the treatment effects on pain-related psychological outcomes as medium effects on pain acceptance and affective distress after treatment were seen. The results also suggest that IACT as an aftercare intervention may strengthen the long-term effect of IPRP as there were significant effects with medium to large effects on pain acceptance, psychological flexibility, and pain-related self-efficacy after aftercare and a significant medium effect on self-efficacy at the one-year follow-up. Overall, the findings speak to the feasibility of IACT when added to IPRP. However, the use of the treatment needs further attention as there was a high level of drop-out and hence data loss. Also, fidelity was not measured, which complicates evaluation of treatment delivery. We suggest that further research pay attention to and build on the growing knowledge of reasons for dropout (Johansson et al., 2015) and adverse events during treatment (Rozenal et al., 2018).

Study IV showed that the feasibility of IACT in an IPRP context may depend on its ability to continuously adapt to the ongoing changes in IPRP while still maintaining its integrity with the pivotal components in internet-delivered psychological treatments, such as deadlines, structure, high-quality content, and therapist feedback. The results also indicate that IACT needs to be aligned with IPRP infrastructure of communication and decision-making to be feasible from a provider's perspective. However, considering the extensiveness of IPRP, IACT may be more feasible as an added psychological individual treatment if given before or after IPRP, which has also been suggested concerning implementation of ICBT in some clinical services (Newby et al., 2021). This would also pave the way for treating comorbidities along-side pain management (Gasslander et al., 2022a). The results in Study IV also point to the need of paying further attention to the assessments in

the earliest phase of implementation to optimize the fit between patient needs, the intervention, and the clinical context.

Autonomy in pain self-management

The importance of fostering self-efficacy to help patients act with autonomy and perseverance is well known and repeatedly outlined as crucial for the ability to self-manage pain (Devan et al., 2018). The structure and format of internet-delivered psychological interventions may in itself enhance confidence in self-management because of its focus on setting goals, planning treatment assignments, summarizing, evaluating and reflecting over treatment progress, and learning from setbacks. Also, the written communication with the e-therapist and the written treatment material enable patients to repeat part of treatment later in life.

In this thesis, Study III showed an effect on self-efficacy after aftercare and at the one-year follow up. In Study II, several participants appreciated that they themselves did the work and they believed that this attributed to their success. The results in Study I showed that putting wishes, visions, dreams, and longings in words using the ACT intervention life values (McCracken and Yang, 2006) may be helpful as it motivates patients to stay persistent, determined, and focused even when strong feelings, symptoms, or setbacks occur. Study I also showed that experiencing a helpful effect of acceptance strategies motivated participants and facilitated autonomy. The same has been found in a systematic review of 33 qualitative studies of pain self-management, outlining facilitating factors in pain self-management (Devan et al., 2018). Feeling empowered by using therapeutic techniques spoke to a greater ability to self-manage pain, whereas being overwhelmed by symptom distress could decrease motivation (Devan et al., 2018). This supports the idea that IACT may influence self-efficacy positively.

Lastly, the structured format in internet-delivered interventions with weekly assignments and deadlines has been perceived as helpful for different reasons. For some patients in Study II, deadlines compensated for difficulties with planning treatment assignments. Participants in Study II also voiced that even if deadlines were stressful, they were still helpful in accomplishing tasks. For example, deadlines provided a structure that helped them work independently. Although many questions still remain on how chronic pain patients may benefit from IACT, it appears as if this treatment format offers new possibilities for chronic pain patients. Considering that chronic pain may be a life-long condition with both somatic and psychological symptoms, IACT may fill a role in fostering autonomy in pain self-management and self-efficacy.

Acceptability

The role of e-therapist feedback

Qualitative studies of patients' perspectives of internet-delivered psychological interventions have highlighted a range of factors that may affect how treatment is experienced. Some examples are e-therapist feedback, deadlines, multimedia, comprehensiveness, and tailoring (van de Graaf et al., 2021, Terpstra et al., 2022, Andersson, 2018, Andersson et al., 2019, Titov et al., 2019). Indeed, patients' experiences of challenges, their needs and expectations, and their reactions to IACT are crucial to guide the development of IACT. In the earliest stages of implementation, observational and interview data are important to widen our knowledge about treatment satisfaction, usability, relevance, and perceived fit (Proctor et al., 2011).

Study II uses data from in-depth interviews focusing on the participants experiences of participating in IACT, touching on both acceptability and appropriateness. The results showed variations in how IACT was carried out, its consequences, and its importance. The varying experiences of e-therapist contact shed light on the important yet complex role of e-therapist communication. Some described that not having to share personal information face to face with a therapist was helpful in the treatment process. In study II, some participants described themselves as the primary therapist and were proud of themselves for learning to cope with pain. These participants did not wish for further therapist support, and some also mentioned that they could have done without therapist feedback. This is in line with findings from another study investigating preferences for e-therapist contact, where one of five patients with depression or anxiety chose optional therapist support rather than the usual weekly support (Hadjistavropoulos et al., 2019).

However, most participants expressed appreciation for the feedback provided by the e-therapist. One hypothesis building on the findings in this thesis is that e-therapist feedback plays a specific role in IACT for chronic pain. Participants in Study II described that e-therapist feedback helped them confront distressing feelings and thoughts. This resembles what was found in a review of facilitating factors for self-managing pain, where the ability to explore pain-related thought and feelings was described as a significant enabler for self-management (Devan et al., 2018). Also, a study on online ACT with minimal e-therapist contact, concluded that therapist feedback might be necessary to help patients grasp and practice ACT interventions (Duggan et al., 2015).

To date, guided internet-delivered interventions have shown results better than unguided interventions. However, besides which setup is the most effective, it has also been highlighted that the intervention needs to be acceptable for patients to optimize completion (Titov et al., 2019). One study showed that optional therapist support was just as effective as standard weekly e-therapist feedback in terms of symptom reduction, although dropout rates were higher in the group with optional

support (Hadjistavropoulos et al., 2017). Being able to choose feedback setup based on preferences may motivate to patients, raise their perception of being part of planning their care, and effect self-efficacy positively.

Also, a curious and willing approach to distressing feeling and thoughts linked to pain appears to be an important theme in learning to self-manage chronic pain. This harmonizes well with the purpose and transdiagnostic approach in ACT. Based on the findings in this thesis and previous research, e-therapist feedback might be especially important to meet the expectations and needs of chronic pain patients. When discussing how to tailor treatment in terms of content, comprehensiveness, and format, the frequency and format of therapist feedback may be relevant.

Patients' needs and expectations

Adjustments may be needed as IACT is added to pain management services. Accounts of patients' experiences may reveal what is needed for them to prosper from treatment (Terpstra et al., 2022). One area where more knowledge is needed is prevalence and impact of unexpected negative events in psychological treatment for chronic pain (Andersson et al., 2019). Study II suggests that patients' expectations and restraints may point to risks of declined adherence to treatment and that e-therapists should be on the lookout for potential problems so they can adjust the setup to reduce risk of attrition. Another study also suggested that monitoring patients' communication with their e-therapist may be a way to discover negative events, such as thoughts about dropping out, to prevent attrition when it helps the patient to stay engaged in treatment (Gullickson et al., 2019).

A second factor potentially influencing adherence to treatment may be congruence between treatment features and patients' expectations, which was suggested based on the findings in Study I and has also been found in wider research (Johansson, 2015). For example, components of treatment that patients expect to be pivotal might be important to include to enhance motivation. Also, the individual participant's expectations on e-therapist contact may need to be accounted for in treatment planning. This is in line with one lesson learned from clinics who successfully offer ICBT in regular mental health care; a too hasty inclusion without proper assessment and communication about the specifics of the treatment has been highlighted as a potential barrier for treatment engagement and associated with poorer outcomes (Titov et al., 2018).

Although several factors relating to patients' perspectives, needs, and expectations would benefit from additional elaboration, reasons for declined adherence to treatment is especially in need of further attention. Much is unknown about reasons for dropping out from IACT. Also, adverse or negative experiences of chronic pain patients in face-to-face rehabilitation, such as IPRP, is a novel field of research (Andersson, 2018, Andersson et al., 2019, Ebert et al., 2018, Rozental et al., 2018). However, looking at attrition from a larger perspective, one needs to bear in mind that dropping out of treatment for some patients might be the wisest decision.

Living with chronic pain comes with psychological and possibly social burdens. Chronic pain might be one of several comorbidities and patients are likely to have several responsibilities in life and potentially also other persons to care for. Chronic pain patients display diverse life situations, a heterogeneous panorama of demographics and symptoms, and varying experiences and expectations regarding treatment. On the one hand, patients might need help to adhere to treatment. On the other hand, treatments should match the needs of patients.

Tailored internet-delivered Acceptance and commitment therapy

Considering the variations in experiences among the patients in Study II, and the vast variation of symptoms associated with chronic pain (Adams and Turk, 2018), the thought of tailoring treatment to patients' preferences may come to mind. However, adjusting IACT may risk diverting focus from the pivotal components of internet-delivered interventions, such as structure, deadlines, and therapist feedback. It has also been suggested that the treatment content in itself might not be necessary to adjust based on characteristics of different groups of patients, at least not culturally adapted (Titov et al., 2019). This thesis suggests that tailored treatment might be beneficial when there is a variation of symptoms, including comorbidities. A tailored treatment format might also facilitate participation.

Elements that may be tailored in IACT are stretched treatment time, blended format, adjusted or simplified content, and frequency or means for communication. Stretched treatment time was applied in a study of adolescents with chronic pain and was found to prevent dropout (Flink et al., 2016). The treatment time in Study I was also prolonged by request of participants due to competing life events. Treatment content was adjusted both in Study II and III as text material was audio recorded to enable participants to listen to as well as read the content. This was appreciated in Study II. However, due to problems with data extraction in study III, the effect could not be evaluated.

Blending email and telephone calls for communicating was positively perceived in Study II. Receiving internet-delivered and face-to-face interventions simultaneously as in Study III was seen as too comprehensive. Additional therapist contact on demand has not been shown to improve outcome (Dear et al., 2015). In fact, guided internet-delivered psychological interventions most often already encourage patients to contact their e-therapist for additional support when needed. Hence, tailored content and format rather than frequency might rather effect adherence.

One possible way to improve adherence in pain management might be to build on patients' expectations of treatment and tailor means of communication or goals based on patients' wishes. Hopefully, perception of competence and self-efficacy and therefore persistence in treatment comes with participating in planning, prioritizing, and choosing treatment components and setup. One way to prevent attrition could be to prospectively plan for how to handle potential challenges during

treatment, including detailing what kind of support the patient might need to stay committed and what would constitute justified reasons for dropping out.

The results from Study II build on previous findings that tailored care might be adjusted both after needs of the patient and the social situation (Andersson et al., 2019). If internet-delivered interventions are tailored to facilitate participation, one might adjust when in time to do the treatment, if the person prefers reading or listening to the material, format of e-therapist feedback (email or telephone calls), or if the person benefits the most from a blend with face-to-face interventions. Blended care especially has been suggested as one way to combine the best of internet-delivered interventions with the best of IPRPs (Titov et al., 2019). The blended format in Study III is one way to mix face-to-face rehabilitation with IACT.

Finally, besides tailoring IACT to the needs of the specific patients, IACT may also be adjusted to fit with and fill gaps in clinical contexts. IACT may be helpful as an alternative for patients with residual symptoms after IPRP to boost the effect of their rehabilitation (Buhrman et al., 2013a). Another option may be to give IACT before IPRP, to prepare and raise motivation before rehabilitation starts. In IACT, patients can do part of their rehabilitation at home, at a time convenient for them and with support from their social network. Hence, it may constitute an alternative for patients who are not attracted to IPRP or do not meet inclusion criteria. One needs to keep in mind that IACT provides therapist-guided psychological treatment, not the breadth of content in an IPRP.

Suitability

The role of time

The efficacy of IACT as a stand-alone treatment has been evaluated in several systematic reviews and meta-analysis, (Eccleston et al., 2014, Heapy et al., 2015, Buhrman et al., 2016, Vugts et al., 2018, Gandy et al., 2022). These reviews showed small to large treatment effects on pain-related outcomes such as pain interference, pain intensity, and disability, and on psychological outcomes such as acceptance, anxiety, depression, catastrophizing, and fear-avoidance. Study II also confirms that patients experience benefits from participating in IACT as stand-alone treatment, for example, changes relating to their attitude to pain, their ability to act with pain, and their perception of being the “commander” in a life with pain.

However, IACT may be given to chronic pain patients in different stages of rehabilitation. Study II also showed that the experiences of chronic pain patients vary, relating to both their perception of the treatment and their personal preferences and expectancies. The variation of symptoms and needs of chronic pain patients is well known. Therefore, it is reasonable to apply IACT with different setups for different needs. The studies in this thesis address added and blended IACT (Study III), stand-alone IACT (Study II) and IACT as a sequential aftercare following IPRP

(Study I). IACT as stand-alone treatment is a way to ease accessibility to treatment, whereas IACT as an addition or blended with IPRP provides opportunities for home-based rehabilitation in between face-to-face sessions.

What remains to be studied is the effect of IACT given before IPRP. Such a setup may help patients get acquainted to and learn key treatment components before rehabilitation (Newby et al., 2021). A pre-treatment intervention may also help patients learn about the aim and focus of the upcoming face-to-face rehabilitation and give them time to set reasonable goals in line with their expectations and needs. Considering the risk for dropout in IPRP and that many chronic pain patients have failed treatment attempts (MacEa et al., 2010), it might be especially important to explore potential barriers and problem-solve how to handle these to avoid drop-out, lack of progress, or negative experiences during IPRP.

It has been suggested that comorbidities may be treated with ICBT as a blended intervention added to face-to-face treatment (Newby et al., 2021). Comorbidities are prevalent among chronic pain patients. However, blended interventions given simultaneously may not always be optimal. IACT and IPRP are both two comprehensive interventions. Study III had a high attrition rate. In Study II, some participants experienced stress relating to assignments. One option might be to give IACT for comorbid conditions before IPRP.

The need for booster interventions following pain rehabilitation has been voiced for a long time. IACT offers potential to meet this need, which was shown in Study I and in previous research (Buhrman et al., 2013a). A prerequisite for such a setup is organisational alignment between primary and specialist level pain care to ensure consistency, synchronization, and patient safety. Another issue to bear in mind is that many IPRPs aim to facilitate return-to-work (Kamper et al., 2015). Therefore, the timing of intervention setup might be crucial so that the booster intervention matches the present focus, demands, and life-situation of the patient. Compared to the substantial evidence for the efficacy of IACT as stand-alone treatment for chronic pain, aftercare interventions and pre-treatment interventions based on ACT are still novel (van de Graaf et al., 2021) and in need of further research before its effectiveness and efficiency can be summarised.

The role of context

Integrating IACT in a clinical setting such as a pain management service will lead to compromises. Study IV hypothesises that alignment might be more challenging in settings where multiple caregivers give multiple treatment modalities to patients in a group format. Another finding was that infrastructure for meetings, communication, and decision-making as well as a cultural competence and a common understanding of core implementation object features are necessary both for effective communication and for detection implementations challenges. Third, monitoring and collecting implementation data may be one way to ensure that infrastructure and communication are sufficient.

Taken together, Study IV recognises that a thorough alignment with the host setting is important. Characteristics for clinics that successfully and routinely offer internet-delivered interventions are that they are well-integrated in organisations, including their funding processes, IT structure, electronic journal registry and communication with those who refer patients (Titov et al., 2018). Another lesson learned from digital mental health services is that a robust governance, both operational and organizational, is a necessity for maintenance of internet-delivered interventions implemented in regular care (Titov et al., 2019). Governance has also been suggested as important to ensure continuous high quality ICBT.

In addition to this formal integration, implementation also builds on an informal integration that is highly sensitive to contextual factors. Study IV suggests that staff champions, people who speak for the implementation object and aid the process, are included in implementation teams to ensure that the point of view of staff is considered. This may be essential to recognise staff attitudes, expectations and needs, information that could lead to amendments to better the intervention fit. However, certain key features of internet-delivered interventions may need to be consolidated to ensure fidelity and treatment integrity.

Treatment fidelity is likely to be less of a concern when IACT is implemented as an alternative to standard face-to-face psychiatric care provided by a single psychologist. The implementation object, namely the IACT treatment protocol, in such a clinical context might be rather easily transferable from the dyadic process between a psychologist and a patient. However, the psychological interventions within IPRP are not stand-alone interventions easily converted to an internet format, as they are synchronized with modalities given by other professionals. Also, they are often provided in group format. Therefore, adapting the implementation object to some extent may be a necessity within an IPRP setting.

For example, therapeutic content not covered in the IPRP may be provided as an addition through internet-delivered interventions. Also, individual support may be provided via the internet, for example, feedback and guidance on IPRP homework assignments in between group-sessions. However, adding only therapist feedback via the internet is a facet of blended treatment that might drift the intervention from one of the key features of guided internet-delivered interventions, namely providing high-quality psychological treatment content via the internet.

Therapist feedback is a pivotal ingredient in IACT. However, when adding IACT to an IPRP context, the role of therapist feedback may shift. For example, if IACT is used to help patients perform treatment assignments in between sessions, patients may be more prone to discuss challenges and success with the on-site therapist face-to-face rather than writing a message online and waiting for a reply from their e-therapist. Another IACT component sensitive to context is delivery format of interventions. Most internet-delivered interventions are text-based as this has been found effective and appreciated by patients. However, in an IPRP, interventions are given verbally and the transformation from on-site interventions to

internet-delivered interventions may lead to designing interventions using multimedia such as audio recordings and video films.

Study II showed that the use of alternative delivery format for interventions was found feasible and appreciated by participants when delivered with e-therapist feedback (Buhrman et al., 2013b). However, it has been perceived as less interesting and less usable without such e-therapist feedback (Duggan et al., 2015). Considering the experiential approach in IACT, audio interventions fit well. However, the effect of the multimedia format on outcome, completion, and satisfaction is not yet evaluated although it has been suggested to possibly enrich the composition of IACT (Kelders et al., 2012, Kloeck et al., 2017). It remains to be tested if and how patients use, prefer, and profit from multimedia interventions other than text-based interventions.

In addition to the influence of context when adapting IACT to fit with IPRP, context also plays a crucial role for sustainable practice. A novel treatment is not fully implemented until infrastructure, staff competence, and recruitment procedures are stable enough to ensure maintenance. The professional staff who refers, assesses, includes, performs, evaluates, and follow-up on the intervention constitute a significant part of context in IPRP. Therefore, a focus on staff needs and expectations and a plan for training, support, and continuous monitoring and supervision may be essential for sustainable implementation of IACT in IPRP settings.

Sustainable implementation

Study IV hypothesised that an organisation's readiness to change may vary between stakeholders and may be difficult to assess. If innovators and early adopters do the assessment, they may not grasp that incentives, fitting, and motivation may vary. Scepticism towards internet-delivered interventions may complicate recruitment and this matter has yet to be fully addressed in research (Folker et al., 2018), although the importance of acknowledging staff attitudes for informal integration has been highlighted (Titov et al., 2018).

Study IV suggests some topics to consider for informal integration, such as clarifying incentives for caregivers and fitting internet-delivered interventions to the needs of the caregivers. One way to fit internet-delivered interventions with caregiver needs might be to clearly define the desired outcome of an added internet-delivered intervention. For example, Study III, showed an effect on psychological flexibility and self-efficacy that might be attractive in a clinical setting aiming to enhance autonomy, self-management, and long-lasting lifestyle changes. This fit would influence choice of treatment content and format. Other clinics might rather seek to complement their pain management service with internet-delivered treatments focusing on anxiety, depression, or insomnia. One suggestion is that expectations and needs from both patients and caregivers need to influence content and format and ensure a fit between clinical context and the internet-delivered intervention.

In wider research, knowledge has been summarised regarding potentials and hurdles for integrating ICBT in mental health care. Many of those learned lessons are transferrable to the context of chronic pain. What may differ is the fact that psychological interventions constitute one of several synchronised parts of IPRP, which complicates transformation to a digital format. However, the need for governance, technical systems, training and supervision of e-therapists, recruitment procedures, funding, and external activities (Titov et al., 2018, Titov et al., 2019, Folker et al., 2018) are likely to facilitate the implementation of IACT in IPRP settings as well.

There are some concerns that are not yet covered in wider implementation research where qualitative methodology might contribute. First, reasons for dropouts, successful ways to detect early signs of attrition, and ways to monitor adherence need further investigations. Second, patients' expectations before start of treatment and their needs and experiences of negative events during treatment are topics relevant for further research both regarding IPRP and IACT. Third, adaptations of internet-delivered interventions with regards to comorbidities and variation of symptoms and needs will be required as IACT is spread and routinely used in pain management services.

Strengths and limitations

The combined perspective of qualitative, quantitative, and implementation research methods in this thesis makes it possible to look at several outcomes such as acceptability, appropriateness, uptake, feasibility, and effectiveness. Study I had a primarily qualitative explorative focus and Study III had a similar explorative focus although comparing the treatment effects between two groups. Study II and IV, on the other hand, aimed to contribute to the ongoing development of IACT for chronic pain from a more direct implementation perspective.

Study II was deployed quite early in the development of IACT for chronic pain. The person-based approach was used to guide intervention development. Therefore, patients' experiences and perspectives are in focus to guide developers during the earliest phases of implementation – i.e., acceptability and appropriateness.

Study IV used the Quality Implementation Framework to describe the actions taken by the implementation team deploying the initiative. A person-based approach aimed to develop the intervention to suit patients, and the QIF was used to develop a strategy to ease the implementation process with regard to staff and host setting. One strength in this thesis is that IACT for chronic pain patients in specialist care, was studied using several methodologies and from the perspectives of patients, caregivers, and host setting.

A second strength in this thesis is that the studies were carried out at two specialist pain care clinics. Although the two clinics provide pain rehabilitation with similar

purpose and interventions, they differ in staff and areas of uptake. The demographic data from patients recruited in Uppsala (Study II) and data from the two studies from Linköping (Study I and Study III) reveal that participants were similar in age, pain duration, gender distribution, occupational status, and to some degree educational level. Only recruiting patients from specialist pain clinics constitutes a selection bias. However, the spread in the demographic data for each sample, ensures representativeness and the generalizability of the findings to chronic pain patients and ecological validity. The conclusions in this thesis and to some degree the logic model presented in Study IV could be applicable and generalized to specialist pain clinics beyond the two represented in this thesis.

One limitation in this thesis is the dropout rate in Study III, which calls for cautious interpretations of the result. The issue of low adherence is known to pain clinics overall (Ringqvist et al., 2019) as well as to internet-delivered interventions, where adherence rates have been found to vary between 39 to 90.3% (van de Graaf et al., 2021). However, how to measure adherence, completion, and attrition as well as what defines a completer are not yet operationalised, which has also been stressed in a scoping review of adherence to self-management programmes (Söderlund and von Heideken Wågert, 2021). We need to define acceptable completion rates, standardize measures of adherence and identify pivotal treatment components for completion.

A second limitation is the lack of quantitative data from Study I, which retrospectively could have guided later trials. A lesson learned from this thesis is the importance of integrating different methodologies and carefully considering the kind of data and means of analysis. For example, a combination of administration data on attrition from the technical system in Study IV in combination with self-report measure of adverse events would potentially have contributed with knowledge on adherence. Second, repeated qualitative interviews prior, during, and after an intervention in combination with self-report forms on function and symptoms, might reveal potentials for tailored treatments. Third, exploration of expectancies and analysis of the communication between patient and caregivers might shine light on the role of e-therapist feedback and its effect on handling attrition and other negative events.

This thesis does not focus on health economic or implementation cost, which further down the line will be important for evaluating efficiency. Neither has gender been in focus, although this together with other patient characteristics will need to be addressed when spread and service access are studied.

Clinical implications

This thesis builds on previous knowledge on efficacy of IACT for chronic pain and speaks for its effectiveness as an addition to IPRP. It has implications for clinicians and organisational leadership. First, the transition from local project to integrated

service deems a continuous interest from the organisational governance to sustainably implement internet-delivered interventions. Lessons learned from wider research and from Study IV suggest that the process of implementation needs to be planned, monitored and evaluated. Funding, infrastructure for communication and decision-making, patient recruitment, and therapist training are leadership-owned issues that cannot be ignored when fully integrating IACT in IPRP.

Second, Study I and Study II point to needs and challenges for chronic pain patients participating in IACT, which need to be considered in planning of content and format, for example, how to focus e-therapist communication. The challenges concerning dropout in Study III also speak for the importance to closely follow the treatment process of participants in IACT. Hence, risks for declining adherence and dropout from treatment is a subject to address in e-therapist communication during IACT. Third, who to recruit and when in the rehabilitation process to fit this intervention are questions for the specific clinic as these issues must be aligned with the aim of the IPRP and the needs of both the patients and caregivers.

To sum up, the need for specialist care for chronic pain patients is extensive and expanding (Breivik et al., 2006). Some patients may need to travel long distances to reach a specialist clinic or might be hindered travelling for even shorter distances due to physical restraints. Others experience cognitive deficits due to pain, as lack of attention, memory difficulties (Mazza et al., 2018), or troubles with cognitive executive functioning (de Guevara et al., 2018). IACT may enable chronic pain patients to access qualified care in their home environment (Buhrman et al., 2016) either as stand-alone treatment (Study II), as part of IPRP (Study III), or as a means to continue pain self-management after a rehabilitation program has ended (Study I). IACT moves rehabilitation closer to the patient's home and social environment, which enables application and generalisation of learned skills (Andersson et al., 2019).

Future directions

Considering the collected knowledge on the efficacy and effectiveness of internet-delivered interventions overall (Andersson et al., 2019) and for chronic pain specifically (Buhrman et al., 2016, Gandy et al., 2022), the next step of research might be to look into implementation outcomes (Andersson et al., 2019) such as acceptability, satisfaction (Eccleston et al., 2014), cost, and efficiency (Heapy et al., 2015). Three suggestions for further research to advance IACT for chronic pain spring from this thesis.

First, studies of adverse events (Rozental et al., 2018) are needed not only for IACT for chronic pain but also for pain management interventions overall. Qualitative studies have outlined potential adverse events of pain rehabilitation, for example, symptom distress and unsupportive social environment (Devan et al., 2018). Other examples are challenges related to skills training and contextual factors affecting

patients' ability to gain from treatment (Peynenburg et al., 2022). However, studying the negative effects of treatment is a novel research field. Terms need to be defined and means to measure them need to be standardised (Paveltchuk et al., 2022). Based on findings in this thesis, one suggestion is to use a combination of several methodologies. Interview data may shed light on patients' expectations before IACT and their experiences during and after IACT. User data drawn from the application providing IACT may provide information on adherence. Quantitative studies may target negative events and their impact on outcome and treatment engagement.

Second, tailored interventions have been suggested as one way to help chronic pain patients to benefit from IACT. Whether it is necessary to target comorbid conditions or treat them simultaneously with a transdiagnostic approach is a research question also for face-to-face ACT (McCracken et al., 2022). Adjustments such as patient-tailored content or format of ICBT have been studied (Păsărelu et al., 2017) and may be relevant when symptoms vary. Chronic pain patients have a high prevalence of comorbidity, for example, insomnia (Wiklund et al., 2020), depression (Gasslander et al., 2022b), and obesity (Dong et al., 2021). Today, not enough is known about the effects of fitting patients' needs, technology features, and treatment assignments. However, moving on to effectiveness studies of blended interventions in clinical settings, such tailored interventions are likely to be necessary.

In addition to adjusting content and format to patients' needs, timing may also be relevant. It is likely that some patients would benefit from a psychological intervention before IPRP that focused on psychological function. Other patients, however, may need an intervention focusing on aftercare directly following IPRP, and others may need booster interventions sometime after end of IPRP. What is needed to impact the specific patient's ability to self-manage pain may guide those decisions.

A third recommendation for further research concerns context. The role of context in implementation research is extensive. The two terms are described as intertwined and the gap of focus on contextual factors has been suggested as a reason for difficulties generalising findings from effectiveness studies to sustainable implementation (Pfadenhauer et al., 2015). Contextual factors are also highlighted as pivotal in guidelines and summaries of successful integrations of internet-delivered interventions in regular care (Titov et al., 2019, Newby et al., 2021, Folker et al., 2018).

The providing institution, the organisation, setting, and administration are the preferred level of analysis and data collection when focusing on the last steps of implementation – cost, spread, and maintenance (Proctor et al., 2011). This is in line with findings in this thesis, suggesting a greater focus on contextual factors in implementation studies of IACT for chronic pain. Some suggested actions are fitting implementations objects with the organisation's vision and staff needs. Including staff champions, aligning with existing infrastructure and adaptations based on

patients' preferences and needs are other examples. Taken together, a focus on contextual factors when planning implementation of IACT for chronic pain in clinical settings may be successful.

Based on the studies in this thesis and current state of research, there are several paths to follow to advance IACT for chronic pain, such as exploring patients' experiences of adverse events, the benefits of tailored interventions, and possible contributions of adding IACT before and after IPRP. One question to keep in mind is that IACT may not be suitable for everyone. It remains to be studied to what extent internet-delivered interventions can and should be adapted to fit expectations, needs, and context of different clinical settings. The other perspective would be to deliver IACT without major adaptations for those who benefit, which would facilitate access to face-to-face care for those patients in need of such.

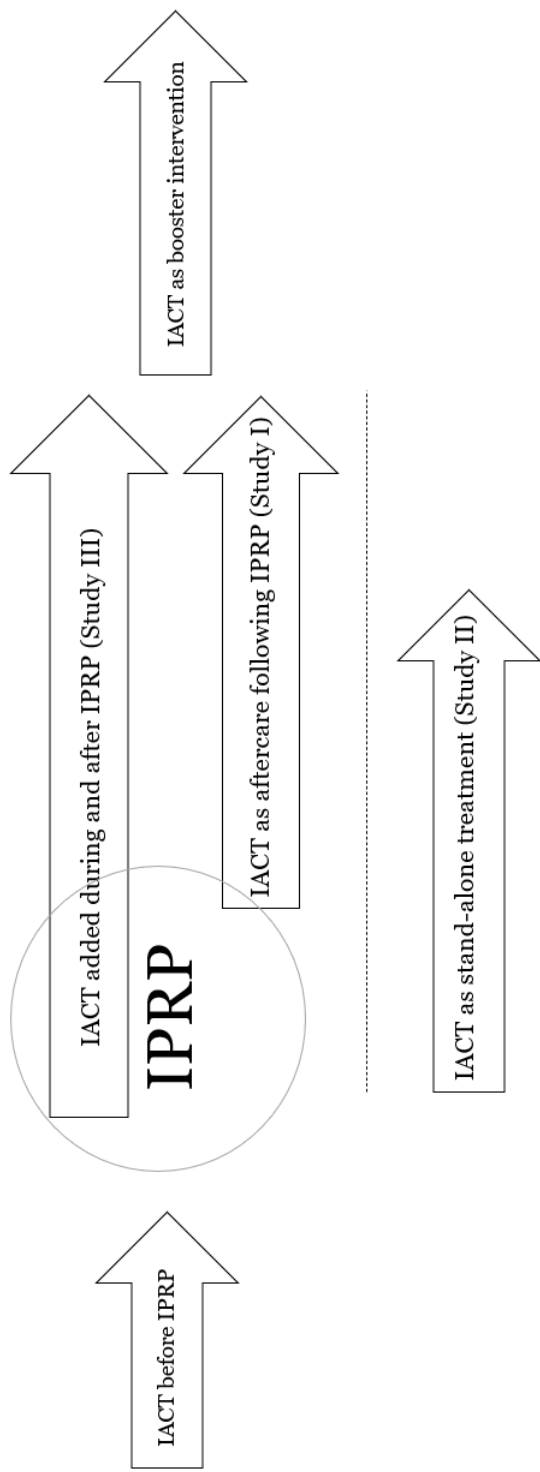


Figure 7. Illustration of five possible ways to add IACT to IPRP from a time perspective: Before start of IPRP, blended during and after IPRP, as aftercare following directly after end of IPRP, as booster intervention sometime after end of IPRP, and stand-alone treatment as an alternative to face-to-face rehabilitation

CONCLUSIONS

Study I: Internet-delivered psychological interventions given as aftercare following IPRP may enable chronic pain patients to continuously focus on their pain rehabilitation. Also, IACT as aftercare may be acceptable and feasible for chronic pain patients. Self-motivating goals and acceptance strategies may be important for chronic pain patients' autonomy in pain self-management. IACT may ease accessibility to aftercare for chronic pain patients.

Study II: Chronic pain patients' experiences of IACT as a stand-alone treatment vary, both concerning being in treatment and consequences after treatment. Patients' characteristics and the specifics of the treatment format and content influence how treatment is experienced. Chronic pain patients may also have diverse expectations, experiences, and benefits of treatment components such as homework assignments and e-therapist feedback. Condition-specific physical and cognitive restraints may influence participants' experiences. IACT may be found acceptable and appropriate for the needs of chronic pain patients.

Study III: IACT added to IPRP may enhance the treatment effects on psychological outcome. IACT as aftercare may strengthen the long-term effect of IPRP. Specifically, the effect on pain self-efficacy speaks to the feasibility of IACT as a means to help patients in their self-management of pain. Blending IACT with IPRP, however, may be too comprehensive for patients. Hence, considering the result from Study I and Study II, it is relevant to test if IACT may be helpful when added before or after IPRP.

Study IV: Implementation of IACT in the clinical context of IPRP may be facilitated and hindered by factors relating to the condition, the host setting and the internet format. Thorough assessment of host needs and planning based on eligible resources before deployment may ease the process. Considering the state of research of internet-delivered interventions for chronic pain, guidance from TMFs and application of condition-specific logic models may aid in future implementation. Also, appropriateness to the setting may depend on an ongoing sensitivity to the changing needs of the clinic. Research on adverse events of treatment may enlighten current research questions such as attrition, relapse, and tailored treatment based on comorbidities.

Taken together, IACT is a treatment format that enables individual psychological interventions for patients with chronic pain in specialist care. Patients' expectations and needs for IACT vary. IACT as an addition to IPRP may have a positive effect on pain acceptance, psychological flexibility, emotional distress, and self-efficacy. The heterogeneous needs of chronic pain patients and the current stage of the implementation process of IACT in IPRP settings, suggest a need to consider

contextual factors and condition-specific factors when moving forward in implementing IACT in regular care.

The contribution of this thesis is that it provides a preliminary condition-specific implementation strategy presented as a logic model (Study IV) where knowledge acquired from both an RCT (Study III) and two qualitative studies (Study I and Study II) are summarised, from an implementation science perspective. Also, this thesis integrates the perspective of patients via the person-based approach (Study II) and the perspective of caregivers and clinical setting via the QIF (Study IV).

Guidelines for integrating ICBT in mental health services are growing and summarise lessons learned, potential barriers and successful strategies. Although there is a path to follow outlining pivotal features, challenges still exist relating to the transition from IACT initiatives as local projects to full integration in regular pain clinics. Hence, there is a need to also do research on how to move forward to reach sustainable implementation of evidence-based internet-delivered psychological interventions for chronic pain.

The present thesis is an attempt to ease and add to the process of integrating IACT to well-established and evidence-based pain management programs such as IPRPs. The purpose and desired long-term impact is to find a way to handle the growing societal burden of chronic pain, meet the needs and expectations of the public, and the preferences of caregivers, and enable greater accessibility for those patients in need of face-to-face pain rehabilitation.

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REFERENCES

- ADAMS, L. M. & TURK, D. C. 2018. Central sensitization and the biopsychosocial approach to understanding pain. *Journal of Applied Biobehavioral Research*, 23.
- ANDERSSON, G. 2009. Using the Internet to provide cognitive behaviour therapy. *Behaviour Research and Therapy*, 47, 175-180.
- ANDERSSON, G. 2015. *The internet and CBT: A clinical guide.*, CRC Press.
- ANDERSSON, G. 2016. Internet-Delivered Psychological Treatments. *Annual Review of Clinical Psychology*.
- ANDERSSON, G. 2018. Internet interventions: Past, present and future. *Internet Interventions*, 12, 181-188.
- ANDERSSON, G. & TITOV, N. 2014. Advantages and limitations of Internet-based interventions for common mental disorders. *World Psychiatry*, 13, 4-11.
- ANDERSSON, G., TITOV, N., DEAR, B. F., ROZENTAL, A. & CARLBRING, P. 2019. Internet-delivered psychological treatments: from innovation to implementation. *World Psychiatry*, 18, 20-28.
- ANDREWS, G. & WILLIAMS, A. D. 2014. Internet psychotherapy and the future of personalized treatment. *Depression and Anxiety*, 31, 912-915.
- APA TASK FORCE 12. 2016. *Treatment: Acceptance and commitment therapy for chronic pain*. [Online]. Available: <https://www.div12.org/treatment/acceptance-and-commitment-therapy-for-chronic-pain/>. [Accessed].
- ASGHARI, A. & NICHOLAS, M. K. 2001. Pain self-efficacy beliefs and pain behaviour. A prospective study. *Pain*, 94, 85-100.
- BARLOW, J., WRIGHT, C., SHEASBY, J., TURNER, A. & HAINSWORTH, J. 2002. Self-management approaches for people with chronic conditions: A review. *Patient Education and Counseling*, 48, 177-187.
- BAUMEISTER, H., REICHLER, L., MUNZINGER, M. & LIN, J. 2014. The impact of guidance on Internet-based mental health interventions - A systematic review. *Internet Interventions*, 1, 205-215.
- BECK, C. D., SOUCY, J. N. & HADJISTAVROPOULOS, H. D. 2020. Mixed-method evaluation of an online motivational intervention as a pre-treatment to internet-delivered cognitive behaviour therapy: Immediate benefits and user feedback. *Internet Interventions*, 20.
- BEUKES, E. W., MANCHAIAH, V., DAVIES, A. S. A., ALLEN, P. M., BAGULEY, D. M. & ANDERSSON, G. 2018. Participants' experiences of an Internet-based cognitive behavioural therapy

- intervention for tinnitus. *International Journal of Audiology*, 57, 947-954.
- BIRKEN, S. A., ROHWEDER, C. L., POWELL, B. J., SHEA, C. M., SCOTT, J., LEEMAN, J., GREWE, M. E., ALEXIS KIRK, M., DAMSCHRODER, L., ALDRIDGE, W. A., HAINES, E. R., STRAUS, S. & PRESSEAU, J. 2018. T-CaST: An implementation theory comparison and selection tool. *Implementation Science*, 13.
- BODENHEIMER, T., LORIG, K., HOLMAN, H. & GRUMBACH, K. 2002. Patient self-management of chronic disease in primary care. *Journal of the American Medical Association*, 288, 2469-2475.
- BOSTROM, K., BOROSUND, E., VARSİ, C., EIDE, H., NORDANG, E. F., SCHREURS, K. M. G., WAXENBERG, L. B., WEISS, K. E., MORRISON, E. J., SMÅSTUEN, M. C., STUBHAUG, A. & NES, L. S. 2020. Digital self-management in support of patients living with chronic pain: Feasibility pilot study. *JMIR Formative Research*, 4.
- BREIVIK, H., COLLETT, B., VENTAFRİDDA, V., COHEN, R. & GALLACHER, D. 2006. Survey of chronic pain in Europe: Prevalence, impact on daily life, and treatment. *European Journal of Pain*, 10, 287-333.
- BUHRMAN, M., FREDRIKSSON, A., EDSTRÖM, G., SHAFIEL, D., TÄRNQVIST, C., LJÖTSSON, B., HURSTI, T., GORDH, T. & ANDERSSON, G. 2013a. Guided Internet-delivered cognitive behavioural therapy for chronic pain patients who have residual symptoms after rehabilitation treatment: Randomized controlled trial. *European Journal of Pain (United Kingdom)*, 17, 753-765.
- BUHRMAN, M., GORDH, T. & ANDERSSON, G. 2016. Internet interventions for chronic pain including headache: A systematic review. *Internet Interventions*, 4, 17-34.
- BUHRMAN, M., NILSSON-IHRFELT, E., JANNERT, M., STRÖM, L. & ANDERSSON, G. 2011. Guided internet-based cognitive behavioural treatment for chronic back pain reduces pain catastrophizing: A randomized controlled trial. *Journal of Rehabilitation Medicine*, 43, 500-505.
- BUHRMAN, M., SKOGLUND, A., HUSELL, J., BERGSTRÖM, K., GORDH, T., HURSTI, T., BENDELIN, N., FURMARK, T. & ANDERSSON, G. 2013b. Guided internet-delivered acceptance and commitment therapy for chronic pain patients: A randomized controlled trial. *Behaviour Research and Therapy*, 51, 307-315.
- BUHRMAN, M., SYK, M., BURVALL, O., HARTIG, T., GORDH, T. & ANDERSSON, G. 2015. Individualized guided internet-delivered cognitive-behavior therapy for chronic pain patients with comorbid depression and anxiety: A randomized controlled trial. *Clinical Journal of Pain*, 31, 504-516.
- BUZASI, E., KURAKATA, H., GANDHI, A., BIRCH, H. L., ZARNEGAR, R. & BEST, L. 2022. Effects of booster sessions on self-management interventions for chronic musculoskeletal pain: A systematic review

- and meta-analysis of randomised controlled trials. *Pain*, 163, 214-257.
- CALNER, T., NORDIN, C., ERIKSSON, M. K., NYBERG, L., GARD, G. & MICHAELSON, P. 2017. Effects of a self-guided, web-based activity programme for patients with persistent musculoskeletal pain in primary healthcare: A randomized controlled trial. *European Journal of Pain (United Kingdom)*, 21, 1110-1120.
- CHARMAZ, K. 2016. Studying the experience of chronic illness through grounded theory. *New Directions in the Sociology of Chronic and Disabling Conditions: Assaults on the Lifeworld*.
- CUIJPERS, P., VAN STRATEN, A. & ANDERSSON, G. 2008. Internet-administered cognitive behavior therapy for health problems: A systematic review. *Journal of Behavioral Medicine*, 31, 169-177.
- CURRAN, G. M., BAUER, M., MITTMAN, B., PYNE, J. M. & STETLER, C. 2012. Effectiveness-implementation hybrid designs: Combining elements of clinical effectiveness and implementation research to enhance public health impact. *Medical Care*, 50, 217-226.
- DAHLIN, M., RYBERG, M., VERNMARK, K., ANNAS, N., CARLBRING, P. & ANDERSSON, G. 2016. Internet-delivered acceptance-based behavior therapy for generalized anxiety disorder: A pilot study. *Internet Interventions*, 6, 16-21.
- DE BOER, M. J., VERSTEEGEN, G. J., VERMEULEN, K. M., SANDERMAN, R. & STRUYS, M. M. R. F. 2014. A randomized controlled trial of an Internet-based cognitive-behavioural intervention for non-specific chronic pain: An effectiveness and cost-effectiveness study. *European Journal of Pain (United Kingdom)*, 18, 1440-1451.
- DE GUEVARA, C. M. L., FERNÁNDEZ-SERRANO, M. J., REYES DEL PASO, G. A. & DUSCHEK, S. 2018. Executive function impairments in fibromyalgia syndrome: Relevance of clinical variables and body mass index. *PLoS ONE*, 13.
- DEAR, B. F., COURTNEY, C., KHOR, K. E., MCDONALD, S., RICCIARDI, T., GANDY, M., FOGLIATI, V. J. & TITOV, N. 2018. The Pain Course: Exploring the Feasibility of an Internet-delivered Pain Management Program When Offered by a Tertiary Pain Management Service. *Clinical Journal of Pain*, 34, 505-514.
- DEAR, B. F., GANDY, M., KDARIN, E., STAPLES, L. G., JOHNSTON, L., FOGLIATI, V. J., WOOTTON, B. M., TERIDES, M. D., KAYROUZ, R., PERRY, K. N., SHARPE, L., NICHOLAS, M. K. & TITOV, N. 2015. The pain course: A randomised controlled trial examining an internet-delivered pain management program when provided with different levels of clinician support. *Pain*, 156, 1920-1935.
- DEAR, B. F., TITOV, N., PERRY, K. N., JOHNSTON, L., WOOTTON, B. M., TERIDES, M. D., RAPEE, R. M. & HUDSON, J. L. 2013. The Pain Course: A randomised controlled trial of a clinician-guided Internet-delivered cognitive behaviour therapy program for

- managing chronic pain and emotional well-being. *Pain*, 154, 942-950.
- DEVAN, H., HALE, L., HEMPEL, D., SAIPE, B. & PERRY, M. A. 2018. What works and does not work in a self-management intervention for people with chronic pain? Qualitative systematic review and meta-synthesis. *Physical Therapy*, 98, 381-397.
- DOCHAT, C., WOOLDRIDGE, J. S., HERBERT, M. S., LEE, M. W. & AFARI, N. 2021. Single-session acceptance and commitment therapy (ACT) interventions for patients with chronic health conditions: A systematic review and meta-analysis. *Journal of Contextual Behavioral Science*, 20, 52-69.
- DONG, H. J. & BÄCKRYD, E. 2023. Teaching the biopsychosocial model of chronic pain: Whom are we talking to? *Patient Education and Counseling*, 110.
- DONG, H. J., DRAGIOTI, E., FISCHER, M. R. & GERDLE, B. 2021. Lose pain, lose weight, and lose both: A cohort study of patients with chronic pain and obesity using a national quality registry. *Journal of Pain Research*, 14, 1863-1873.
- DRAGIOTI, E., EVANGELOU, E., LARSSON, B. & GERDLE, B. 2018. Effectiveness of multidisciplinary programmes for clinical pain conditions: An umbrella review. *Journal of Rehabilitation Medicine*, 50, 779-791.
- DU, S., DONG, J., JIN, S., ZHANG, H. & ZHANG, Y. 2021. Acceptance and Commitment Therapy for chronic pain on functioning: A systematic review of randomized controlled trials. *Neuroscience and Biobehavioral Reviews*, 131, 59-76.
- DUGGAN, G. B., KEOGH, E., MOUNTAIN, G. A., MCCULLAGH, P., LEAKE, J. & ECCLESTON, C. 2015. Qualitative evaluation of the SMART2 self-management system for people in chronic pain. *Disability Rehabilitation Assisted Technology*, 10, 53-60.
- EBERT, D. D., VAN DAELE, T., NORDGREEN, T., KAREKLA, M., COMPARE, A., ZARBO, C., BRUGNERA, A., ØVERLAND, S., TREBBI, G., JENSEN, K. L., KAEHLKE, F. & BAUMEISTER, H. 2018. Internet- and Mobile-Based Psychological Interventions: Applications, Efficacy, and Potential for Improving Mental Health: A Report of the EFPA E-Health Taskforce. *European Psychologist*, 23, 167-187.
- ECCLESTON, C., FISHER, E., CRAIG, L., DUGGAN, G. B., ROSSER, B. A. & KEOGH, E. 2012. Psychological therapies (internet delivered) for the management of chronic pain in adults. *Cochrane Database of Systematic Reviews*, 2012.
- ECCLESTON, C., FISHER, E., CRAIG, L., DUGGAN, G. B., ROSSER, B. A. & KEOGH, E. 2014. Psychological therapies (Internet-delivered) for the management of chronic pain in adults. *Cochrane Database of Systematic Reviews*, 2014.

- ECCLESTON, C., MORLEY, S. J. & WILLIAMS, A. C. 2013. Psychological approaches to chronic pain management: Evidence and challenges. *British Journal of Anaesthesia*, 111, 59-63.
- ECCLESTON, C., WILLIAMS, A. C. D. C. & MORLEY, S. 2009. Psychological therapies for the management of chronic pain (excluding headache) in adults. *Cochrane Database of Systematic Reviews*.
- EHDE, D. M., DILLWORTH, T. M. & TURNER, J. A. 2014. Cognitive-behavioral therapy for individuals with chronic pain: Efficacy, innovations, and directions for research. *American Psychologist*, 69, 153-166.
- ENGEL, G. L. 1977. The need for a new medical model: A challenge for biomedicine. *Science*, 196, 129-136.
- ENGEL, G. L. 1980. The clinical application of the biopsychosocial model. *American Journal of Psychiatry*, 137, 535-544.
- ERBE, D., PSYCH, D., EICHERT, H. C., RIPER, H. & EBERT, D. D. 2017. Blending face-to-face and internet-based interventions for the treatment of mental disorders in adults: Systematic review. *Journal of Medical Internet Research*, 19.
- FELIU-SOLER, A., MONTESINOS, F., GUTIÉRREZ-MARTÍNEZ, O., SCOTT, W., MCCracken, L. M. & LUCIANO, J. V. 2018. Current status of acceptance and commitment therapy for chronic pain: A narrative review. *Journal of Pain Research*, 11, 2145-2159.
- FILLINGIM, R. B. 2017. Individual differences in pain: Understanding the mosaic that makes pain personal. *Pain*, 158, S11-S18.
- FLINK, I. K., SFYRKOU, C. & PERSSON, B. 2016. Customized CBT via internet for adolescents with pain and emotional distress: A pilot study. *Internet Interventions*, 4, 43-50.
- FOLKER, A. P., MATHIASSEN, K., LAURIDSEN, S. M., STENDERUP, E., DOZEMAN, E. & FOLKER, M. P. 2018. Implementing internet-delivered cognitive behavior therapy for common mental health disorders: A comparative case study of implementation challenges perceived by therapists and managers in five European internet services. *Internet Interventions*, 11, 60-70.
- FORDYCE, W. E. 1976. *Behavioral methods for chronic pain and illness*, CV Mosby.
- FORDYCE, W. E., FOWLER JR, R. S., LEHMANN, J. F., DELATEUR, B. J., SAND, P. L. & TRIESCHMANN, R. B. 1973. Operant conditioning in the treatment of chronic pain. *Archives of Physical Medicine and Rehabilitation*, 54, 399-408.
- FRIEDBERG, F., WILLIAMS, D. A. & COLLINGE, W. 2012. Lifestyle-oriented non-pharmacological treatments for fibromyalgia: A clinical overview and applications with home-based technologies. *Journal of Pain Research*, 5, 425-435.
- GANDY, M., FOGLIATI, V. J., TERIDES, M. D., JOHNSTON, L., NICHOLSON PERRY, K., NEWALL, C., TITOV, N. & DEAR, B. F. 2016. Short message service prompts for skills practice in Internet-

- delivered cognitive behaviour therapy for chronic pain – are they feasible and effective? *European Journal of Pain (United Kingdom)*, 20, 1288-1298.
- GANDY, M., PANG, S. T. Y., SCOTT, A. J., HERISEANU, A. I., BISBY, M. A., DUDENEY, J., KARIN, E., TITOV, N. & DEAR, B. F. 2022. Internet-delivered cognitive and behavioural based interventions for adults with chronic pain: A systematic review and meta-analysis of randomized controlled trials. *Pain*, 163, E1041-E1053.
- GASSLANDER, N., ALFONSSON, S., JACKALIN, A., TENGBERG, C., HÅKANSSON, J., HUOTARI, L. & BUHRMAN, M. 2021. Predictors of adherence to an internet-based cognitive behavioral therapy program for individuals with chronic pain and comorbid psychological distress. *BMC Psychology*, 9.
- GASSLANDER, N., ANDERSSON, G., BOSTRÖM, F., BRANDELIUS, L., PELLING, L., HAMRIN, L., GORDH, T. & BUHRMAN, M. 2022a. Tailored internet-based cognitive behavioral therapy for individuals with chronic pain and comorbid psychological distress: a randomized controlled trial. *Cognitive Behaviour Therapy*, 51, 408-434.
- GASSLANDER, N., ANDERSSON, G., BOSTRÖM, F., BRANDELIUS, L., PELLING, L., HAMRIN, L., GORDH, T. & BUHRMAN, M. 2022b. Tailored internet-based cognitive behavioral therapy for individuals with chronic pain and comorbid psychological distress: a randomized controlled trial. *Cognitive Behaviour Therapy*.
- GATCHEL, R. J., PENG, Y. B., PETERS, M. L., FUCHS, P. N. & TURK, D. C. 2007. The Biopsychosocial Approach to Chronic Pain: Scientific Advances and Future Directions. *Psychological Bulletin*, 133, 581-624.
- GERDLE, B., MOLANDER, P., STENBERG, G., STÅLNACKE, B. M. & ENTHOVEN, P. 2016. Weak outcome predictors of multimodal rehabilitation at one-year follow-up in patients with chronic pain - a practice based evidence study from two SQRP centres. *BMC Musculoskeletal Disorders*, 17, 1-14.
- GERDLE, B., RIVANO FISCHER, M. & RINGQVIST, Å. 2022. Interdisciplinary pain rehabilitation programs - evidence and clinical real-world results. In: WITNEY, A. (ed.) *Pain Management - From Pain Mechanisms to Patient Care*. London: IntechOpen.
- GOGOVAR, A., VISCA, R., AUGER, C., BOUVRETTE-LEBLANC, L., SYMEONIDIS, I., POISSANT, L., WARE, M. A., SHIR, Y., VIENS, N. & AHMED, S. 2017. Informing the development of an Internet-based chronic pain self-management program. *International Journal of Medical Informatics*, 97, 109-119.
- GOLD, S. M., ENCK, P., HASSELMANN, H., FRIEDE, T., HEGERL, U., MOHR, D. C. & OTTE, C. 2017. Control conditions for randomised trials of behavioural interventions in psychiatry: a decision framework. *The Lancet Psychiatry*, 4, 725-732.

- GOLDBERG, D. S. & MCGEE, S. J. 2011. Pain as a global public health priority. *BMC Public Health*, 11.
- GRANEHEIM, U. H. & LUNDMAN, B. 2004. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, 24, 105-112.
- GULLICKSON, K. M., HADJISTAVROPOULOS, H. D., DEAR, B. F. & TITOV, N. 2019. Negative effects associated with internet-delivered cognitive behaviour therapy: An analysis of client emails. *Internet Interventions*, 18.
- HADJISTAVROPOULOS, H. D., SCHNEIDER, L. H., EDMONDS, M., KARIN, E., NUGENT, M. N., DIRKSE, D., DEAR, B. F. & TITOV, N. 2017. Randomized controlled trial of internet-delivered cognitive behaviour therapy comparing standard weekly versus optional weekly therapist support. *Journal of Anxiety Disorders*, 52, 15-24.
- HADJISTAVROPOULOS, H. D., SCHNEIDER, L. H., HADJISTAVROPOULOS, T., TITOV, N. & DEAR, B. F. 2018. Effectiveness, acceptability and feasibility of an Internet-delivered cognitive behavioral pain management program in a routine online therapy clinic in Canada. *Canadian Journal of Pain*, 2, 62-73.
- HADJISTAVROPOULOS, H. D., SCHNEIDER, L. H., MEHTA, S., KARIN, E., DEAR, B. F. & TITOV, N. 2019. Preference trial of internet-delivered cognitive behaviour therapy comparing standard weekly versus optional weekly therapist support. *Journal of Anxiety Disorders*, 63, 51-60.
- HALMETOJA, C. O., MALMQUIST, A., CARLBRING, P. & ANDERSSON, G. 2014. Experiences of internet-delivered cognitive behavior therapy for social anxiety disorder four years later: A qualitative study. *Internet Interventions*, 1, 158-163.
- HANN, K. E. J. & MCCracken, L. M. 2014. A systematic review of randomized controlled trials of Acceptance and Commitment Therapy for adults with chronic pain: Outcome domains, design quality, and efficacy. *Journal of Contextual Behavioral Science*, 3, 217-227.
- HAYDEN, J. A., VAN TULDER, M. W., MALMIVAARA, A. & KOES, B. W. 2005. Exercise therapy for treatment of non-specific low back pain. *Cochrane database of systematic reviews (Online)*.
- HAYES, S. C. 2004. Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy*, 35, 639-665.
- HAYES, S. C., BARNES-HOLMES, D. & ROCHE, B. 2001. *Relational Frame Theory: A Post-Skinnerian account of human language and cognition*, New York, Plenum Press.
- HAYES, S. C., LUOMA, J. B., BOND, F. W., MASUDA, A. & LILLIS, J. 2006. Acceptance and Commitment Therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, 44, 1-25.
- HEAPY, A., OTIS, J., MARCUS, K. S., FRANTSVE, L. M., JANKE, E. A., SHULMAN, M., BELLMORE, W. & KERNS, R. D. 2005.

- Intersession coping skill practice mediates the relationship between readiness for self-management treatment and goal accomplishment. *Pain*, 118, 360-368.
- HEAPY, A. A., HIGGINS, D. M., CERVONE, D., WANDNER, L., FENTON, B. T. & KERNS, R. D. 2015. A systematic review of technology-assisted self-management interventions for chronic pain: Looking across treatment modalities. *Clinical Journal of Pain*, 31, 470-492.
- HEDMAN, E., LJÖTSSON, B. & LINDEFORS, N. 2012. Cognitive behavior therapy via the Internet: A systematic review of applications, clinical efficacy and cost-effectiveness. *Expert Review of Pharmacoeconomics and Outcomes Research*, 12, 745-764.
- HOOKE, S. A., SLATTENGREN, A. H., BOYLE, L. & SHERMAN, M. D. 2020. Values-Based Behavioral Activation for Chronic Pain in Primary Care: A Pilot Study. *Journal of Clinical Psychology in Medical Settings*, 27, 633-642.
- HUGHES, L. S., CLARK, J., COLCLOUGH, J. A., DALE, E. & MCMILLAN, D. 2017. Acceptance and Commitment Therapy (ACT) for Chronic Pain. *Clinical Journal of Pain*, 33, 552-568.
- IASP. 2018. *Task Force on Multimodal Pain Treatment Defines Terms for Chronic Pain Care* [Online]. Available: <https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=6981> [Accessed May, 28 2021].
- JAKOBSEN, J. C., GLUUD, C., WETTERSLEV, J. & WINKEL, P. 2017. When and how should multiple imputation be used for handling missing data in randomised clinical trials - A practical guide with flowcharts. *BMC Medical Research Methodology*, 17.
- JENSEN, M. P. & TURK, D. C. 2014. Contributions of psychology to the understanding and treatment of people with chronic pain. *American Psychologist*, 69, 105-118.
- JOHANSSON, O., MICHEL, T., ANDERSSON, G. & PAXLING, B. 2015. Experiences of non-adherence to Internet-delivered cognitive behavior therapy: A qualitative study. *Internet Interventions*, 2, 137-142.
- JORDAN, J. L., HOLDEN, M. A., MASON, E. E. & FOSTER, N. E. 2010. Interventions to improve adherence to exercise for chronic musculoskeletal pain in adults. *Cochrane database of systematic reviews (Online)*.
- JULL, G. 2017. Biopsychosocial model of disease: 40 years on. Which way is the pendulum swinging? *British Journal of Sports Medicine*, 51, 1187-1188.
- KAMPER, S. J., APELDOORN, A. T., CHIAROTTO, A., SMEETS, R. J. E. M., OSTELO, R. W. J. G., GUZMAN, J. & TULDER, M. W. V. 2015. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. *BMJ (Online)*, 350.

- KAREKLA, M., KASINOPOULOS, O., NETO, D. D., EBERT, D. D., VAN DAELE, T., NORDGREEN, T., HÖFER, S., OEVERLAND, S. & JENSEN, K. L. 2019. Best Practices and Recommendations for Digital Interventions to Improve Engagement and Adherence in Chronic Illness Sufferers. *European Psychologist*, 24, 49-67.
- KELDERS, S. M., KOK, R. N., OSSEBAARD, H. C. & VAN GEMERT-PIJNEN, J. E. W. C. 2012. Persuasive system design does matter: A systematic review of adherence to web-based interventions. *Journal of Medical Internet Research*, 14.
- KELSON, J., ROLLIN, A., RIDOUT, B. & CAMPBELL, A. 2019. Internet-Delivered Acceptance and Commitment Therapy for Anxiety Treatment: Systematic Review. *Journal of medical Internet research*, 21, e12530.
- KERNS, R. D., TURK, D. C. & RUDY, T. E. 1985. The West Haven-Yale Multidimensional Pain Inventory (WHYMPI). *Pain*, 23, 345-356.
- KLOEK, C., BOSSEN, D., BAKKER, D. H. D., VEENHOF, C. & DEKKER, J. 2017. Blended interventions to change behavior in patients with Chronic somatic disorders: Systematic review. *Journal of Medical Internet Research*, 19.
- KOSEK, E., COHEN, M., BARON, R., GEBHART, G. F., MICO, J. A., RICE, A. S. C., RIEF, W. & SLUKA, A. K. 2016. Do we need a third mechanistic descriptor for chronic pain states? *Pain*, 157, 1382-1386.
- LENHARD, W. & LENHARD, A. 2016. *Calculation of Effect Sizes* [Online]. Dettelbach (Germany): Psychometrica. Available: https://www.psychometrica.de/effect_size.html [Accessed May, 10, 2021].
- LETHEM, J., SLADE, P. D., TROUP, J. D. G. & BENTLEY, G. 1983. Outline of a fear-avoidance model of exaggerated pain perception-I. *Behaviour Research and Therapy*, 21, 401-408.
- LIN, J., FAUST, B., EBERT, D. D., KRÄMER, L. & BAUMEISTER, H. 2018. A web-based acceptance-facilitating intervention for identifying patients' acceptance, uptake, and adherence of internet- and mobile-based pain interventions: Randomized controlled trial. *Journal of Medical Internet Research*, 20.
- LIN, J., LÜKING, M., EBERT, D. D., BUHRMAN, M., ANDERSSON, G. & BAUMEISTER, H. 2015. Effectiveness and cost-effectiveness of a guided and unguided internet-based acceptance and commitment therapy for chronic pain: Study protocol for a three-armed randomised controlled trial. *Internet Interventions*, 2, 7-16.
- LINDEGAARD, T., SEATON, F., HALAJ, A., BERG, M., KASHOUSH, F., BARCHINI, R., LUDVIGSSON, M., SARKOHI, A. & ANDERSSON, G. 2021. Internet-based cognitive behavioural therapy for depression and anxiety among Arabic-speaking individuals in Sweden: a pilot randomized controlled trial. *Cognitive Behaviour Therapy*, 50, 47-66.

- LJÓTSSON, B., ATTERLÖF, E., LAGERLÖF, M., ANDERSSON, E., JERNELOV, S., HEDMAN, E., KEMANI, M. & WICKSELL, R. K. 2014. Internet-Delivered Acceptance and Values-Based Exposure Treatment for Fibromyalgia: A Pilot Study. *Cognitive Behaviour Therapy*, 43, 93-104.
- LOUCAS, C. E., FAIRBURN, C. G., WHITTINGTON, C., PENNANT, M. E., STOCKTON, S. & KENDALL, T. 2014. E-therapy in the treatment and prevention of eating disorders: A systematic review and meta-analysis. *Behaviour Research and Therapy*, 63, 122-131.
- LUNDGREN, T., LUOMA, J. B., DAHL, J., STROSAHL, K. & MELIN, L. 2012. The Bull's-Eye values survey: A psychometric evaluation. *Cognitive and Behavioral Practice*, 19, 518-526.
- MACEA, D. D., GAJOS, K., DAGLIA CALIL, Y. A. & FREGNI, F. 2010. The efficacy of web-based cognitive behavioral interventions for chronic pain: A systematic review and meta-analysis. *Journal of Pain*, 11, 917-929.
- MARTORELLA, G., BOITOR, M., BERUBE, M., FREDERICKS, S., LE MAY, S. & GÉLINAS, C. 2017. Tailored Web-based interventions for pain: Systematic review and meta-analysis. *Journal of Medical Internet Research*, 19.
- MAZZA, S., FROT, M. & REY, A. E. 2018. A comprehensive literature review of chronic pain and memory. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 87, 183-192.
- MCCRACKEN, L. M. & VOWLES, K. E. 2006. Acceptance of chronic pain. *Current Pain and Headache Reports*, 10, 90-94.
- MCCRACKEN, L. M. & VOWLES, K. E. 2014. Acceptance and commitment therapy and mindfulness for chronic pain: Model, process, and progress. *American Psychologist*, 69, 178-187.
- MCCRACKEN, L. M., VOWLES, K. E. & ECCLESTON, C. 2004. Acceptance of chronic pain: Component analysis and a revised assessment method. *Pain*, 107, 159-166.
- MCCRACKEN, L. M. & YANG, S. Y. 2006. The role of values in a contextual cognitive-behavioral approach to chronic pain. *Pain*, 123, 137-145.
- MCCRACKEN, L. M., YU, L. & VOWLES, K. E. 2022. New generation psychological treatments in chronic pain. *The BMJ*, 376.
- MCGEARY, D. D., MCGEARY, C. A., NABITY, P., VILLARREAL, R., KIVISALU, T. & GATCHEL, R. J. 2016. Improving stress reduction and wellness in interdisciplinary chronic pain management: Is transdisciplinary care a better option? *Journal of Applied Biobehavioral Research*, 21, 205-215.
- MEHTA, S., PEYNENBURG, V. A. & HADJISTAVROPOULOS, H. D. 2019. Internet-delivered cognitive behaviour therapy for chronic health conditions: a systematic review and meta-analysis. *Journal of Behavioral Medicine*, 42, 169-187.

- MEINTS, S. M. & EDWARDS, R. R. 2018. Evaluating psychosocial contributions to chronic pain outcomes. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 87, 168-182.
- MELZACK, R. & WALL, P. D. 1965. Pain mechanisms: A new theory. *Science*, 150, 971-979.
- MEYERS, D. C., DURLAK, J. A. & WANDERSMAN, A. 2012. The Quality Implementation Framework: A Synthesis of Critical Steps in the Implementation Process. *American Journal of Community Psychology*, 50, 462-480.
- MILLER, W. R. & ROLLNICK, S. P. 2012. *Motivational Interviewing. Preparing people for change*, The Guilford Press.
- MOENS, M., JANSEN, J., DE SMEDT, A., ROULAUD, M., BILLOT, M., LATON, J., RIGORD, P. & GOUDMAN, L. 2022. Acceptance and Commitment Therapy to Increase Resilience in Chronic Pain Patients: A Clinical Guideline. *Medicina (Lithuania)*, 58.
- MORLEY, S. 2008. Relapse prevention: Still neglected after all these years. *Pain*, 134, 239-240.
- NEWBY, J., MASON, E., KLDNISTKI, N., MURPHY, M., MILLARD, M., HASKELBERG, H., ALLEN, A. & MAHONEY, A. 2021. Integrating internet CBT into clinical practice: a practical guide for clinicians. *Clinical Psychologist*, 25, 164-178.
- NICHOLAS, M. K., ASGHARI, A., BLYTH, F. M., WOOD, B. M., MURRAY, R., MCCABE, R., BRNABIC, A., BEESTON, L., CORBETT, M., SHERRINGTON, C. & OVERTON, S. 2017. Long-term outcomes from training in self-management of chronic pain in an elderly population: A randomized controlled trial. *Pain*, 158, 86-95.
- NICHOLAS, M. K., ASGHARI, A., CORBETT, M., SMEETS, R. J., WOOD, B. M., OVERTON, S., PERRY, C., TONKIN, L. E. & BEESTON, L. 2012. Is adherence to pain self-management strategies associated with improved pain, depression and disability in those with disabling chronic pain? *European journal of pain (London, England)*, 16, 93-104.
- NICHOLAS, M. K., ASGHARI, A., SHARPE, L., BRNABIC, A., WOOD, B. M., OVERTON, S., TONKIN, L., DE SOUSA, M., FINNISS, D., BEESTON, L., SUTHERLAND, A., CORBETT, M. & BROOKER, C. 2014. Cognitive exposure versus avoidance in patients with chronic pain: Adherence matters. *European Journal of Pain (United Kingdom)*, 18, 424-437.
- NICHOLAS, M. K., COSTA, D. S. J., LINTON, S. J., MAIN, C. J., SHAW, W. S., PEARCE, G., GLEESON, M., PINTO, R. Z., BLYTH, F. M., MCAULEY, J. H., SMEETS, R. J. E. M. & MCGARITY, A. 2020. Implementation of Early Intervention Protocol in Australia for 'High Risk' Injured Workers is Associated with Fewer Lost Work Days Over 2 Years Than Usual (Stepped) Care. *Journal of Occupational Rehabilitation*, 30, 93-104.

- NORDIN, C. A., MICHAELSON, P., GARD, G. & ERIKSSON, M. K. 2016. Effects of the web behavior change program for activity and multimodal pain rehabilitation: Randomized controlled trial. *Journal of Medical Internet Research*, 18.
- PĂȘĂRELU, C. R., ANDERSSON, G., BERGMAN NORDGREN, L. & DOBREAN, A. 2017. Internet-delivered transdiagnostic and tailored cognitive behavioral therapy for anxiety and depression: a systematic review and meta-analysis of randomized controlled trials. *Cognitive Behaviour Therapy*, 46, 1-28.
- PAVELTCHUK, F., MOURÃO, S. E. D. Q., KEFFER, S., DA COSTA, R. T., NARDI, A. E. & DE CARVALHO, M. R. 2022. Negative effects of psychotherapies: A systematic review. *Counselling and Psychotherapy Research*, 22, 267-278.
- PEYNENBURG, V., WILHELMS, A., SAPKOTA, R., NUGENT, M., OWENS, K., TITOV, N., DEAR, B. & HADJISATVROPOULOS, H. 2022. Understanding Client Difficulties in Transdiagnostic Internet-Delivered Cognitive Behaviour Therapy: A Qualitative Analysis of Homework Reflections. *Journal of Clinical Medicine*, 11.
- PFADENHAUER, L. M., MOZYGEMBA, K., GERHARDUS, A., HOFMANN, B., BOOTH, A., LYSDAHL, K. B., TUMMERS, M., BURNS, J. & REHFUESS, E. A. 2015. Context and implementation: A concept analysis towards conceptual maturity. *Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen*, 109, 103-114.
- PHILIPPI, P., BAUMEISTER, H., APOLINÁRIO-HAGEN, J., EBERT, D. D., HENNEMANN, S., KOTT, L., LIN, J., MESSNER, E. M. & TERHORST, Y. 2021. Acceptance towards digital health interventions – Model validation and further development of the Unified Theory of Acceptance and Use of Technology. *Internet Interventions*, 26.
- PROCTOR, E., SILMERE, H., RAGHAVAN, R., HOVMAND, P., AARONS, G., BUNGER, A., GRIFFEY, R. & HENSLEY, M. 2011. Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, 38, 65-76.
- RASK, M. T., FROSTHOLM, L., HANSEN, S. H., PETERSEN, M. W., ØRNBØL, E. & ROSENDAL, M. 2023. Self-help interventions for persistent physical symptoms: a systematic review of behaviour change components and their potential effects. *Health Psychology Review*.
- RICKARDSSON, J., GENTILI, C., HOLMSTRÖM, L., ZETTERQVIST, V., ANDERSSON, E., PERSSON, J., LEKANDER, M., LJÓTSSON, B. & WICKSELL, R. K. 2021. Internet-delivered acceptance and commitment therapy as microlearning for chronic pain: A randomized controlled trial with 1-year follow-up. *European Journal of Pain (United Kingdom)*.

- RINGQVIST, Å., DRAGIOTI, E., BJÖRK, M., LARSSON, B. & GERDLE, B. 2019. Moderate and Stable Pain Reductions as a Result of Interdisciplinary Pain Rehabilitation—A Cohort Study from the Swedish Quality Registry for Pain Rehabilitation (SQRP). *Journal of Clinical Medicine*, 8, 905.
- ROZENTAL, A., CASTONGUAY, L., DIMIDJIAN, S., LAMBERT, M., SHAFRAN, R., ANDERSSON, G. & CARLBRING, P. 2018. Negative effects in psychotherapy: Commentary and recommendations for future research and clinical practice. *BJPsych Open*, 4, 307-312.
- RUIZ, F. J. 2012. Acceptance and commitment therapy versus traditional cognitive behavioral therapy: A systematic review and meta-analysis of current empirical evidence. *International Journal of Psychology and Psychological Therapy*, 12, 333-357.
- SCOTT, W., CHILCOT, J., GUILDFORD, B., DALY-EICHENHARDT, A. & MCCracken, L. M. 2018. Feasibility randomized-controlled trial of online Acceptance and Commitment Therapy for patients with complex chronic pain in the United Kingdom. *European Journal of Pain (United Kingdom)*, 22, 1473-1484.
- SIMPSON, P. A., MARS, T. & ESTEVES, J. E. 2017. A systematic review of randomised controlled trials using Acceptance and commitment therapy as an intervention in the management of non-malignant, chronic pain in adults. *International Journal of Osteopathic Medicine*, 24, 18-31.
- SKINNER, M., WILSON, H. D. & TURK, D. C. 2012. Cognitive-behavioral perspective and cognitive-behavioral therapy for people with chronic pain: Distinctions, outcomes, and innovations. *Journal of Cognitive Psychotherapy*, 26, 93-113.
- SOLEM, I. K. L., VARSI, C., EIDE, H., KRISTJANSDDOTTIR, O. B., MIRKOVIC, J., BØRØSUND, E., HAALAND-ØVERBY, M., HELDAL, K., SCHREURS, K. M. G., WAXENBERG, L. B., WEISS, K. E., MORRISON, E. J. & NES, L. S. 2019. Patients'needs and requirements for ehealth pain management interventions: Qualitative study. *Journal of Medical Internet Research*, 21.
- SULLIVAN, M., LANGFORD, D. J., DAVIES, P. S., TRAN, C., VILARDAGA, R., CHEUNG, G., YOO, D., MCREYNOLDS, J., LOBER, W. B., TAUBEN, D. & VOWLES, K. E. 2018. A Controlled Pilot Trial of PainTracker Self-Manager, a Web-Based Platform Combined With Patient Coaching, to Support Patients' Self-Management of Chronic Pain. *Journal of Pain*, 19, 996-1005.
- SWAIN, J., HANCOCK, K., HAINSWORTH, C. & BOWMAN, J. 2013. Acceptance and Commitment Therapy in the treatment of anxiety: A systematic review. *Clinical Psychology Review*, 33, 965-978.
- SÖDERLUND, A. & VON HEIDEKEN WÄGERT, P. 2021. Adherence to and the maintenance of self-management behaviour in older people with musculoskeletal pain-a scoping review and theoretical models. *Journal of Clinical Medicine*, 10, 1-25.

- TERPSTRA, J. A., VAN DER VAART, R., VAN BEUGEN, S., VAN EERSEL, R. A., GKIKI, I., ERDŐS, D., SCHMIDT, J., RADSTAKE, C., KLOPPENBURG, M., VAN MIDDENDORP, H. & EVERS, A. W. M. 2022. Guided internet-based cognitive-behavioral therapy for patients with chronic pain: A meta-analytic review. *Internet Interventions*, 30.
- TITOV, N., DEAR, B., NIELSSEN, O., STAPLES, L., HADJISTAVROPOULOS, H., NUGENT, M., ADLAM, K., NORDGREEN, T., BRUVIK, K. H., HOVLAND, A., REPÅL, A., MATHIASSEN, K., KRAEPELIEN, M., BLOM, K., SVANBORG, C., LINDEFORS, N. & KALDO, V. 2018. ICBT in routine care: A descriptive analysis of successful clinics in five countries. *Internet Interventions*, 13, 108-115.
- TITOV, N., HADJISTAVROPOULOS, H. D., NIELSSEN, O., MOHR, D. C., ANDERSSON, G. & DEAR, B. F. 2019. From research to practice: Ten lessons in delivering digital mental health services. *Journal of Clinical Medicine*, 8.
- TREEDE, R. D., RIEF, W., BARKE, A., AZIZ, Q., BENNETT, M. I., BENOLIEL, R., COHEN, M., EVERS, S., FINNERUP, N. B., FIRST, M. B., GIAMBERARDINO, M. A., KAASA, S., KORWISI, B., KOSEK, E., LAVAND'HOMME, P., NICHOLAS, M., PERROT, S., SCHOLZ, J., SCHUG, S., SMITH, B. H., SVENSSON, P., VLAEYEN, J. W. S. & WANG, S. J. 2019. Chronic pain as a symptom or a disease: The IASP Classification of Chronic Pain for the International Classification of Diseases (ICD-11). *Pain*, 160, 19-27.
- TRINDADE, I. A., GUIOMAR, R., CARVALHO, S. A., DUARTE, J., LAPA, T., MENEZES, P., NOGUEIRA, M. R., PATRÃO, B., PINTO-GOUBEIA, J. & CASTILHO, P. 2021. Efficacy of Online-Based Acceptance and Commitment Therapy for Chronic Pain: A Systematic Review and Meta-Analysis. *Journal of Pain*, 22, 1328-1342.
- TURK, D. C. & RUDY, T. E. 1991. Neglected topics in the treatment of chronic pain patients - relapse, noncompliance, and adherence enhancement. *Pain*, 44, 5-28.
- TURK, D. C., WILSON, H. D. & CAHANA, A. 2011. Treatment of chronic non-cancer pain. *The Lancet*, 377, 2226-2235.
- VAN BEUGEN, S., FERWERDA, M., HOEVE, D., ROVERS, M. M., SPILLEKOM-VAN KOULIL, S., VAN MIDDENDORP, H. & EVERS, A. W. M. 2014. Internet-based cognitive behavioral therapy for patients with chronic somatic conditions: A meta-analytic review. *Journal of Medical Internet Research*, 16, e88.
- VAN DE GRAAF, D. L., TROMPETTER, H. R., SMEETS, T. & MOLS, F. 2021. Online Acceptance and Commitment Therapy (ACT) interventions for chronic pain: A systematic literature review. *Internet Interventions*, 26.
- VARSİ, C., LEDEL SOLEM, I. K., EIDE, H., BØRØSUND, E., KRISTJANSÐOTTIR, O. B., HELDAL, K., WAXENBERG, L. B.,

- WEISS, K. E., SCHREURS, K. M. G., MORRISON, E. J., STUBHAUG, A. & SOLBERG NES, L. 2021. Health care providers' experiences of pain management and attitudes towards digitally supported self-management interventions for chronic pain: a qualitative study. *BMC Health Services Research*, 21.
- VEEHOF, M. M., OSKAM, M. J., SCHREURS, K. M. G. & BOHLMELJER, E. T. 2011. Acceptance-based interventions for the treatment of chronic pain: A systematic review and meta-analysis. *Pain*, 152, 533-542.
- VEEHOF, M. M., TROMPETTER, H. R., BOHLMELJER, E. T. & SCHREURS, K. M. G. 2016. Acceptance- and mindfulness-based interventions for the treatment of chronic pain: a meta-analytic review. *Cognitive Behaviour Therapy*, 45, 5-31.
- VEREENOGHE, L., GEGA, L. & LANGDON, P. E. 2017. Intellectual disability and computers in therapy: Views of service users and clinical psychologists. *Cyberpsychology*, 11.
- VLAEYEN, J. W. S. & LINTON, S. J. 2000. Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain*, 85, 317-332.
- VOWLES, K. E. & MCCRACKEN, L. M. 2010. Comparing the role of psychological flexibility and traditional pain management coping strategies in chronic pain treatment outcomes. *Behaviour Research and Therapy*, 48, 141-146.
- VUGTS, M. A. P., JOOSEN, M. C. W., VAN DER GEER, J. E., ZEDLITZ, A. M. E. E. & VRIJHOEF, H. J. M. 2018. The effectiveness of various computer-based interventions for patients with chronic pain or functional somatic syndromes: A systematic review and meta-analysis. *PLoS ONE*, 13.
- WETHERELL, J. L., AFARI, N., RUTLEDGE, T., SORRELL, J. T., STODDARD, J. A., PETKUS, A. J., SOLOMON, B. C., LEHMAN, D. H., LIU, L., LANG, A. J. & HAMPTON ATKINSON, J. 2011. A randomized, controlled trial of acceptance and commitment therapy and cognitive-behavioral therapy for chronic pain. *Pain*, 152, 2098-2107.
- WICKSELL, R. K., LEKANDER, M., SORJONEN, K. & OLSSON, G. L. 2010. The Psychological Inflexibility in Pain Scale (PIPS) - Statistical properties and model fit of an instrument to assess change processes in pain related disability. *European Journal of Pain*, 14, 771.e1-771.e14.
- WIKLUND, T., GERDLE, B., LINTON, S. J., DRAGIOTI, E. & LARSSON, B. 2020. Insomnia is a risk factor for spreading of chronic pain: A Swedish longitudinal population study (SwePain). *European Journal of Pain (United Kingdom)*, 24, 1348-1356.
- YANG, S. Y., MOSS-MORRIS, R. & MCCRACKEN, L. M. 2017. IACT-CEL: A Feasibility Trial of a Face-to-Face and Internet-Based Acceptance and Commitment Therapy Intervention for Chronic Pain in Singapore. *Pain Research and Treatment*, 2017.

- YARDLEY, L., AINSWORTH, B., ARDEN-CLOSE, E. & MULLER, I. 2015. The person-based approach to enhancing the acceptability and feasibility of interventions. *Pilot and Feasibility Studies*, 1.
- YARDLEY, L., MORRISON, L. G., ANDREOU, P., JOSEPH, J. & LITTLE, P. 2010. Understanding reactions to an internet-delivered health-care intervention: Accommodating user preferences for information provision. *BMC Medical Informatics and Decision Making*, 10.

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