Remote delivery of psychological interventions

Impact and acceptability of preventive strategies to improve risk factors associated with coronary heart disease

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Abstract


Depression, anxiety and excessive weight are public health concerns that have been associated with an increased risk and worse prognosis of coronary heart disease. Remote delivery of psychological interventions may be an effective preventive strategy to improve these lifestyle-related risk factors as treatment may be delivered to many people at a low cost and reduce stigma related to seeking help. The general contribution of this thesis is to investigate the impact and indicators of treatment acceptability in contexts where this type of delivery may improve access to psychological interventions. The aim of Study I was to investigate whether stigma predicts the intention to seek help via the Internet compared to face to face among undergraduate students (N=267) and primary care patients (N=195). The results indicate that Internet-based interventions may improve intentions to seek help among individuals who are reluctant to seek psychological treatment face to face due to stigma. In Study II, the effect of a guided Internet-based Cognitive Behavior Therapy (iCBT) and Treatment-As-Usual (TAU) was compared to TAU only to reduce symptoms of depression and anxiety among patients with a recent myocardial infarction (N=239) in a randomized controlled trial. The results indicate no difference in symptoms of depression and anxiety between the groups. Study III describe treatment activity among participants allocated to the iCBT intervention in Study II (N=117). Furthermore, user experiences were explored using a semi-structured interview with 21 of these participants. The results indicate overall low treatment activity and different preferences regarding the web-based portal, treatment program and therapist communication. The aim of Study IV was to evaluate the impact and investigate indicators of treatment acceptability of a guided Acceptance and Commitment Therapy (ACT) self-help intervention to improve value attainment related to health and reduce experiential avoidance among individuals with overweight or obesity using a multiple baseline design (N=13). The results indicate that the ACT intervention may be an acceptable intervention to improve value attainment related to health and decrease experiential avoidance. In conclusion, the studies in this thesis illustrate several challenges related to the willingness to seek and engage in Internet-based interventions. Furthermore, the results indicate varying responses to the remote delivery of ACT. The principal findings are discussed in relation to methodological limitations. Possible strategies to improve the take-up rates, adherence and treatment satisfaction are suggested as well as areas of future research.

Keywords: Depression, anxiety, overweight, obesity, technology-assisted interventions, Cognitive Behavioral Therapy, Acceptance and Commitment Therapy

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To you
List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.


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Contributions

The contributions of Emma Wallin to the papers included in this thesis are as follows:

I  Design of the study in collaboration with co-authors. Withdrawal, processing and statistical analysis of survey data. Main responsibility for drafting and revising the manuscript in collaboration with co-authors.

II Recruitment of participants and provision of therapist support in the Internet-based intervention. Planning of the statistical analysis in collaboration with co-authors. Writing and revising of the manuscript in collaboration with co-authors.

III Design of the study in collaboration with co-authors. Main responsibility for data analysis, writing and revision of the manuscript in collaboration with co-authors.

IV Design of the study in collaboration with co-authors. Provided therapist support via telephone in the ACT intervention. Main responsibility for recruitment, data collection, data analysis, writing and revision of the manuscript in collaboration with co-authors.
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## Abbreviations

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<tr>
<td>AAQ-W</td>
<td>Acceptance and Action Questionnaire for Weight-related Difficulties</td>
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<td>ACT</td>
<td>Acceptance and Commitment Therapy</td>
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<td>BADS-SF</td>
<td>Behavioral Activation for Depression Scale-Short Form</td>
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<tr>
<td>BBQ</td>
<td>Brunsviken Brief Quality of Life Inventory</td>
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<td>BEVS</td>
<td>Bull’s Eye Value Survey</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>CAQ</td>
<td>Cardiac Anxiety Questionnaire</td>
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<td>CI</td>
<td>Confidence Interval</td>
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<td>CBT</td>
<td>Cognitive Behavior Therapy</td>
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<td>DASS-21</td>
<td>Depression Anxiety and Stress Scale-21</td>
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<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
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<td>iCBT</td>
<td>Internet-based Cognitive Behavior Therapy</td>
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<td>ISCI</td>
<td>Intentions to Seek Counseling Inventory</td>
</tr>
<tr>
<td>ITT</td>
<td>Intention-To-Treat</td>
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<tr>
<td>LOC</td>
<td>Last Observation Carried Forward</td>
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<tr>
<td>MADRS-S</td>
<td>Montgomery-Åsberg Depression Rating Scale Short Form</td>
</tr>
<tr>
<td>NAP</td>
<td>Non-overlap of All Pairs</td>
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<tr>
<td>RCT</td>
<td>Randomized Controlled Trial</td>
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<tr>
<td>SMS</td>
<td>Short Message Service</td>
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<tr>
<td>SSOMI</td>
<td>Self-stigma of Mental Illness Scale</td>
</tr>
<tr>
<td>SSOSH</td>
<td>Self-stigma of Seeking Psychological Help Scale</td>
</tr>
<tr>
<td>TAAS</td>
<td>Treatment Acceptability and Anticipated Adherence Scale</td>
</tr>
<tr>
<td>TAU</td>
<td>Treatment-As-Usual</td>
</tr>
<tr>
<td>WSSQ</td>
<td>Weight Self-stigma Questionnaire</td>
</tr>
<tr>
<td>WTP-DI</td>
<td>Willingness to Pay-Distress Intolerance measure</td>
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Introduction

The challenge and possible solutions

A major challenge for psychology research is to transfer science-based behavioral principles into cost-effective and acceptable interventions to improve the conditions of individuals and society (American Psychological Association, 2010). Depression and anxiety and excessive weight are public health concerns and potentially modifiable risk factors related to the onset and prognosis of coronary heart disease (Huffman, 2010; Thomsen & Nordestgaard, 2014; Yusuf et al., 2004). Access to evidence-based psychological interventions has the potential to reduce these lifestyle-related risk factors by promoting healthy behavior changes. Although potentially effective psychological treatments exist, many people with symptoms of depression and anxiety do not seek or receive adequate care (Kohn, Saxena, Levav, & Saraceno, 2004). A similar treatment gap has been observed among individuals who struggle to lose weight (Gesundheit, 2012). This gap has been conceptualized as a combination of a lack of service provision and stigma-related avoidance (Clement et al., 2012; Patel et al., 2016). Stigma, referred to as self-devaluation and fear of discrimination, has a detrimental effect on mental health help-seeking (Clement et al., 2015). There is also evidence that individuals with a high BMI avoid seeking health care due to anticipated stigma (Mold & Forbes, 2013). A variety of remote deliveries of psychological interventions are now being developed to improve mental health care coverage across conditions and populations. Anonymity, a particular characteristic of remote delivery, may be especially helpful to facilitate help-seeking among individuals deterred by stigma (Clement et al., 2015; Griffiths, Lindemmeyer, Powell, Lowe, & Thorogood, 2006; Spurgeon & Wright, 2010). This thesis focuses on the impact and acceptability of the remote delivery of psychological interventions as a preventive strategy to improve mental health problems and promote healthy behavior to reduce cardiac risk in potential target populations. I will begin with a presentation of depression, anxiety and excessive weight as potentially modifiable risk factors of coronary heart disease. Thereafter, I will describe strategies to improve healthcare coverage followed by a presentation of the remote delivery of Cognitive Behavior Therapy (CBT) and Acceptance and Commitment Therapy (ACT) as potentially effective treatments to improve the aforementioned risk factors. Specific challenges related to treatment ac-
ceptability and the remote delivery of psychological interventions are described, after which I will outline the rationale and the specific research questions of this thesis.

Modifiable risk factors of coronary heart disease

Cardiovascular disease includes a range of conditions that affect the heart and blood vessels and is a leading cause of death, disability and healthcare costs worldwide (Lennon, Claussen, & Kuersteiner, 2018; Naghavi et al., 2017). Coronary heart disease accounts for a large proportion of total deaths related to cardiovascular disease (Naghavi et al., 2017). Coronary heart disease occurs when plaque builds up inside the coronary arteries that supply oxygen-rich blood to the heart. A myocardial infarction has occurred if the flow of the oxygen-rich blood to the heart is reduced or blocked (ischemia) with resultant cell death (Huffman, 2010). According to a case-control study of over 52 countries, potentially modifiable risk factors related to lifestyle account for 90% of the risk of having a myocardial infarction. These lifestyle-related factors have a synergetic effect and include cigarette smoking, alcohol overconsumption, sedentary lifestyle, low daily fruit and vegetable intake, abdominal obesity, and psychosocial measures related to depression and perceived stress (Yusuf et al., 2004). There is also substantial evidence that symptoms of depression and anxiety contribute to the onset and prognosis of coronary heart disease (Nicholson, Kuper, & Hemingway, 2006; Roest, Martens, de Jonge, & Denollet, 2010; Roest, Martens, Denollet, & de Jonge, 2010). Overweight and obesity have also been associated with an increased risk of coronary heart disease (GBD 2015 Obesity Collaborators et al., 2017; Thomsen & Nordestgaard, 2014).

Depression and anxiety and cardiovascular risk

Depression and anxiety disorders are leading causes of death worldwide, and are associated with substantial health loss across the lifespan (Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015). Depression is characterized by feelings of sadness, tiredness, loss of interest, disturbed sleep or appetite and poor concentration (American Psychiatric Association, 2013). Anxiety disorders include a range of different conditions characterized by excessive fear or worry, autonomic arousal and escape behavior (American Psychiatric Association, 2013). Apart from an increased risk of suicide, mortality among individuals with depression and anxiety has been attributed to indirect causes of death such as heart diseases (Lawrence, Hancock, & Kisely, 2013; Pratt, Druss, Manderscheid, & Walker, 2016). Elevated levels of depression and anxiety have been reported among individuals with coronary heart disease (Huffman, 2010). Comorbid symptoms of depression and anxiety are common
and associated with an even higher mortality compared to non-comorbid symptoms among individuals with an ischemic heart disease (Doering et al., 2010). Symptoms of depression and anxiety have been associated with other known risk factors of coronary heart disease, such as substance abuse (Lai, Cleary, Sitharthan, & Hunt, 2015), little physical activity (Azevedo Da Silva et al., 2012), and overweight and obesity (Luppino et al., 2010). Hence, possible mechanisms between depression and anxiety and negative cardiac outcomes are a combination of adverse physiological changes alongside impaired health-promoting behaviors, such as reduced adherence to recommendations regarding diet, exercise, smoking cessation and medical advice as well as low cardiac rehabilitation attendance (Huffman, 2010).

Overweight and obesity and cardiovascular risk

Overweight and obesity are cited as a top threat to modern-day health (Gregg & Shaw, 2017; Webber et al., 2014). Standard cutoff points for overweight and obesity are defined according to the Body Mass Index (BMI), weight in kilos divided by the square of the height in meters. Overweight is defined as having a BMI between 25 to 29, and obesity as above 30 (GBD 2015 Obesity Collaborators et al., 2017). Excess weight among adults accounts for almost four million deaths globally, in which cardiovascular diseases are the leading causes of death (GBD 2015 Obesity Collaborators et al., 2017). Moreover, adults who are overweight or obese are at increased risk of cardiovascular death compared to adults with a normal BMI (Khan et al., 2018). Having a high BMI is also associated with psychological issues related to weight stigma (Tomiyama, 2014), symptoms of depression and anxiety (Petry, Barry, Pietrzak, & Wagner, 2008), and lower quality of life (Wei et al., 2015). Weight self-stigma refers to self-devaluation and a fear of social discrimination as a consequence of identification with negative stereotypes about being overweight (Lillis, Luoma, Levin, & Hayes, 2010). Weight self-stigma has been identified as a potential barrier for engaging in health-promoting behaviors among individuals with overweight and obesity (Farhangi, Emam-Alizadeh, Hamedi, & Jahangiry, 2017), and a significant factor in failures to reduce and maintain weight loss (Elfhag & Rössner, 2005; Garcia Ulen, Huizinga, Beech, & Elasy, 2008; Lavery & Loewy, 1993). Given that mental health symptoms and overweight are potentially modifiable risk factors of coronary heart disease, preventive efforts are needed to encourage healthy lifestyle changes.

Preventive strategies

Preventive strategies at different levels have been proposed to reduce risk and improve cardiovascular prognosis (Wong, 2014). Primary prevention strategies are directed toward known risk factors to prevent the onset of disease. For
example, healthy lifestyle changes related to diet and exercise have the potential to reduce the risk of myocardial infarction (Yusuf et al., 2004). Secondary preventive strategies are directed toward individuals who already have manifestations of a heart disease, with the aim of improving risk factors related to prognosis and prevent recurrent disease (Wong, 2014). Preliminary evidence suggests that psychological interventions may reduce psychological symptoms of depression and anxiety and reduce cardiac mortality among individuals with coronary heart disease (Richards et al., 2017). However, depression, anxiety and overweight are massive public health concerns. Access to evidence-based interventions is important to reduce the treatment gap and improve global health (Shidhaye, Lund, & Chisholm, 2015). Thus, efforts are needed to improve access to potentially effective treatments.

Remote delivery of psychological interventions

Evidence-based practice refers to the integration of research into clinical practice with the aim of encouraging high-quality care according to patients’ characteristics, culture and preferences (APA Presidential Task Force on Evidence-Based Practice, 2006). Several strategies have been suggested to improve access to evidence-based practices. These include disseminating evidence-based treatments from controlled settings to clinical care, and extending existing effective treatments to reach the many individuals who not receive care (Kazdin, 2017). Moreover, efforts are needed to decrease stigma-related treatment avoidance to improve the willingness to seek help when in need (Patel et al., 2016). Integration of mental health services into primary healthcare and incorporation of technological innovation into existing services may improve mental health care coverage and reduce the stigma associated with seeking help (Rebello, Marques, Gureje, & Pike, 2014). The use of technology such as the Internet and telephone to deliver mental health care and promote self management may reduce the treatment gap by making evidence-based interventions more accessible at a lower cost (Kazdin, 2017; Patel et al., 2016; Spurgeon & Wright, 2010). Commonly cited reasons for why people avoid seeking professional help face to face include a preference to for managing the problem themselves (van Beljouw et al., 2010), concerns that treatment would take too much time, or that it would be inconvenient or expensive (Kessler et al., 2001). Remote delivery has the potential to overcome some of these obstacles by providing flexible services (Kruse et al., 2018). It has also been suggested that the aspect of anonymity embedded in remote delivery may deter issues related to stigma (Griffiths, Lindemmeyer, Powell, Lowe, & Thorogood, 2006; Spurgeon & Wright, 2010). A variety of remotely delivered psychological interventions are now being developed and evaluated as a way to improve access to potentially effective treatments, including internet-based
Cognitive Behavior Therapy (iCBT) and self-help interventions based on Acceptance and Commitment Therapy (ACT).

iCBT
The term CBT is used to describe a range of therapy models that apply principles of respondent and operant conditioning, and cognitive processes in therapy (Herbert, Gaudiano, & Forman, 2013). CBT delivered face to face is a widely used and effective treatment for depression and anxiety disorders among both psychiatric and somatic populations (Butler, Chapman, Forman, & Beck, 2006; Kaczkurkin & Foa, 2015). Preliminary evidence indicates that CBT may reduce symptoms of depression and improve quality of life among patients with a recent myocardial infarction (Berkman et al., 2003).

Typically, iCBT entails similar behavioral-change techniques as face-to-face sessions, such as psycho-education. Other methods offered are self-monitoring, cognitive restructuring, behavioral activation, problem solving and communication training, relaxation, homework assignments, progress monitoring, and relapse prevention (Iakimova, Dimitrova, & Burté, 2017). Therapist support is usually provided in a text message similar to email or via telephone (Andersson, Carlbring, Ljótsson, & Hedman, 2013). Accumulating evidence suggests that guided iCBT is an acceptable, effective, and cost-effective way to reduce symptoms of depression and anxiety (Gavin Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010; Arnberg, Linton, Hulterantz, Heintz, & Jonsson, 2014; Hedman, Ljótsson, & Lindefors, 2012). iCBT may also improve psychological and physical functioning, as well as disease-related impact among individuals with chronic somatic conditions (van Beugen et al., 2014). Preliminary evidence suggests that iCBT may reduce symptoms of depression and anxiety among adults with high cardiovascular risk (Glozier et al., 2013).

Despite considerable research efforts, most psychological interventions including CBT, have proven to be unsuccessful at producing long-term weight loss (Castelnuovo et al., 2017; Davin & Taylor, 2009). Non-surgical methods without the use of drug therapy, such as intensive lifestyle modifications with a focus on diet and exercise appear to achieve a 4-7% reduction in BMI (Gesundheit, 2012). Many individuals also regain weight over time (Brownell, 2010). Moreover, longitudinal studies with a minimum of one-year follow-up indicate that weight loss does not necessarily result in improved quality of life (Hayes, Baxter, Müller-Nordhorn, Hohls, & Muckelbauer, 2017; Kros, Osei-Assibey, Baker-Searle, & Huang, 2016). Instead of defining health gains in terms of weight loss, interventions to promote self-care behaviors that may reduce the impact of weight-related stigma and improve quality of life with or without weight reduction have been called for (Cuschieri & Mamo, 2016; Puhl & Brownell, 2006; Tylka et al., 2014).
ACT self-help

The use of ACT with a focus on increasing behaviors that have a positive impact on overall health, function and quality of life has been suggested as a complement to the standard behavioral intervention of weight control (Lillis & Kendra, 2014). ACT is a modern behavior-analytic approach applied to a range of clinical issues. ACT builds on functional contextualism and its application to human language and cognition, called Relational Frame Theory (Hayes, 2016). A basic assumption of ACT is that experiential avoidance of private events is a common denominator for many psychological problems. Experiential avoidance is the opposite of psychological flexibility and refers to humans’ natural tendency to avoid aversive private events such as thoughts, feelings, and bodily sensations even when doing so causes harm in the future (Hayes, 2004). Evidence suggests that dealing with thoughts and emotional experiences constructively may be vital for successful long-term weight control (Elfhag & Rössner, 2005; Lillis & Kendra, 2014).

Instead of trying to change the frequency or content of private events, ACT teaches acceptance and mindfulness skills to improve psychological flexibility. Psychological flexibility refers to the ability to act in a way that is constructive for yourself and for those around you; this is also referred to as values-based behavior (Hayes, 2004). Accumulating evidence suggests that treatment outcomes in ACT are mediated through improved psychological flexibility (Griffiths, Williamson, Zucchelli, Paraskeva, & Moss, 2018; Twohig & Levin, 2017). ACT may improve symptoms of depression and anxiety (Twohig & Levin, 2017), reduce somatic health complaints (A-Tjak et al., 2015), facilitate healthy behavior change (Zhang et al., 2018), reduce the impact of weight self-stigma, improve quality of life (Griffiths et al., 2018; Lillis, Hayes, Bunting, & Masuda, 2009; Weineland, Hayes, & Dahl, 2012), and promote long-term weight control (Lillis et al., 2016; Niemeier et al., 2012).

The remote delivery of ACT has been studied less than iCBT. Evidence suggests that the remote delivery of ACT may reduce symptoms of depression and anxiety and improve well-being (Brown, Glendenning, Hoon, & John, 2016; Fledderus, Bohlmeijer, Pieterse, & Schreurs, 2012; Ritzert et al., 2016; Thorsell et al., 2011). Moreover, acceptance and mindfulness skills may be taught using text-based self-help interventions (Cavanagh, Strauss, Forder, & Jones, 2014). Preliminary evidence indicates that ACT self-help combined with face-to-face sessions may be an acceptable and effective treatment for improving weight self-stigma, psychological flexibility, health behaviors and mental health outcomes in individuals with obesity (Levin, Potts, Haeger, & Lillis, 2018). However, the study included few participants and no control condition.
Treatment acceptability

Different criteria are used to identify evidence-based treatments. A common criterion is treatment efficacy, the scientifically proven effect of a given treatment compared to a no-treatment control or a treatment-as-usual condition in a controlled setting (American Psychological Association, 2002; Kazdin, 2008). Besides having efficacy, evidence-based psychological interventions must be acceptable and engaging for the intended user (American Psychological Association, 2002). A treatment is considered acceptable when it is perceived as appropriate, fair, reasonable, and nonintrusive for a given problem (Kazdin, 1980; Kazdin, 2000). However, a consensual definition of the term “treatment acceptability” is lacking, and different operational definitions and indicators have been used (Sekhon, Cartwright, & Francis, 2017). Commonly cited indicators include observable behaviors related to take-up rates, retention and adherence (Sekhon et al., 2017). The take-up rate is the proportion of individuals who agree to start treatment relative to the total number approached with the option to start treatment (Kaltenthaler et al., 2008). Retention is the proportion of individuals who complete follow-up measures compared to those who dropout of the study (Murray et al., 2013). Adherence is the usage of an intervention expressed as the proportion of randomized participants who finish the course (Andrews et al., 2018), or complete the prescribed number of modules within the treatment period (Păsărelu, Andersson, Bergman Nordgren, & Dobrean, 2017). Another common indicator of treatment acceptability is the degree of satisfaction and user experience as assessed by self-reports or interviews (Sekhon et al., 2017).

The importance of treatment acceptability

Treatment acceptability is important to consider for numerous reasons. There is an ethical obligation to understand why some treatments are more acceptable than others (Kaltenthaler et al., 2008). Moreover, it is possible that individuals who are matched according to their treatment preference may be more likely to show improvements and less likely to drop out of treatment compared to individuals who do not receive their preferred choice of treatment (Swift & Callahan, 2009). Treatment acceptability may also affect the internal and external validity of study findings (Kaltenthaler et al., 2008). Internal validity is threatened if there is differential drop-out between conditions. External validity is threatened if only a small proportion of the screened patients are willing to enter treatment. Moreover, extensive research indicates that patient expectations about the helpfulness of a given treatment have an impact on outcome (Price, Finniss, & Benedetti, 2008). Treatment effects may also be compromised if adherence is low, or if a substantial number of participants drop out of treatment prematurely (Kaltenthaler et al., 2008).
Acceptability of remote delivery of psychological interventions

Studies investigating iCBT report issues with indicators of treatment acceptability (Gun, Titov, & Andrews, 2011), including low expectations of its helpfulness and credibility (Musiat, Goldstone, & Tarrier, 2014; Wallin, Mattsson, & Olsson, 2016), low take-up rates (Kaltenthaler et al., 2008), high dropout rates (Eysenbach, 2005; Ljótsson et al., 2011), and poor adherence (Păsăreanu et al., 2017). Preliminary evidence also suggests that older individuals may experience more technical problems using Internet-based interventions (Crabb et al., 2012). Studies indicate that recruitment strategies show differences in preferences of treatment delivery. Participants recruited in routine care may have less favorable views of Internet-based interventions compared to face-to-face delivery (Klein et al., 2017). Moreover, individuals recruited through a consecutive clinical procedure may be less motivated to engage in Internet-based interventions compared to participants recruited through self-referral (Iakimova et al., 2017; Ljótsson et al., 2011). Dropout rates and adherence have also been found to vary in self-help interventions for weight loss (Beintner, Jacobi, & Schmidt, 2014; Lee & Lindquist, 2015). Given that remote delivery has the potential to increase access to preventive efforts to reduce cardiac risk, there is a need to investigate indicators of treatment acceptability in contexts where technology-assisted interventions may be an alternative to traditional healthcare services delivered face to face.
Rationale

Depression, anxiety and high BMI are public health concerns associated with increased cardiac risk. Effective and accessible preventive strategies are needed to improve these potentially modifiable risk factors. Remote delivery of psychological interventions may improve access to effective treatment and reduce practical and stigma-related barriers for seeking professional psychological help. Given its potential to reduce the treatment gap, there is a need to evaluate the impact and indicators of treatment acceptability in contexts where remote delivery may be used for primary and secondary prevention of risk factors associated with coronary heart disease. More specifically, there is a need for empirical studies that investigate whether remote delivery improves mental health help-seeking intentions among individuals deterred by stigma. Undergraduate students are a commonly used population for research and a potential target population, as they are used to studying text-based material. Primary care patients represent another potential target population as many people receive mental health services in the first line of care. Few studies have evaluated the effect and acceptability of iCBT to reduce symptoms of depression and anxiety among patients with a recent myocardial infarction. Thus, explorative studies to investigate indicators of treatment acceptability alongside evaluation of treatment effects are warranted. Interventions to promote healthy behavioral change regardless of weight may be a complement to standard weight-loss programs. The anonymity associated with remote delivery may be particularly useful to reach individuals with high BMI who are reluctant to seek face-to-face care due to anticipated stigma. Preliminary evidence suggests that ACT may improve healthy behavior and increase quality of life among individuals with obesity. However, more studies are needed to evaluated the impact and acceptability of brief guided ACT interventions among individuals who struggle to lose weight.
Aims

The overall aim of this thesis is to increase knowledge about the impact and indicators of treatment acceptability of the remote delivery of psychological interventions to improve risk factors associated with coronary heart disease.

The specific aims of the included studies were to:

I Investigate the impact of self-stigma related to seeking help on the preference and intention to seek psychological treatment delivered via Internet compared to face to face among undergraduate students and primary care patients.

II Evaluate the effects of a therapist-guided iCBT intervention and TAU versus TAU only to reduce self-reported symptoms of depression and anxiety among patients with a recent myocardial infarction.

III Explore treatment activity, user satisfaction and experienced usability among participants allocated to a guided iCBT intervention for treatment of depression and anxiety following a recent myocardial infarction.

IV Evaluate the impact and acceptability of a telephone-assisted ACT self-help intervention to improve value attainment related to health and reduce weight-related experiential avoidance among individuals with overweight or obesity.
Methods

Study designs

The studies included in this thesis used both quantitative and qualitative methods (Table 1). Quantitative methods were used to describe, predict and draw causal inferences. In Study I we investigated whether self-stigma related to seeking help predicted treatment preference and intention to seek help via the Internet compared to face to face. Study II was a Randomized Controlled Trial (RCT). Participants were allocated to either iCBT and Treatment-As-Usual (TAU) or TAU only. Outcome measures were collected before and after treatment. The primary outcome comprised symptoms of depression and anxiety as measured by the Hospital Depression and Anxiety Scale (HADS; Zigmond & Snaith, 1983). Remaining outcome measures were considered secondary. Adherence was defined as the proportion of patients to complete the prescribed amount of content within the treatment period (Păsărele et al., 2017). Study III used a mixed-methods approach. Quantitative data to explore treatment activity were registered automatically through the web-based portal. Treatment activity was operationalized as the number of completed modules and assignments, and internal messages sent from patients to therapists. Qualitative data of user experiences were collected through semi-structured telephone interviews conducted after treatment. Study IV used a non-concurrent multiple baseline design across individuals. Intervention onset was randomized according to temporally staggered intervals. Outcome measures were collected daily, and before and after the baseline and intervention phase. The primary outcome was daily ratings of value attainment related to health and weight-related experiential avoidance using the The Bull’s Eye Value Survey (Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012). Remaining outcome measures were considered secondary.
Table 1. Summary of the design of the included studies.

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample</th>
<th>Data collection</th>
<th>Data analysis</th>
</tr>
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<tr>
<td>I</td>
<td>Correlational</td>
<td>Students ((n=267)) and primary care patients ((n=195))</td>
<td>Web-based and paper and pencil questionnaire</td>
<td>McNemar’s test and multilinear regression</td>
</tr>
<tr>
<td>II</td>
<td>RCT</td>
<td>Patients with a recent myocardial infarction ((n=239))</td>
<td>Web-based questionnaire</td>
<td>Multilinear regression and Spearman’s rank order correlation</td>
</tr>
<tr>
<td>III</td>
<td>Mixed methods</td>
<td>Participants randomized to iCBT in Study II ((n=117)) and participants included in follow-up interview ((n=21))</td>
<td>Logged user data and semi-structured telephone interview</td>
<td>Descriptive statistics and inductive qualitative content analysis</td>
</tr>
<tr>
<td>IV</td>
<td>Single case experimental design</td>
<td>Individuals with overweight or obesity ((n=13))</td>
<td>Daily ratings via SMS, and paper and pencil questionnaire</td>
<td>Visual analysis, Non-overlap of all pairs, Wilcoxon signed-rank test and Reliable change index</td>
</tr>
</tbody>
</table>

RCT = Randomized controlled trial, SMS = Short Message Service.
Participants and procedures

Common inclusion criteria in all studies were age ≥18 years old, and an ability to read and write Swedish. Studies I and IV used convenience sampling. In Study II, participants were consecutively recruited in routine care. Study III included a sample of participants allocated to treatment in Study II.

Study I

Undergraduate students and primary care patients were recruited by advertisement and visits to a university, and in three different primary health care clinics between 2014 and 2015. The students included (N=267) had a mean age of 24.5 years (SD=6.1). The majority identified themselves as female (78.7%) and used the Internet daily (97.8%). The primary care patients (N=195) had a mean age of 45.3 years (SD=17.7). About half (56.9%) identified themselves as female. The majority used the Internet daily (92.3%). The students included were referred to a secured web-based survey, while the primary health care patients completed a paper-and-pencil survey. The survey took approximately 15 minutes to complete. Participants received a lottery voucher as compensation.

Studies II and III

Patients under 75 years old with a recent myocardial infarction (<3 months) were screened for eligibility at 25 cardiac clinics between September 2013 and December 2016. Eligibility screening was performed by cardiac nurses during a routine visit one to eight weeks after their myocardial infarction. Exclusion criteria included: being scheduled for a coronary artery bypass surgery; inability to use the Internet or a computer/mobile device; life expectancy of less than one year; anticipated to show poor compliance (e.g. substance abuse); and participation in another behavioral intervention. Research staff contacted eligible patients by telephone to inform them about the study and collect verbal consent. A written consent form was sent to patients via the postal services. The included patients received a user name and a password via email to access a web-based portal. Patients with mild symptoms of depression or anxiety indicated by a score above 7 on either or both subscales on the HADS baseline assessment (Zigmond & Snaith, 1983) were randomized automatically in the portal. Participants subsequently received an email with information about group allocation. Participants with severe depression or suicidal ideation defined as a total score >34, or item 9>3 on the Montgomery Asberg depression rating scale (MADRS-S; Svanborg & Asberg, 2001) were contacted via phone, referred to appropriate care and excluded from the trial. In total, 3928 patients were screened for eligibility (Figure 1). Of those, 1982 were excluded, 1359 declined to participate, and 348 were excluded due to other reasons. The
remaining 239 patients were randomized to iCBT and TAU ($n=117$), or TAU ($n=122$).
Figure 1. Participant flow in studies II and III.
Participants \((n=69)\) allocated to the iCBT condition in Study II between June 2015 and October 2016 were eligible to participate in a follow-up telephone interview (Figure 1). Participants were excluded if they had not filled out the follow-up questionnaires in the randomized trial or if they terminated treatment prematurely. Eligible participants were contacted via telephone. A written informed consent form was sent to participants who were not reached via the postal service. Four participants were not contacted due to administrative reasons. Of the participants who were contacted \((n=56)\), 13 declined to participate and 20 could not be reached or did not return the consent form. Two interviews were excluded due to poor sound quality. This resulted in 21 interviews. Data on number of completed modules, homework assignments, and internal messages sent from patients to therapists were registered automatically through the web-based portal. Individual telephone interviews were conducted by a member of the research staff who had not been involved as a therapist. Interviews were conducted with the aid of a semi-structured interview guide. The interviews were audio recorded and transcribed verbatim and lasted between 22 and 66 minutes.

A summary of the sample characteristics of participants included in the RCT and interviews is presented in Table 2. On average, participants in the RCT were 59.6 years old \((SD=8.49)\), 58.2\% were male, 60.3\% were employed, and 41.8\% had a studied at a university. Both groups had similar baseline characteristics. The baseline sample characteristics of the participants who were interviewed were representative of the participants in the RCT with two exceptions. The interviews did not include any participants who were unemployed or on sick leave. Furthermore, Fisher’s exact test indicated that a higher proportion of the interviewed participants had studied at a university compared with participants who were not interviewed \((p=.027)\).
Table 2. Baseline characteristics of participants included in Study II and Study III.

<table>
<thead>
<tr>
<th></th>
<th>TAU only (n=122)</th>
<th>iCBT (n=117)</th>
<th>Interview (n=21)</th>
<th>No interview (n=69)</th>
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<tbody>
<tr>
<td>Age, M (SD)</td>
<td>60.79 (7.86)</td>
<td>58.37 (8.98)</td>
<td>56.95 (10.38)</td>
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<tr>
<td>Women, n (%)</td>
<td>36 (29.5)</td>
<td>44 (37.6)</td>
<td>7 (33.3)</td>
<td>37 (38.5)</td>
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<tr>
<td>Occupation, n (%)</td>
<td></td>
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<td></td>
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<tr>
<td>Employed</td>
<td>66 (54.1)</td>
<td>78 (66.7)</td>
<td>16 (76.2)</td>
<td>62 (64.6)</td>
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<td>Unemployed</td>
<td>2 (1.6)</td>
<td>4 (3.4)</td>
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<td>4 (4.2)</td>
</tr>
<tr>
<td>Retired</td>
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<td>33 (28.2)</td>
<td>5 (23.8)</td>
<td>28 (29.2)</td>
</tr>
<tr>
<td>Sick leave</td>
<td>1 (0.8)</td>
<td>2 (1.7)</td>
<td>0 (0)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Missing</td>
<td>14 (11.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Highest level of education, n (%)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>26 (21.3)</td>
<td>22 (18.8)</td>
<td>3 (14.3)</td>
<td>19 (19.8)</td>
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<tr>
<td>High school</td>
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<td>45 (38.5)</td>
<td>4 (19.0)</td>
<td>41 (42.7)</td>
</tr>
<tr>
<td>University &lt;3 years</td>
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<td>24 (20.5)</td>
<td>6 (28.6)</td>
<td>18 (18.8)</td>
</tr>
<tr>
<td>University ≥3 years</td>
<td>31 (25.4)</td>
<td>26 (22.2)</td>
<td>8 (38.1)</td>
<td>18 (18.8)</td>
</tr>
<tr>
<td>Country of birth, other than Sweden, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HADS-A, M (SD)</td>
<td>10.21 (2.90)</td>
<td>10.27 (2.94)</td>
<td>9.76 (2.0)</td>
<td>10.39 (3.11)</td>
</tr>
<tr>
<td>HADS-D, M (SD)</td>
<td>8.39 (3.29)</td>
<td>7.97 (3.15)</td>
<td>6.95 (2.42)</td>
<td>8.20 (3.26)</td>
</tr>
</tbody>
</table>

TAU = Treatment-As-Usual; HADS-A = Hospital Anxiety and Depression Scale-Anxiety; HADS-D = Hospital Anxiety and Depression Scale-Depression.

Study IV

Individuals with a BMI ≥25 were recruited through convenience sampling via an advertisement in social media in 2016. Individuals interested in taking part in the study sent an email to a member of the research staff. Potential participants were contacted via phone and informed about the study. In total, 22 individuals were assessed for eligibility (Figure 2). Of these, five declined to participate and four were excluded. All participants included in the analysis (n=13) identified as female with a mean age of 42 years (SD=13.79). The majority had a university degree (n=9), and the remaining participants had finished high school (n=4). On average, participants had a BMI of 29.90 (SD=3.35) within the range 25.03 to 38.39.
The included participants were randomized to different baselines according to three staggered intervals (6-8; 12-14; and 18-20 days). Daily outcome measures were collected via short message service (SMS) once a day throughout the baseline and intervention phases. Participants were instructed to answer the SMS before going to bed. One reminder was sent to participants who failed to return the daily SMS. Standardized outcome measures were collected using a paper-and-pencil survey. The participants received no compensation. The text-based treatment material was sent to the participants via the postal service. Participants returned the treatment chapters to the researchers at the end of treatment in order to evaluate treatment adherence.

**The interventions**

**Study II**

The iCBT intervention was tailored to patients with a recent myocardial infarction. Participants logged onto the web-based portal using a two-factor authentication solution with a password and a numerical SMS verification code. The treatment included 11 modules with different focuses (Figure 3). Each module consisted of text-based treatment material divided into two to four
steps and homework assignments. Participants were given a recommendation to work with one step each week during the 14-week treatment period. The first module was mandatory. Thereafter, participants could choose which modules to work with. Supplementary material was available in an additional module called the Library. Participants had access to a discussion board for communication with other participants.

Each patient was assigned a licensed psychologist trained in CBT. The therapist provided asynchronous written feedback on homework assignments via an internal message function within 24 hours. Therapists contacted participants who had been inactive for more than one week via phone, or via SMS if not reached. The intervention was modified after consultations with test users who had experienced emotional distress after a myocardial infarction, and two cardiac nurses. The introductory module was shortened after a pilot trial (Norlund, Olsson, Burell, Wallin, & Held, 2015). The portal was adapted for handheld devices after 63 participants had been randomized. Patients were treated by their local healthcare providers according to international guidelines regardless of treatment allocation. TAU typically includes information.

**Figure 3.** Sitemap of the Internet-based portal in Study II.
about risk factors and lifestyle changes, cardiac rehabilitation and psychosocial support.

Study IV
The ACT intervention was inspired by a treatment protocol for individuals with obesity (Lillis, Dahl, & Weineland, 2014). The intervention entailed three text-based chapters following key processes in ACT: values, acceptance and mindfulness, and committed action (Figure 4). The chapters were introduced subsequently once a week during a 3-week treatment period. Weekly 30-minute phone sessions provided therapist support and tailored the intervention according to individual needs and preferences.

![Figure 4. Themes and therapeutic objectives in the 3-week ACT intervention.](image)

Implementation of the therapeutic objectives used a combination of learning by text, metaphors and exercises with the purpose of making the treatment material interactive. Participants were encouraged to spend one hour per week working with the text-based material. Each chapter included a weekly committed action based on individually defined values. There were no a priori treatment goals related to specific behaviors. Although daily physical activity was included as a secondary outcome, the intervention did not specifically target level of physical activity. Two licensed psychologists with training in ACT developed the treatment protocol and delivered the intervention.

Data collection instruments
Study I
The Depression Anxiety and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) was used to measure current psychological distress. The scale consists of 21 items divided into three subscales (depression, anxiety,
and stress). Each item is rated on a 4-point scale. For comparison with normative data established with DASS-42, scores are doubled (Gloster et al., 2008). Higher scores indicate a higher level of distress. DASS-21 has shown to be a valid and consistent instrument (Henry & Crawford, 2005; Osman et al., 2012). In Study I, Cronbach’s alpha was .93 across samples.

The Self-stigma of Mental Illness Scale (SSOMI; Tucker et al., 2013) was used to measure mental health self-stigma. The scale consists of 10 items rated on a 5-point scale. Four items are reversed when scoring. Higher scores indicate higher levels of stigma. SSOMI has been shown to be a valid and reliable instrument (Tucker et al., 2013). In Study I, Cronbach’s alpha was $\alpha = .85$ among students, and $\alpha = .87$ among primary care patients.

The Self-stigma of Seeking Psychological Help Scale (SSOSH; Vogel et al., 2013) was used to measure self-stigma related to seeking help. The scale consists of 10 items rated on a 5-point scale. Five items are reversed when scoring. Higher scores indicate higher levels of stigma. SSOSH is a valid and reliable instrument that predicts actual help-seeking behavior (Vogel et al., 2013). In Study I, Cronbach’s alpha among students and primary care patients were $\alpha = .84$ and $\alpha = .85$ respectively. A standard back translation procedure was used to translate SSOMI and SSOSH into Swedish.

Treatment preference was measured with forced choice items. Online interventions were described as psychological treatment delivered via the Internet with the use of text-based educational material, homework assignments and therapist support via e-mail or telephone. First, respondents were asked to indicate a treatment preference if the need arises now or in the future. Possible choices of delivery were: online, face to face, or neither. Thereafter, participants were asked the same question with regard to a problem that they would feel embarrassed to seek help for (stigmatized problem). The possible choices of delivery were: online, face to face, neither, or that there is nothing they would feel embarrassed to seek help for.

The perceived helpfulness of psychological treatment delivered online and face to face was measured with regard to four areas: psychological distress; lifestyle-related problems; interpersonal problems; and personal crisis. Each item was rated on a 7-point scale. Cronbach’s alpha for online interventions was .74 among students and .86 among primary care patient. For face-to-face treatment, Cronbach’s alpha was .87 among students and .89 among primary care patients.

Help-seeking intentions were measured by four items based on the Intentions to Seek Counseling Inventory (ISCI; Cash, Begley, McCown, & Weise, 1975). Participants were asked to rate how likely it is that they would seek psychological treatment delivered online or face to face with regard to the same four areas used to measure treatment expectancy. Each item was rated on a 7-points scale. The original ISCI is a valid and reliable instrument (Wei et al., 2015). Cronbach’s alpha with regard to online interventions was .82
among students and .89 among primary care patients. For face-to-face treatment, Cronbach’s alpha was .86 among students and .88 among primary care patients.

Studies II and III
Socio-demographic data were obtained from self-reported baseline assessments. Medical data were obtained from two Swedish cardiac care registers called RIKS-HIA and SEPHIA.

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) was used to measure symptoms of depression and anxiety. The scale consists of 14 items divided into two subscales, anxiety and depression. Each item is rated on a 4-point scale. Higher scores indicate higher levels of distress. The HADS has been shown to be a reliable and valid measurement in different populations (Bjelland, Dahl, Haug, & Neckelmann, 2002). In Study II, Cronbach’s alpha for the HADS total score was .75. The subscales of depression and anxiety had a Cronbach’s alpha of .74 and .70 respectively.

Montgomery-Åsberg Depression Rating Scale Short Form (MADRS-S; Svanborg & Åsberg, 2001) was used to measure symptoms of depression and/or suicidal ideation. The scale consists of nine items rated on a 7-point scale. Higher scores indicate higher levels of symptoms. The MADRS-S has shown adequate psychometric properties (Holländare, Andersson, & Engström, 2010). In Study II, Cronbach’s alpha was .79.

The Behavioral Activation for Depression Scale-Short Form (BADS-SF; Manos, Kanter, & Luo, 2011) was used to measure symptoms of depression. The scale consists of nine items rated on a 7-point scale. Higher scores indicate higher levels of symptoms. The BADS-SF has been shown to be a valid and reliable instrument (Manos et al., 2011). In Study II, Cronbach’s alpha was .61.

The Cardiac Anxiety Questionnaire (CAQ; Eifert et al., 2000) was used to measure cardiac anxiety. The scale consists of 18 items rated on 4-point scale. Higher scores indicate higher level of symptoms. The CAQ has been shown to be a valid and reliable instrument among cardiac patients (Eifert et al., 2000). In Study II, Cronbach’s alpha was .86.

A semi-structured telephone interview guide was used to evaluate user experiences of the iCBT intervention. The interview guide included questions about positive and negative experiences, preferences and suggestions for improvements. Probes were used to explore experiences and preferences.

Study IV
A modified version of the Bull’s Eye Value Survey (BEVS; Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012) was used to measure daily ratings of value attainment related to health (e.g. with regard to your values, to what
extent have you taken care of your health today?), and weight-related experien-
tial avoidance (e.g. to what extent have thoughts and feelings related to your
weight kept you from living according to your values?). Items were rated on
a 7-point scale. The original BEVS has shown adequate validity and reliability
(Lundgren et al., 2012).

One modified item from the Willingness to Pay-Distress Intolerance
(WTP-DI; McHugh, Hearon, Halperin, & Otto, 2011) was used to measure
daily ratings of weight-related distress intolerance (e.g. what percent of your
monthly income would you be willing to pay in order to get rid of unpleasant
thoughts and feelings related to your weight for the rest of the life?). The item
was rated on a 7-point scale. The WTP-DI has shown discriminant and con-
current validity (McHugh et al., 2011).

Physical activity was measured by a standard pedometer (SILVA Ex-PED)
in terms of total number of steps per day.

The Acceptance and Action Questionnaire for Weight-Related Difficulties
(AAQ-W; Lillis & Hayes, 2008) was used to measure weight-related experien-
tial avoidance. The AAQ-W consists of 22 items rated on a 7-point scale.
Higher scores indicate higher levels of experiential avoidance/less psycholog-
ical flexibility. Five items are reversed when scoring. AAQ-W has shown to
be a valid and reliable instrument (Lillis & Hayes, 2008). In Study IV,
Cronbach’s alpha was .88.

The Brunnsviken Brief Quality of Life Inventory (BBQ; Lindner et al.,
2016) was used to measure quality of life. The scale consists of 12 items rated
on a 5-point scale. An index sum is calculated by multiplying ratings of im-
portance and satisfaction of different life domains. Higher scores indicate
higher quality of life. The BBQ has been shown to be a reliable instrument
(Lindner et al., 2016). In Study IV, Cronbach’s alpha was .68.

The Weight Self-stigma Questionnaire (WSSQ; Lillis, Luoma, Levin, &
Hayes, 2010) was used to measure weight-related self-stigma. The question-
naire consists of 12 items rated on a 5-point scale. Higher scores indicate
higher levels of stigma. The WSSQ has shown to be a valid and reliable in-
strument (Lillis et al., 2010). In Study IV, the WSSQ was translated from Eng-
lish to Swedish using a standard back translation procedure. The translated
scale showed acceptable internal consistency (α=.85).

The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) was
used to measure symptoms of anxiety and depression. The questionnaire was
described under Study II and Study III. In Study IV, Cronbach’s alpha was
.92.

Indicators of treatment acceptability included retention rate, adherence, and
self-reported acceptability. The retention rate was defined as the proportion of
randomized individuals included in the analysis of daily measures. Adherence
was defined as the proportion of completed exercises in the text-based mate-
rial. A modified version of the Treatment Acceptability and Anticipated Ad-
herence Scale (TAAS; Milosevic, Levy, Alcolado, & Radomsky, 2015) was
used to measure overall self-reported treatment acceptability. The scale consists of ten items rated on a 7-point scale. When scoring, six items are reversed. Higher scores represent greater acceptability. TAAS has shown adequate psychometric properties (Milosevic et al., 2015). In Study IV, Cronbach’s alpha was .54.

Data analyses

Study I

McNemar’s test was used to analyze differences in treatment preference for a general mental health condition compared to a stigmatized condition. Multiple linear regression with forced entry was used to investigate whether self-stigma related to seeking help predicts treatment intention difference while controlling for age, gender, country of birth, psychological distress, mental health self-stigma, and treatment expectancy difference. The variables treatment intention difference and treatment expectancy difference were calculated by subtracting individual mean score related to face-to-face treatment from the mean related to online interventions. Assessment of basic assumptions of multiple linear regression were conducted. IBM SPSS 24.0 was used to analyze data.

Study II

Multilinear regression analysis was used to analyze treatment effects. Treatment allocation was entered as the predictive variable. The criteria variable in the main analysis was HADS score at follow-up. Age, gender and HADS baseline scores were entered as covariates. The number of missing values in the primary outcome differed between groups. Multiple imputation via chained equations and predictive mean matching were conducted since values could not be assumed to be missing at random. The main analysis was conducted with the intention-to-treat (ITT) principle. Sensitivity analysis was conducted on observed data. Per protocol analysis included participants that had completed at least one homework assignment. Exploratory analysis of the two subscales HADS-Anxiety and HADS-Depression were performed separately. Only participants scoring above the cutoff on each subscale were included in the analysis. Secondary outcomes were analyzed using ITT only. Effect estimates as pooled adjusted point estimates ($\beta$) with 95% Confidence Intervals (CI) were reported. Paired $t$-tests were performed to investigate change over time across all outcomes. The association between number of completed homework assignments and changes in HADS over time was calculated with the Spearman’s rank order correlation, with alpha level set to .05 (two-tailed). Analyses were performed in R version 3.4.0 and IBM SPSS version 22.
Study III
Data of completed modules, assignments, and internal messages were analyzed with descriptive statistics using R version 3.2.2. Inductive qualitative manifest content analysis was used to analyze the telephone interviews according to recommendations by Graneheim and Lundman (2004). Two of the authors (EW and TC) were responsible for the analysis. Meaning units were defined as words, sentences or paragraphs of positive and negative experiences, or suggestions for improvement. Each condensed meaning unit was labeled with a code to represent the core content with as little interpretation as possible. Codes were sorted into categories and sub-categories. Initially, two of the authors analyzed two interview transcripts independently. Since no important differences were observed when comparing the analysis, one author (EW) analyzed the remaining transcripts. Face-to-face discussions were held between EW and TC about the categorization of codes. Nvivo version 11.3.2 was used to analyze the qualitative data.

Study IV
Evaluation of the daily ratings included visual analysis of changes in level and slope. A non-parametric effect size index was also used to quantify the magnitude of data overlap between baseline and intervention called Non-overlap of All Pairs (NAP; Parker & Vannest, 2009). NAP scores ranging from .5-.65 represent a weak effect, .66-.92 a medium effect, and .93-1 a strong effect (Parker & Vannest, 2009). Daily ratings of experiential avoidance and distress intolerance were reversed so that values above .5 represented improvements across all scales. We compared the overlap between the baseline and the last week of the intervention since the intervention was introduced gradually during the first two weeks.

Changes in standardized outcome measures collected before and after baseline, and before treatment and at 3-month follow up were analyzed using the Wilcoxon Signed Rank Tests. The analysis was conducted with the intention-to-treat (ITT) principle. Missing values were replaced with the Last Observation Carried Forward (LOC). Alpha level was set to .05 (two-tailed). No correction was made for multiple group level comparisons to avoid type II errors when conducting an exploratory analysis (Armstrong, 2014). Effect sizes were calculated according to recommendations by Field (2009). An effect size ≤ .10 is considered small, ≤ .30 is considered medium, and ≤ .50 is considered large (Cohen, 1992). The Reliable Change Index (Jacobson & Truax, 1991) was used to evaluate individual changes in standardized outcome measures before and after baseline and intervention. Participants were placed in one of four categories: recovered, improved, unchanged, or deteriorated depending on the magnitude and direction of change.
The NAP analysis was conducted using online software (www.single-casereasearch.org/calculators/nap). The Wilcoxon Signed Rank Test was carried out in IBM SPSS, version 24. Reliable Change Index was calculated with the aid of Microsoft Excel version 15.40.
Results

Study I

In general, approximately four out of five students (78.3%), and primary care patients (84.6%) preferred face-to-face treatment. For a stigmatized problem, a higher proportion of students (43.4%) preferred treatment online compared to face-to-face delivery (30.3%). Among primary care patients, one third (32.3%) preferred treatment online while 44.1% still preferred face-to-face delivery. The results of McNemar’s tests indicates that a larger proportion of the participants preferred treatment online if seeking psychological help for an embarrassing problem compared to generally among students ($\chi^2(1)= 19.5, p<.001$), and primary care patients ($\chi^2(1)= 13.1, p<.001$). The odds ratio indicates that students were 6.41 (CI 95% [4.05, 10.14]) times more likely, and primary care patients 11.19 (CI 95% [5.29, 23.67]) times more likely to prefer treatment online compared to face-to-face delivery if seeking help for a perceived stigmatized problem.

Overall, students and primary care patients reported lower treatment expectancy, and lower intentions to seek treatment online compared to face to face. The result of the multiple regression analysis indicates that three predictors explained 39% of the variance in treatment intention difference scores among students, ($F(7,233)= 22.69, p< .001, R^2 \text{Adjusted} = .39$). Significant predictors included current psychological distress ($\beta = .15, p= .004$), help-seeking self-stigma ($\beta = .15, p= .034$), and treatment expectancy difference ($\beta = .56, <.001$). Among primary care patients, the result of the regression analysis indicates that four predictors explained 37% of the variance in treatment intention difference scores, ($F(7, 166)= 15.49, p< .001, R^2 \text{Adjusted} = .37$). Significant predictors included age ($\beta = -.14, p= .030$), country of birth ($\beta = -.20, p= .002$), help-seeking self-stigma ($\beta = .17, p= .012$), and treatment expectancy difference scores ($\beta = .53, p= <.001$).

Study II

Out of the total number of patients ($N=3928$) screened for eligibility, 239 (6%) were randomized. Among the participants randomized to iCBT, one (0.9%) individual adhered to the recommended number of one step per week during the 14-week treatment period.
Primary outcome

The result of the main analysis indicates no difference in HADS between groups at follow-up, $\beta = -0.47$ [95% CI = -1.95, 1.00], $p = .53$. Sensitivity analysis of observed data and the per protocol analysis indicate a similar result as the main ITT analysis. Exploratory analyses with regard to HADS-Anxiety and HADS-Depression indicate no differences between the groups at follow-up (Table 3). There was a general reduction in HADS over time in the total study sample with a (mean $\Delta$=-5.1, $t=12.92$, $p < .001$).

Table 3. Baseline, follow-up and change scores, and treatment effects in Study II.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Baseline $M (SD)$</th>
<th>Follow-up $M (SD)$</th>
<th>Change</th>
<th>Effect $\beta$ (95% CI)</th>
<th>$p$</th>
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<tbody>
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<td>HADS</td>
<td></td>
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<td>-0.47 (-1.95 to 1.00)</td>
<td>.53</td>
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<td>.32</td>
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<td>-3.3</td>
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<tr>
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<td>MADRS-S</td>
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<td>-0.58 (-2.20 to 1.04)</td>
<td>.48</td>
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<td></td>
<td>iCBT</td>
<td>14.8 (6.4)</td>
<td>12.0 (7.2)</td>
<td>-2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>15.9 (7.2)</td>
<td>13.3 (7.6)</td>
<td>-2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.73 (-2.83 to 1.38)</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>iCBT</td>
<td>26.1 (10.3)</td>
<td>21.5 (10.2)</td>
<td>-5.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>25.3 (10.8)</td>
<td>22.0 (11.4)</td>
<td>-3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BADS-SF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.50 (-2.31 to 1.30)</td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td>iCBT</td>
<td>21.2 (6.1)</td>
<td>21.4 (6.9)</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>21.4 (7.7)</td>
<td>21.6 (7.2)</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Descriptive statistics ($M, SD$) are based on observed data. Effect estimates ($\beta$) are pooled adjusted coefficients for treatment (iCBT) versus Control (TAU) on follow-up outcomes adjusted for sex, age, and baseline levels of the respective outcomes after multiple imputation. BADS-SF = the Behavioral Activation for Depression Scale-Short Form; CAQ = Cardiac Anxiety Questionnaire; HADS = Hospital Anxiety and Depression Scale total score; MADRS-S = The Montgomery-Asberg Depression Rating Scale-Self Rated; CI = Confidence Interval.

Secondary outcomes

The result of the multilinear model with regard to MADRS-S, CAQ and BADS-SF indicates no differences between groups at follow-up (Table 3).
The total number of completed homework assignments did not correlate with change in HADS scores at follow up ($r_s=.07$, $p=.53$).

**Study III**

**Treatment activity in the randomized controlled trial**

On average, participants in the iCBT condition completed 0.76 modules ($SD=0.93$, range=0-5), and 3.09 homework assignments ($SD=4.05$, range=0-29). Almost all participants (96.6%) initiated, and about half (53.9%) completed the introduction module. A minority (15%) continued to work with an optional module. Participants sent an average of 1.4 messages to therapists during the treatment period ($SD=2.56$, range=0-16). The total number of completed assignments and messages sent to therapist declined over the course of treatment (Figure 5). A slight increase in activity was observed in conjunction to collection with outcome assessments in the middle of treatment, and toward the end of the treatment period.

![Figure 5. Completed modules, completed assignments and messages sent to therapist for each treatment week of the intervention.](image)

**Telephone interviews**

Interviews revealed different subcategories and preferences with regard to the Internet-based portal, the treatment program, therapist communication, and aspects related to the personal situation and required skills (Figure 6-9).
Figure 6. Positive and negative aspects related to the web-based portal.
Figure 7. Positive and negative aspects related to the treatment program.
**Figure 8.** Positive and negative aspects related to the therapist communication.
<table>
<thead>
<tr>
<th>Negative aspects (n)</th>
<th>Categories and subcategories</th>
<th>Positive aspects (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERSONAL SITUATION AND REQUIRED SKILLS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpleasant emotions evoked by the intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad conscience and guilt for being inactive (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment rekindled difficult memories, emotions, and thoughts (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of making mistakes (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lack of time</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of time because everyday chores, children, and working fulltime (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor timing of treatment (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Responding to outcome measures in</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reports were difficult to understand (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reports felt repetitive (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strenuous work to respond to self-report measures (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report measures felt irrelevant (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technical issues</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low computer literacy (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention requires them to spend time in front of a computer (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of Internet connection (2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 9.* Positive and negative aspects related to personal situation and required skills.
In total, interviews revealed 19 suggestions for improvement with regard to the web-based portal, the treatment program, therapist communication, and personal situation and required skills (Table 4).

Table 4. Summary of suggestions for improvement

<table>
<thead>
<tr>
<th>Category</th>
<th>Suggestion for improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web-based Portal</td>
<td>Remove the completed modules to facilitate navigation</td>
</tr>
<tr>
<td></td>
<td>Include the possibility of having several windows open at the same time</td>
</tr>
<tr>
<td></td>
<td>Make the portal available via CD-ROM and as an application for mobile devices</td>
</tr>
<tr>
<td>Treatment program</td>
<td>Have less focus on depression and anxiety following a myocardial infarction</td>
</tr>
<tr>
<td></td>
<td>Include the possibility of asking medical questions to health professionals and other participants in the portal</td>
</tr>
<tr>
<td></td>
<td>Include information about how to communicate with children</td>
</tr>
<tr>
<td></td>
<td>Use easy-to-read language</td>
</tr>
<tr>
<td></td>
<td>Use closed-ended questions with predetermined alternatives in the treatment program</td>
</tr>
<tr>
<td></td>
<td>Prolong the treatment period and allow more time for work with modules that feel relevant for the patient</td>
</tr>
<tr>
<td></td>
<td>Make the program feel more fun for the intended users</td>
</tr>
<tr>
<td>Therapist communication</td>
<td>Offer synchronous verbal therapist communication e.g. via telephone calls.</td>
</tr>
<tr>
<td></td>
<td>Offer more therapist feedback in decision-making concerning which modules to work with</td>
</tr>
<tr>
<td></td>
<td>Use audio or video recordings of therapist feedback</td>
</tr>
<tr>
<td></td>
<td>Entitle the patient with their name instead of username</td>
</tr>
<tr>
<td></td>
<td>Include picture of the therapist in all conversations</td>
</tr>
<tr>
<td>Personal situation and required skills</td>
<td>Individualize the outcome questionnaires</td>
</tr>
<tr>
<td></td>
<td>Make the outcome questionnaires easier to understand</td>
</tr>
<tr>
<td></td>
<td>Allow participants to access previous responses in the outcome questionnaires</td>
</tr>
<tr>
<td></td>
<td>Offer access to treatment closer in time to the infarction</td>
</tr>
</tbody>
</table>

Study IV
Primary outcomes

Visual analysis of level or slope with regard to value attainment related to health indicates changes in the desired direction among eight (62%) participants, and in the undesired direction among one (8%) participant. Visual analysis of level or slope with regard to experiential avoidance indicates changes in the desired direction among five (38%) participants, and in the undesired direction for one (8%) participant. NAP scores indicate an increase in value attainment related to health with a medium effect size among three (23%) participants, and a strong effect size among four (31%) participants (Table 5). NAP scores indicate a decrease in weight-related experiential avoidance with
a medium effect size among one (8%) participant, and a strong effect size among four (31%) participants, see Table 5.

Table 5. Changes in mean standard deviation and NAP scores for daily ratings of value attainment related to health and weight-related experiential avoidance

<table>
<thead>
<tr>
<th>ID</th>
<th>Data points A/B</th>
<th>Value attainment related to health</th>
<th></th>
<th></th>
<th>Weight-related experiential avoidance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M (SD) difference</td>
<td>NAP [90% CI]</td>
<td>M (SD) difference</td>
<td>NAP [90% CI]</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>8/21</td>
<td>0.92 (0.53)</td>
<td>.96** [0.42, 1]</td>
<td>-0.99 (-0.02)</td>
<td>1** [0.49, 1.0]</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8/21</td>
<td>1.78 (0.39)</td>
<td>.95** [0.39, 1.0]</td>
<td>-0.15 (-0.17)</td>
<td>.50 [-0.51, 0.51]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>13/21</td>
<td>1.60 (-0.13)</td>
<td>.93*** [0.41, 1.0]</td>
<td>-1.38 (0.47)</td>
<td>.99*** [0.52, 1]</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>14/21</td>
<td>0.74 (0.26)</td>
<td>.86*** [0.27, 1]</td>
<td>0 (0)</td>
<td>.50 [-0.45, 0.45]</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>20/21</td>
<td>-0.12 (0.04)</td>
<td>.34 [-0.74, 0.11]</td>
<td>0.42 (0.14)</td>
<td>.36 [-0.70, 0.15]</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7/21</td>
<td>1.67 (0.39)</td>
<td>.88 [0.23, 1.0]</td>
<td>-0.48 (0.13)</td>
<td>.72 [-0.08, 0.97]</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7/21</td>
<td>0.52 (0.01)</td>
<td>.76 [-0.02, 1]</td>
<td>-0.57 (-0.15)</td>
<td>.69 [-0.14, 0.91]</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>12/21</td>
<td>0.76 (-0.15)</td>
<td>.83* [0.20, 1]</td>
<td>-1.06 (-0.48)</td>
<td>.83* [0.20, 1]</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>12/20a</td>
<td>1.79 (-0.03)</td>
<td>.95** [0.43, 1]</td>
<td>-1.99 (-0.25)</td>
<td>1*** [0.54, 1]</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>18/21</td>
<td>0.26 (-0.27)</td>
<td>.64 [-0.15, 0.71]</td>
<td>-0.11 (0.05)</td>
<td>.67 [-0.08, 0.78]</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>8/20a</td>
<td>0.98 (0.21)</td>
<td>.67 [-0.17, 0.85]</td>
<td>-0.73 (0.33)</td>
<td>.73 [-0.04, 0.97]</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>14/21</td>
<td>-0.86 (-0.39)</td>
<td>.34 [-0.77, 0.13]</td>
<td>-1.34 (0.05)</td>
<td>1*** [0.55, 1]</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>18/21</td>
<td>0.43 (0.03)</td>
<td>.60 [-0.24, 0.62]</td>
<td>-0.43 (-0.28)</td>
<td>.73 [0.04, 0.90]</td>
<td></td>
</tr>
</tbody>
</table>

Note. Descriptive statistics (M, SD) are based on observed data. NAP = Non-overlap of All pairs; CI = Confidence Interval.
***p <.001, ** p <.01, * p <.05.
a One missing data point in the intervention phase.
Secondary outcomes

Low variability and floor effects were observed with regard to daily ratings of weight-related distress intolerance. NAP scores indicate a decrease in weight-related distress intolerance with a medium effect size ($\geq .82$) among three (23%) participants, and a strong effect size ($\geq .94$) among four (31%) participants. Daily ratings of physical activity indicate high variability in both the baseline and intervention phase. NAP scores indicate an increase in physical activity with a strong effect size (.96) among one (8%) participant.

Wilcoxon Signed Ranks Test indicated significant changes in the desired direction with regard to all standardized outcome measures with large effect sizes ($r \geq .60$) after the intervention, and at 3-month follow-up ($r \geq .67$), compared with prior to intervention onset. Reliable change index indicated changes among participants with regard to AAQ-W (8/13, 62%), BBQ (4/13, 31%), WSSQ (6/13, 46%), HADS (3/13, 23%) after the intervention compared to before. Some of these changes traversed cut-off scores for being categorized as recovered. At 3-month follow-up, some of these changes were maintained. One participant deteriorated with regard to AAQ and WSSQ during the intervention. Results with regard to indicators of treatment acceptability indicate that the retention rate was 62% as 13 out of the 21 randomized participants completed the intervention. Adherence to the treatment varied; 10 participants (77%) completed all exercises and three participants (23%) completed $\geq 90\%$ of the exercises. Overall treatment satisfaction measured by the TAAS ranged from 51 to 70 ($M=62.2, SD=5.26$).
Discussion

Principal findings

Study I

As hypothesized, a larger proportion of the participants preferred an Internet-based intervention if seeking help for a perceived stigmatized problem compared to a mental health problem in general. Furthermore, higher levels of self-stigma related to seeking help predicted higher intention to seek Internet-based interventions compared to treatment delivered face to face. These findings provide supportive evidence that Internet-based interventions represents a less stigmatizing source of treatment compared to traditional delivery in person (Griffiths et al., 2006; Spurgeon & Wright, 2010). Furthermore, the anonymous aspect of remote delivery appears to help to enable help-seeking intentions among those deterred by symptoms associated with stigma (Clement et al., 2015). In line with previous research, perceived helpfulness and self-reported likelihood to use Internet-based interventions were low compared to face-to-face delivery (Musiat et al., 2014). Our findings suggest that efforts to improve the perceived helpfulness may be key to improving the willingness to seek Internet-based interventions.

Studies II and III

The results of study II indicate that iCBT was as effective as TAU in reducing self-reported symptoms of depression and anxiety among patients with a recent myocardial infarction. Findings from both Studies II and III indicate issues related to indicators of treatment acceptability (Sekhon et al., 2017). Adherence and treatment activity were unexpectedly low and declined over time, which indicates that participants received little or no dose of the treatment. It also indicates that the intervention was unsuccessful at engaging participants in the treatment. Moreover, only 6% of the screened patients were randomized. A substantial number of participants declined to participate or were excluded due to low computer literacy. Participants in the iCBT condition were more likely to drop out from the study compared to TAU, ($\chi^2(1)= 8.6, p= .003$). Follow-up assessments were completed by 96 (82.1%) participants in the iCBT condition compared to 115 (94.3%) of the participants allocated to TAU. In Study III, interviews revealed different preferences with regard to the
Internet-based intervention. Negative experiences reported by the participants related to design and usability calls attention to a risk of distress and frustration when faced with technological difficulties (Rozental, Boettcher, Andersson, Schmidt, & Carlbring, 2015). Older adults are more likely to report technological challenges in iCBT trials (Crabb et al., 2012; Waller & Gilbody, 2009). In line with previous findings, the participants reported a lack of support, and limited personalization of the program content (Knowles et al., 2015). Treatments that are perceived as strenuous and as failing to tailor the content in the treatment to the individuals’ needs have been associated with a negative user experience in iCBT interventions (Knowles et al., 2015).

Study IV

Results of the daily primary outcome measure indicate that seven participants improved with regard to value attainment related to health and five individuals improved with regard to weight-related experiential avoidance. The secondary daily outcome measure of weight-related distress intolerance and physical activity indicated issues related to variability and floor effects. A group level analysis of secondary standardized outcomes indicates that the intervention may improve quality of life, reduce symptoms of depression and anxiety, weight-related self-stigma and experiential avoidance. The reliable change index indicated differential responses to the intervention. The results of this study are congruent with previous findings that ACT self-help interventions may reduce symptoms of anxiety and depression, and improve well-being (Fledderus et al., 2012; Ritzert et al., 2016; Thorsell et al., 2011) and weight self-stigma, psychological flexibility, health behaviors and mental health outcomes among individuals with obesity (Levin et al., 2018).

Furthermore, we investigated indicators of treatment acceptability. The retention rate of 62% was lower than what is generally considered acceptable in a randomized controlled trial (Fewtrell et al., 2008). Adherence was higher than previously found in manualized self-help interventions for eating disorders (Beintner et al., 2014) and ACT self-help interventions delivered online to improve mental health and well-being (Brown et al., 2016). Individual sum scores of overall treatment satisfaction were above the 75th percentile, which indicates that the intervention was perceived as acceptable (Milosevic et al., 2015). The findings support previous evidence that guided ACT self-help interventions are perceived as acceptable by the users (Levin et al., 2018).

General discussion

The overall aim of this thesis was to increase knowledge about the use of remote delivery of psychological intervention to reduce the impact of risk fac-
tors related to coronary heart disease. The studies included in this thesis indicate several challenges related to differential responses to treatment and issues related to treatment acceptability and generalizability.

What works for whom and under what conditions
The aim of evidence-based practice is to encourage high-quality care according to the best available research evidence (APA Presidential Task Force on Evidence-Based Practice, 2006). Typically, empirically supported psychological treatments builds on aggregated data that assume that the needs and preferences of different individuals who present with similar problems are relatively homogeneous (Spring, 2007). As illustrated by our findings in Study II, the effects of an empirically supported treatment may not hold up when applied in a new context. Moreover, the findings from Study IV indicate that an intervention may be effective on a group level while individual outcomes may vary. Thus, aggregate data do not necessarily predict individual responses. Effective treatment may not work for different individuals, and some individuals will respond best to treatment that may be ineffective for the majority of users (American Psychological Association, 2002). Previous studies suggest that remote delivery of psychological treatment may be an effective and feasible form of healthcare (Andrews et al., 2010). Possible reasons for the variation in treatment activity and outcomes across settings may be due to the recruitment strategy (Waller & Gilbody, 2009). Participants recruited in clinical care may be less likely to persist with guided self-help treatment compared to participants recruited through self-referral (Cuijpers, van Straten, & Andersson, 2008; Haug, Nordgreen, Öst, & Havik, 2012; Ljótsson et al., 2011). The expansion of healthcare beyond clinics and traditional treatment settings to general social networks may be a potential strategy to improve access to evidence-based practice (Kazdin, 2017). Novel ways to present information and deliver interventions may be a way to bring health care services to people, instead of bringing people to the services. Moreover, it has been suggested that technology-assisted interventions may be better suited for individuals who are familiar with computers, express confidence in writing about thoughts and feelings, and who appreciate the anonymity provided by the medium (Beattie, Shaw, Kaur, & Kessler, 2009). Efforts to identify patient and treatment characteristics associated with differential treatment responses are needed to understand who is likely to respond to which treatment and why (Button, Wiles, Lewis, Peters, & Kessler, 2012). Hopefully, this will allow researchers and clinicians to tailor therapy for each individual (Lutz & Hill, 2009).

The importance of treatment acceptability
Improved access to potentially effective psychological interventions will have little impact if intended users are unwilling to seek or persist with treatment.
Remote delivery of technology-assisted interventions may be unacceptable to potential stakeholders for a variety of reasons. Intentions to seek mental health services are associated with the belief that service use would be helpful to resolve the problem (Schomerus & Angermeyer, 2008). Findings of Study I indicate low perceived helpfulness and little intention to seek remote delivery of psychological interventions compared to face-to-face delivery among students and primary care patients. Low treatment expectancy calls for efforts to improve the credibility of the remote delivery of psychological interventions (Schomerus & Angermeyer, 2008; ten Have et al., 2010). It has also been suggested that communication about how confidentiality is managed in technology-assisted interventions may improve the willingness to seek remote help (Christensen, Reynolds, & Griffiths, 2011). Consistent with previous findings, the results from Study III indicates negative experiences of the Internet program, including technical difficulties (Crabb et al., 2012) and that the pace was too fast (Kaltenthaler et al., 2008). These negative experiences may underpin the reported preference for face-to-face therapist support. Involving potential users throughout the developmental process has been recommended to improve the user experience (Brett et al., 2014). Ideally, involvement of potential stakeholders may result in an intervention closer to the needs, preferences and skills of the intended end-users. Barriers related to uptake and engagement will likely limit the treatment impact of technology-assisted interventions if they are not addressed.

Another aspect of treatment acceptability is how intrusive users perceive the treatment to be (Kazdin, 1980; Kazdin, 2000). Treatment intrusiveness and harmfulness of psychological treatments have not been consistently defined or measured (Olthuis, Watt, Bailey, Hayden, & Stewart, 2016; Vaughan, Goldstein, Alikakos, Cohen, & Serby, 2014). Reports of harmful events are often missing from RCT investigating psychological treatments (Jonsson, Alaie, Parling, & Arnberg, 2014). In Study III, negative experiences reported by the users included feeling stressed by reminders received, feelings of guilt for being inactive, and feeling negative emotions when reminded of aversive memories. The experience of unwanted emotions during psychological interventions may be unavoidable. However, from an ethical point of view, interventions with fewer reported negative experiences should be chosen (Linden, 2013). Non-response to treatment is another unwanted treatment effect that may result in dashed hopes about failed efforts (Barlow, 2010). The investigation of risk-benefits of psychological treatment may shed light on the balance between treatment effects and possible harm and unwanted treatment effects (Jonsson et al., 2014). Furthermore, idiographic efforts to predict individual responses to a given treatment may be a valuable complement to aggregated data examining the average response of a group of individuals (Barlow & Nock, 2009). Qualitative approaches may be used to generate hypotheses about how to improve user experiences.
How to improve treatment generalizability

The extent to which treatment effects are generalizable across populations, problem areas and to other contexts is a central issue for evidence-based treatments (Kazdin, 2008). Flexibility, including choice with regard to treatment content is suggested as critically important for extending the generalizability of evidence-based interventions (Kazdin, 2017). Tailored and transdiagnostic treatments have been developed to allow flexibility with regard to service use and to address issues related to comorbidity (Andersson et al., 2013; Păsărelu et al., 2017). The text-based treatment material in Study II was adapted for patients with a recent myocardial infarction. The treatment program allowed participants the flexibility to tailor the treatment and select which modules they preferred to work with. However, follow-up telephone interviews indicate that preferences regarding the treatment program as well as type of therapist communication and required skills varied considerably among individuals. A number of the interviewed participants described the focus of the treatment and its content as irrelevant. It is possible that more flexibility regarding the choices in the treatment program would have yielded a better match between the intervention and individual preferences. Moreover, it has been suggested that a focus on specific treatments for specific conditions may fail to account for common factors across disorders and a diverse range of patients with varying comorbidities (APA Presidential Task Force on Evidence-Based Practice, 2006). Transdiagnostic treatments aim at targeting common mechanisms underlying multiple psychological or behavioral problems and may therefore be applicable across individuals and conditions (Păsărelu et al., 2017). Another potential strategy to improve the generalizability of evidence-based treatments is to target behaviors that have an overall positive effect on health regardless of the underlying problem (Kazdin, 2017). For example, ACT to improve healthy behavior may be used to improve multiple risk factors of coronary heart disease and other somatic diseases. Remote delivery of psychological interventions aims at increasing access to evidence-based treatments and improving user convenience. Novel ways to allow treatment flexibility may enhance generalizability and improve user satisfaction and engagement.

Methodological considerations and limitations

Design

Multilinear regression was used in Study I to investigate the association between multiple independent variables and a dependent variable. The study was correlational, which precludes causal inferences between variables. We controlled for common confounding variables such as age and sex as they may be associated with both the dependent and independent variables (Schneider,
Hommel, & Blettner, 2010). Future studies should include other variables of interest such as previous or current use of mental health services.

In Study II, participants were assigned randomly to iCBT and TAU or TAU only to control for time effects and differences between groups that may arise from chance alone. Randomized controlled trials have a high degree of experimental control and allow causal inferences (Essock, Drake, Frank, & McGuire, 2003). However, low adherence and premature drop-out in the iCBT condition compromise the internal validity of a study (Kaltenthaler et al., 2008). Non-usage of an intervention leads to an underestimate of the potential effect of a given treatment and drop-outs complicate interpretation of the results, as it is difficult to understand the effect among the participants who did not report follow-up measures (Murray et al., 2013). Moreover, symptoms of depression and anxiety improve over time in both groups. Mental health screening and access to face-to-face counselling is included in TAU after a myocardial infarction in Sweden (Ogmundsdottir et al., 2017). It is possible that individuals with a recent myocardial infarction already have access to adequate mental healthcare services. For example, participant in both conditions reported initiating contact with a local counsellor during the study period. However, several alternative explanations may account for the reduction in symptoms in the total study sample, including regression to the mean and spontaneous recovery. The reduction in symptoms may also be a product of the Hawthorne effect, which refers to a change in behavior as a result of the awareness of being observed (Chen, Vander Weg, Hofmann, & Reisinger, 2015). It is also worth noting that TAU includes different elements for different individuals with a recent myocardial infarction, which complicate the comparison between the experimental and the control group. Moreover, mild symptoms of depression and/or anxiety were used as inclusion criteria. This may have resulted in an underestimate of the potential difference between the conditions, as there is little room for improvement when symptoms are mild at baseline.

In Study III, we used a mixed method approach to describe treatment activity and explore user experiences. A combination of quantitative and qualitative research methods may be used to quantify a phenomenon and to generate new hypotheses (Malina, Nørreklit, & Selto, 2011). The trustworthiness of these hypotheses is enhanced if the participants have experience with the phenomena under study (Graneheim, Lindgren, & Lundman, 2017). Since participants included in the interviews completed few modules, user experience most likely relates to initiating treatment and reasons for discontinuing the intervention.

In Study IV, we used a multiple baseline design to control for threats to internal validity, such as history and maturation (Tate et al., 2016). Randomization of intervention onset was used to improve the internal validity by controlling for potential confounding variables associated with readiness or eagerness to participate (Kratochwill & Levin, 2010; Rhoda, Murray, Andridge,
Pennell, & Hade, 2011) and history (Christ, 2007). Ideally, an experimental effect in a multiple baseline design is demonstrated when there is a clear change in the target behavior when an intervention is introduced according to staggered intervals across different participant (Rhoda et al., 2011). If this change is absent among other participants, it is unlikely that collection of frequent assessments is influencing the ratings and threatening internal validity (Biglan, Ary, & Wagenaar, 2000). However, the design of Study IV did not control for when the participants started the intervention. Participants could start working with the text-based material at any time during the first treatment week. The intervention was also introduced gradually over the course of the first two weeks and any experimental effects were expected to be delayed. Allowing sufficient time for the intervention to show an effect before introducing it to another set of participants would have addressed issues related to latency to change to some extent (Rhoda et al., 2011). Extending the baseline phase further would have prolonged the study duration and could have been inconvenient for the participants. Moreover, visual inspection of the baseline ratings of the primary outcomes indicates high variability. Unstable baselines and high variability makes it harder to detect an experimental effect. Uncontrolled variability is a common problem with multiple baseline design and it may be a consequence of unreliability of the measurement or of inherent the instability of the process being studied (Biglan et al., 2000). Another potential confounding variable and threat to the internal validity is that the participants knew what kind of treatment they were receiving and the timing of the intervention onset, which might have influenced their ratings. Given the specific requirement of a multiple baseline design, it has been suggested that this type of design may be used in the development process of an intervention before being followed by evaluation of efficacy and generalizability in a randomized controlled trial (Biglan et al., 2000).

Data analysis

In Study I, the basic assumptions of multilinear regression were met. Study II had enough participants \( n > 126 \) to detect a medium effect size \( (d = .5) \) with a power of 80% at alpha level .05. The power analysis was conducted a priori. The variables of age, gender and baseline HADS-T were entered as covariates in the multilinear model to control for potential differences between groups at baseline. In Study III, we used qualitative content analysis to systematically describe patterns in text-based data with as little interpretation as possible. However, qualitative approaches always include an element of abstraction (Patton, 2002). Including more than one researcher in the analysis process is a way to strengthen the trustworthiness of the study as a co-researcher may have different preconceptions and perceive the content differently (Graneheim et al., 2017). Sufficient data are needed to cover significant variation rather than a specific number of participants (Graneheim et al., 2017). Toward the
end of the analysis process, codes were sorted into existing categories which indicate that adding more participant would have yielded little difference. In Study IV, statistical analysis was used to complement visual analysis of daily outcomes. The use of both approaches has been recommended since visual analysis may be unreliable (Tate et al., 2016). There is a lack of consensus about the appropriate use of statistical methods in single-case designs (Smith, 2012). For example, there may be other methods of analyzing overlap between phases that may be better suited to control for baseline trends (Tarlow, 2017). Another limitation relates to the use of multiple statistical comparisons without correcting for the increased probability of falsely rejecting the null hypothesis as the number of comparisons increase (Pike, 2011). Moreover, the use of LOCF is a commonly used and simple method to account for missing values. However, this method may overestimate the benefit of a given treatment if the missing value is replaced by an earlier value that is better than the true missing value (Lachin, 2016). Hence, the results of the statistical analysis should be considered provisional.

Data collection instruments
Self-report questionnaires are commonly used in psychological research as they allow quantification of unobservable private events such as thoughts, feelings and experiences. However, the use of a single method to assess a construct of interest may result in a mono-method bias that may threaten the construct validity. Moreover, self-reports have several disadvantages and potential sources of measurement error. In Study I, the items with regard to treatment preferences and intentions to seek help represented hypothetical questions about future behavior. Attitudes have been associated with actual help-seeking behavior (ten Have et al., 2010). However, there is no direct correlation between any particular attitude and actual help-seeking behavior (Gulliver, Griffiths, Christensen, & Brewer, 2012). Moreover, the order of items in a questionnaire may influence the response (Reis & Judd, 2000), as preceding items may influence subsequent responses (Tourangeau & Rasinski, 1988). Preferably, the items regarding treatment preference, intentions and perceived helpfulness would have been randomized in order to control for order effects. Although the internal consistency of the scales in the study was satisfactory, it is also worth noting that the scales translated into Swedish or otherwise modified have not been validated.

Memory bias in retrospective questionnaires is a threat to internal validity as past negative mood states may be exaggerated as compared to daily ratings (Sato & Kawahara, 2011). Study II included patients who reported mild symptoms of depression and anxiety in the past week. It is possible that the tendency to overestimate past negative mood states resulted in the inclusion of participants with low levels of distress and perceived need for treatment. However,
it is also possible that patients may have under-reported the severity or frequency of symptoms due to non-disclosure, which has been identified as a commonly used strategy to avoid mental health stigma (Clement et al., 2015).

Measurement error may occur if respondents misread or misunderstand questions (Reis & Judd, 2000). In Study III, interviews revealed negative aspects related to the self-reports that were used to evaluate the outcome in study II. Questions were described as difficult to understand, repetitive and irrelevant. Responding to the questionnaire was described as strenuous work. It is possible that these negative experiences may have led to measurement errors. Respondents may have misreported “difficult to understand questions” and failed to pay attention to questions presented towards the end of the survey due to exhaustion effects.

In Study III, telephone interviews were used to collect qualitative data regarding user experiences. Telephone interviews may result in a loss of non-verbal data and thereby compromise probing and interpretation of responses. On the other hand, the anonymity provided by the medium may allow respondents to feel relaxed and more able to disclose sensitive information (Novick, 2008). The interviews were conducted by a member of the research team without prior involvement in the Internet-based treatment in order to reduce the risk of socially desirable answers. A semi-structured interview guide was used to enhance instrumental consistency between interviews (Lincoln & Guba, 1985; Patton, 2002). Semi-structured interviews include a predetermined set of questions to facilitate quantification and allow additional questions to explore issues brought up by the interviewee. This combination allows the collection of rich textual data that can be analyzed with quantitative and qualitative approaches (Cachia & Millward, 2011).

Study IV used a daily assessment of distress tolerance as an outcome measure. However, the low variability combined with the floor effects shown in this study call into question the use of this item in this population. Furthermore, the primary daily outcome measure of value attainment and experiential avoidance showed variability during the baseline phases across individuals. These outcome measures referred to functional classes of behaviors rather than the topography of behaviors. Operationalization of individually defined values-based behaviors may potentially have yielded less variability and more stable trends during the baseline and intervention phases. However, the ability to discriminate between different functional classes of behavior was a therapeutic objective of the ACT intervention. Daily self-assessment may have a therapeutic effect (Shiffman, Stone, & Hufford, 2008). A functional rather than topographical definition of the primary outcome was used to facilitate the therapeutic learning objectives in the treatment.
Generalizability

Several factors may limit the external validity and generalizability of the studies’ findings. Biases related to sampling may occur if a sample does not include a proportion of the population of interest (Reis & Judd, 2000). In Study I, it is possible that students and primary care patients with high or low levels of stigma related to help-seeking refrained from participation in the study. The majority of participants in both samples had a university education and used the Internet daily. Moreover, while some participants had previous experience with psychological treatment delivered face to face, only a minority had previous experience with Internet-based interventions. Previous experience with psychological treatments and level of computer use and literacy may affect attitudes toward different treatment formats, which may restrict the generalizability of the results to other populations.

The generalizability of the results is threatened if only a small proportion is willing to enter a treatment (Kaltenthaler et al., 2008). The findings in Study II suggests that only a minority of the screened patients were randomized. A substantial number of participants declined participation or were excluded due to low computer literacy. Moreover, only patients under 75 years of age were screened for eligibility since this is the upper age limit for being included in the Swedish cardiac registers RIKS-HIA and SEPHIA. The majority of participants were male, in a relationship and born in Sweden. Therefore, the sample may not fully represent the population of patients with symptoms of depression and anxiety after a recent myocardial infarction.

It has been argued that generalizability is not the focus of qualitative research as these approaches are designed to study a specific phenomenon in a certain population (Leung, 2015). On the other hand, the level of transferability to similar settings and populations has been included as a criteria for judging the trustworthiness of qualitative findings (Graneheim & Lundman, 2004). To facilitate transferability in Study III, an in-depth description of the iCBT intervention was provided. Participant characteristics were described as well as the process of data collection and analysis. Illustrative quotes and frequency counts of the number of codes included in the subcategories were provided to describe the findings in sufficient detail. However, only a subsample of participants in the randomized control trial was included in the follow-up interviews due to practical and economical limitations. Of the 69 eligible participants, 21 (30.4%) were included in the qualitative content analysis. Therefore, the interviews may not fully represent the range of experiences of the participants included in the iCBT condition. Moreover, none of the participants who were unemployed or on sick leave were included in the follow-up interviews. A higher proportion had studied at a university compared to those who were not interviewed. It is also possible that participants with more positive attitudes toward treatment were more likely to participate in an interview about
user experiences. These factors imply a source of bias that may impact the result and limit the transferability of the results.

In Study IV, the extent to which the results can be generalized can be questioned as multiple baseline design involve a small sample of participants (Biglan et al., 2000). Moreover, all of the participants included in the analysis identify as female and reported a high level of education, which limits the generalizability of the results to other populations. The sample was recruited by self-referral via social media. This recruitment strategy may have resulted in a selection of individuals that felt comfortable with technology-assisted communication. It is also likely that the recruitment strategy resulted in a selection of individuals who had positive attitudes toward psychological treatment in general and toward ACT treatment principles specifically.

Ethical considerations
The studies included in this thesis adhered to the ethical codex outlined in the Declaration of Helsinki (World Medical Association, 2013) designed to ensure respect for each participant’s right to make informed decisions about entering and withdrawing from research. Approval was obtained from the Ethical Regional Board in Uppsala prior conducting Study I (2014/476), Study II and III (2011/217), and Study IV (2015/063). The research was conducted in accordance with the approved proposals. When substantial changes were made, which was the case in Study II, additional approval from the Regional Board in Uppsala was obtained. Moreover, Study II was pre-registered at ClinicalTrials.gov the on January 5, 2012 (NCT01504191) with the purpose of improving transparency and reducing publication bias and selective reporting (El-Menyar, Aslam, Imanullah, & Asim, 2013). Data are stored in a locked facility at the Uppsala University.
Conclusions

The following conclusions are drawn based on the results and limitations of the included studies:

- Internet-based interventions may facilitate mental health help-seeking among individuals who are reluctant to seek face-to-face treatment due to stigma-related avoidance. However, low expectations about the helpfulness of Internet-based interventions may limit the willingness to seek such help.

- There were no differences in symptoms of depression and anxiety among participants with a recent myocardial infarction randomized to either iCBT and TAU or TAU only. Low adherence and negative user experiences among participants randomized to the iCBT intervention indicate issues related to treatment acceptability. Researchers and clinicians need to consider the preferences, personal situation, and technical skills of the end users during the development of Internet-based interventions to improve treatment activity, user satisfaction, and usability among individuals with a recent myocardial infarction.

- A brief ACT intervention with therapist support via telephone may be an acceptable intervention to increase behaviors that have a positive effect on health among individuals with overweight and obesity.
Future research

The results of the studies indicate that more research is needed to understand for whom and under what conditions remote delivery of psychological treatment may be an acceptable and effective treatment alternative.

- Development of a validated measure of barriers and facilitators related to Internet-based interventions may be a useful tool to investigate for whom and in which contexts Internet-based interventions may be an acceptable treatment alternative.

- More knowledge is needed about what kind of support patients with a recent myocardial infarction prefer and how this support can be delivered to improve treatment activity and user experience using mixed method studies and feasibility trials.

- Future studies, preferably randomized controlled trials with an active control group, are needed in order to investigate the impact and acceptability of the remote delivery of ACT to improve values-based behavior.
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