

# **Self-Harm among Adolescents: From Identification to Tailored Treatment**

**Anita Johanna Tørmoen**

**National Centre for Suicide Research and Prevention  
Institute of Clinical Medicine,  
Faculty of Medicine,  
University of Oslo**

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## **SUMMARY**

### Background and aims:

Non-suicidal self-harm and suicide attempts among adolescents are highly prevalent and associated with psychosocial problems. There is a considerable lack of knowledge about the link between non-suicidal self-harm and what treatment is effective. The overall aims of this thesis has been: first to investigate prevalence and characteristics of adolescents with non-suicidal self-harm and/or suicide attempts, and their contact with relevant treatment providers; secondly to test whether a tailored treatment (Dialectical Behavioural Therapy adapted for adolescents, DBT-A), could be implemented and delivered to adherence within a Norwegian child and adolescent psychiatric clinical context; and finally to examine the efficacy of this treatment.

### Methods:

The thesis comprises three studies. Papers I and II used data from a large-scale cross-sectional school-based survey of 11,440 adolescents in Oslo. Participants were asked about past and current self-harm behaviours and about psychosocial problems and contact with help services. They were divided into the following four groups according to their lifetime self-harm experiences: those who had experienced *non-suicidal self-harm only*, those who had *suicide attempts only*, those who had *both* and those who had *neither*. Paper III used an uncontrolled naturalistic design and embraced a clinical sample of 27 adolescents referred to outpatient treatment. Participants were interviewed about and assessed for relevant clinical characteristics and recruited to a treatment programme of Dialectical Behaviour Therapy for Adolescents (DBT-A). In Paper IV, a single blind randomized controlled design was used. A total of 77 adolescents referred to regular outpatient treatment and screened for current self-harm behaviour were included and assigned to either enhanced usual care (EUC) or DBT-A, after having been interviewed and assessed on relevant clinical characteristics. Participants in the two clinical samples (Papers III and IV) were recruited from the same catchment area as the survey sample participants (Papers I and II).

### Results:

In Paper I, our findings were that 4.3% of participants reported non-suicidal self-harm only; 4.5% reported suicide attempts only, whereas 5% had a history of both. Participants in the

latter group were more often girls, and reported more suicidal ideation, more problematic lifestyles, and poorer subjective health; they had more psychological problems than the other groups of self-harming participants.

In Paper II, we report on adolescents' previous contact with child and adolescent psychiatric outpatient services. Such contact was significantly associated with all three patterns of previous self-harm behaviour, with a particularly elevated likelihood of contact among participants with both non-suicidal self-harm and suicide attempts. However, only a minority (37%) of participants in this group had had contact with psychiatric outpatient services. Having a non-western ethnic background further reduced the likelihood of such contact.

In Paper III, we report that therapists recruited and trained in DBT-A obtained favourable therapy adherence scores relatively quickly; that the treatment programme was well accepted by patients, and that we observed a decrease in self-harm behaviour and in urges to self-harm and suicide attempts among the patients during the treatment course.

In Paper IV, we report that DBT-A was superior to EUC in reducing self-harm, suicidal ideation and depressive symptoms over the course of 19 weeks of treatment. Effect sizes were large for treatment outcomes in patients who received DBT-A, whereas effect sizes were small for outcomes among those having received EUC.

#### Conclusions:

Self-harm is prevalent among Norwegian adolescents and co-occurs with several mental health and behavioural problems, yet the majority of self-harming adolescents do not report being in contact with the appropriate health services. Our findings that dialectical behaviour therapy adapted for adolescents could be successfully implemented and well accepted by participants and that this treatment could effectively reduce self-harm, suicidal ideation and depressive symptoms, altogether provide good reason for treatment optimism with regard to this substantial public health problem.

## **ABBREVIATIONS**

<b>SH</b>	=	Self-Harm
<b>NSSH</b>	=	Non-Suicidal Self-Harm
<b>SA</b>	=	Suicide Attempt
<b>NoSH</b>	=	No Self-Harm
<b>NSSI</b>	=	Non-Suicidal Self-Injurious Behaviour
<b>SI</b>	=	Suicidal Ideation
<b>DBT</b>	=	Dialectical Behaviour Therapy
<b>DBT-A</b>	=	Dialectical Behaviour Therapy adapted for Adolescents
<b>RCT</b>	=	Randomised Controlled Trial
<b>BPD</b>	=	Borderline Personality Disorder
<b>CAPS</b>	=	Child and Adolescent Psychiatric Services

## **LIST OF PAPERS**

### **Paper I**

Tørmoen AJ, Rossow I, Larsson B, Mehlum L: Nonsuicidal self-harm and suicide attempts in adolescents: differences in kind or in degree? *Social Psychiatry and Psychiatric Epidemiology* 2013, 48:1447–1455

### **Paper II**

Tørmoen AJ, Rossow I, Mork E, Mehlum L: Contact with child and adolescent psychiatric services among self-harming and suicidal adolescents in the general population: a cross sectional study. *Child and Adolescent Psychiatry and Mental Health*. 2014 Apr 17;8(1):13

### **Paper III**

Tørmoen AJ, Grøholt B, Haga E, Brager-Larsen A, Miller A, Walby F, Stanley B, Mehlum L: Feasibility of Dialectical Behavior therapy with Suicidal and Self-harming Adolescents with Multi-problems: Training, Adherence and Retention. *Archives of Suicide Research* 2014, 18 (4):432-44

### **Paper IV**

Mehlum L, Tørmoen AJ, Ramberg M, Haga E, MyDiep L, Laberg S, Larsson B, Stanley B, Miller A, Sund AM, Grøholt B: Dialectical Behavior Therapy for Adolescents with Repeated Suicidal and Self-harming Behavior – A Randomized Trial. *Journal of American Academy of Child and Adolescent Psychiatry*. 2014 Oct 53, (10)1082–1091

The papers will be referred to by their Roman numerals.



## **PREFACE**

*Som relativt nyutdannet skulle jeg ha en samtale med en ung jente. Jeg var ansatt i en av de første stillingene som ble opprettet etter «Opptrappingsplanen for psykisk helse», i en bydel i Oslo. Hun var utskrevet fra sykehus samme dagen, etter et selvmordsforsøk. Det jeg har tenkt mest på i ettertid er at hun i samtalen sa hun hadde vært full, at hun egentlig ikke ville dø, men at hun der og da hadde følt seg forlatt og var sjalu. Selvmordsforsøket kunne ført til livslang skade eller død. Det hender jeg får hilsener fra tidligere pasienter som har fått et bedre liv, eller som på tross av vanskelige liv sier at de er glad i livet, og for at de gikk i behandling. De motiverer og inspirerer til både videre forskning og klinisk arbeid. Hun er en av dem.*

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The milieu at NSSF has extensive knowledge of clinical suicidology, and I am grateful for being allowed to be a part of this stimulating environment. My supervisors were Professors Lars Mehlum, Ingeborg Rossow and Bo Larsson. I am grateful to my main research supervisor Lars, for guiding me through this large project, for all the discussions and advices, and for his patience and support. Lars contributed substantially in all phases in this project, sharing his knowledge from both clinical and scientific experience, and was available when I needed him. He has shown me that hard work is necessary to achieve a goal, and that the devil is in the details. Ingeborg supported me during challenges in the research process, she was always available for methodological supervision, and helped me perform statistics. Ingeborg deserves thank for being so generously available for me in writing up this thesis, and she has been patient in learning me how to write scientific papers, always providing me with valuable advices during the writing process. Bo deserves thanks for getting me started, helping me perform the statistical analyses in the first paper, for always being friendly and enthusiastic, and for his humorous perspective on life. I would also like to thank my colleagues, both at NSSF and at Oslo University Hospital. In particular Erlend Mork, who patiently read all of my drafts, gave valuable feedback, and supervised me on statistics. I also thank the clinical research group at NSSF, and in particular my fellow PhD candidates who were important in drafting the papers; Maria Ramberg, MD and Ruth-Kari Ramleth, MD. Egil Haga, PhD deserves thank for his support in managing large amounts of clinical data, and for useful comments on both practical and scientific issues. Further thanks to Wenche Andreassen for always finding solutions to problems, and the other colleagues at NSSF for

being social and supportive. I also want to show my gratitude to all the adolescents and their families in therapy, to the therapists involved in this project, the leaders that supported the study, and to my clinical supervisors over the years that made me more confident as a therapist and researcher.<sup>1</sup>

Thanks to everyone in my family. Most of all I want to thank my dearest Fredrik Andreas Walby. You were the one that started with your PhD project at the Centre; you inspired me to learn more about evidence based treatment and research in general. You have given invaluable clinical supervision and emotional support since we started our studies in psychology together, back in the nineties. Or, when lost in the wilderness *“sleeping in the woods by a fire in the night”*. Our two adolescents Johanna and Robert; you are my *“radiant jewels; so easy to look at, but hard to define”*.<sup>2</sup> Thank you.

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<sup>1</sup> To illustrate some of my points through this thesis, I have written small clinical vignettes. They are based on a synthesis of what I have heard through the years working with this thesis, but not on any single patient.

<sup>2</sup> The two quotes in italics are from Bob Dylan’s song Sara from the album “Desire” from 1976.

## 1. INTRODUCTION

Despite mankind's innate drive for survival and good health, there are many examples throughout history and contemporary human behaviour that seem antithetical to these ambitions. Self-harm is a striking example of such. Self-harm is highly prevalent, to the extent that it comprises a large and important public health problem. Describing these phenomena and understanding why people engage in self-harming behaviour has gained increased focus in social policy, professional practice and research in particular from the 1990s and onwards (Madge et al., 2008).

There may exist numerous reasons why people want to harm themselves, but often self-harm seems to be related to the need to regulate emotions. In itself, self-harm might be a serious hazard to one's own health, although the actual physical harm may vary greatly. Furthermore, self-harm is a strong predictor of future suicide. Self-harm is a disturbing and perplexing behaviour, with profound effects both on the person who self-harms and on people in their immediate environment.

Thus, treating and preventing self-harming behaviour is of utmost importance from both an individual and a public health perspective. Despite the fact that self-harm is particularly prevalent in adolescence (Nock et al., 2013) and is associated with mental health difficulties that may possibly be prevented by early recognition and intervention, studies that move beyond identification are scant, and treatment studies that focus on reducing this behaviour directly are few. This thesis examined the prevalence, associated factors and treatment of self-harming behaviours among adolescents.

*Live, a sixteen year old girl visited the doctor, not saying anything, looking down, but with scars and a new cut on her wrists. She had taken an overdose of paracetamol last night. Her mother and foster parents were upset. They had stayed up all night, but Live had not said much besides screaming "Leave me alone". The doctor was shocked at how much pain they all were in. She felt desperately in need of more knowledge and consulting a colleague, realizing her own emotions made her distressed and worried.*

## **1.1 Defining self-harming behaviours**

Research in the field of suicidology has suffered from lack of definitional clarity (Silverman, Berman, Sanddal, O'Carroll, & Joiner, 2007a). Since no set of uniform and consistent definitions of self-harm exist, there are inconsistencies in the definitions and measures of self-harm across studies and continents. Numerous terms are used to describe the same behaviours in various research projects, or the same terms are used to describe different phenomena. It is outside the scope of this thesis to clarify further on this important issue, but it is important to use a terminology that makes it possible to compare research findings and also is applicable in clinical settings.

In the United States, the research literature tends to distinguish between self-harm with some intent to die (suicide attempt), non-suicidal self-injury (NSSI) which excludes self-poisoning, and self-harm with undetermined intent. The reason for excluding self-poisoning from the term non-suicidal self-injury is the assumption that self-poisoning may not relate to the explicit need for regulating emotions. Non-suicidal self-injury is defined as a direct (the ultimate outcome of the injury occurs without intervening steps) and deliberate destruction of one's own body tissue, while overdosing of medication is argued to be indirect, causing negative health outcomes through chemical processes (Nock, 2010).

On the other hand, it could be argued that the most important distinction should be made based on the *intent* behind self-destructive behaviours, not the methods used to harm. In line with this argument, a large European epidemiological study on self-harm of adolescents (the CASE study) found that the method of self-harm was not related to the intent (Ystgaard, Reinholdt, Husby, & Mehlum, 2003). In Europe, the broader term "self-harm" embraces both self-poisoning and self-injury such as cutting, irrespective of the intent, whereas the term "non-suicidal self-harm" refers to such self-injurious behaviour with no intent to die. The latter is most similar to the above-mentioned NSSI, and reviewing the literature revealed that in spite of this possible distinction, overdoses is included in self-harm behaviour labeled as NSSI in several papers. Based on this similarity, the term NSSH will be used in this thesis even if NSSI was used in the original studies that we refer to.

Although there exist no universally accepted definitions or nomenclature with respect to self-harming behaviours, subdividing self-harm behaviour into categories on the basis of presence or absence of the intent to die seems widely acknowledged (Nock, 2009; Silverman, Berman, Sanddal, O'Carroll, & Joiner, 2007b). The intent of self-harming behaviours is, however, neither always clear, nor easy to assess as intent may fluctuate over time and depend on the situation. To distinguish between suicidal and non-suicidal self-harm based on self-report of suicidal intent is challenging. In a clinical setting, the clinician will normally rely on multiple informants, even though we know that synthesizing information from multiple informants may present difficulties in its interpretation and evaluating the importance of each informant. Both poor agreement among adolescents, parents and clinicians, (Prinstein, Nock, Spirito, & Grapentine, 2001), as well as the person's own difficulties in recalling or thinking logically about their own behaviour can make the distinction difficult.

These challenges notwithstanding, recently developed measures and a number of assessment tools to aid researchers and clinicians in this decision are available, and may help distinguish between suicide attempts and non-suicidal (self-injurious) behaviours (Nock, Wedig, Holmberg, & Hooley, 2008).

In this thesis, the following terms have been adopted to describe different forms of self-harming behaviours: self-harm, non-suicidal self-harm suicide attempts and suicidal ideation.

*Self-harm (SH)* is defined as intentional self-poisoning or injury with a non-fatal outcome, regardless of intention to die. It includes poisoning, asphyxiation, cutting, burning and other self-inflicted injuries (Hawton, 2002; Skegg, 2005).

*Non-suicidal self-harm (NSSH)* is defined as self-harm by overdose or other self-harming behaviour without any suicide intent (Skegg, 2005).

*Suicide attempt (SA)* is defined as self-harm behaviour with an explicit or inferred intention to die (Bridge, Goldstein, & Brent, 2006).

*Suicidal ideation (SI)* includes self-reported thoughts of engaging in suicide-related behaviour. (O'Carroll et al., 1996)

## **1.2 Two categories of self-harm**

As SA and NSSH are distinct with respect to suicidal intent, they constitute two categories of self-harm which could be measured differently in population surveys. In the more recent epidemiological literature on self-harm among adolescents, studies often pertain specifically to one of these categories. In the subsequent review of this literature, I have therefore treated the two categories separately.

Like most behaviours, suicide attempts and nonsuicidal self-harm are likely to be a result of a complex interaction of cultural, social, psychological and biological factors. Empirical research has found a vast number of factors that are correlated to such behaviours, and knowledge of them is of importance, but not sufficient, to identify adolescents at risk.

In the description that follows, we group the associated factors into demographics, mental health, and family factors/life events, in line with the focus of this thesis. The essential factors reported in review papers or important overview papers are described, others are described in Papers I and II.

### **1.2.1 Suicide Attempts**

#### Prevalence

Lifetime prevalence of suicide attempts among adolescents was 9.7% (95% CI, 8.5–10.9) in a systematic review of 128 epidemiological studies. The prevalence varied depending on the terminology used and tended to be higher in studies employing anonymous questionnaires than in studies employing non-anonymous methods (Evans, Hawton, Rodham, & Deeks, 2005).

A recent general adolescent population study from US found a prevalence of 4.1% (Nock et al., 2013). Lifetime prevalence estimate of suicide attempts among adolescents in Norway is 8.3 in an older nationwide school-based study (Rossow & Wichstrom, 1994).

#### Associated factors

*Demographics:* Prevalence rates of suicide attempts increases with age, as the rates are typically low in early adulthood, and rise precipitously during late adolescence and as such, suicide attempts are more common among older adolescents and young adults, the reverse

is true for nonsuicidal self-harm. More girls than boys attempt suicide (Evans, Hawton, Rodham, et al., 2005).

*Mental health:* Among the mental health characteristics, psychiatric disorders, in particular mood disorders, anxiety disorders, conduct and substance abuse disorders, and the comorbidity of mood, disruptive and substance abuse disorder are important (Cash & Bridge, 2009). Other mental health factors related to suicide attempts are suicide ideation, hopelessness, impulsive and aggressive behaviours, as well as drug and alcohol misuse (Evans, Hawton, & Rodham, 2005; Nock, Borges, et al., 2008; Nock et al., 2013).

*Family factors/life events:* Parental psychopathology and loss, a family history of suicidality, and few or poor family relationships as well as distress due to conflicts are reported. Repeated physical abuse or neglect, as well as being bullied, is also found (Cash & Bridge, 2009; Evans, Hawton, & Rodham, 2005; Nock & Kessler, 2006).

### **1.2.2 Non-suicidal self-harm**

#### Prevalence

A review of 50 epidemiological studies of adolescents from Europe and the US, report that non-suicidal self-harm is highly prevalent, but estimates vary significantly across nations and studies. Overall mean estimate of non-suicidal self-harm was 18 % (*SD* 7.3, range 12.5-23.6) for lifetime prevalence (Muehlenkamp, Claes, Havertape, & Plener, 2012). The large variation in prevalence rates is partly due to differences in how NSSH is measured. Studies using multiple item assessments typically reported a significantly higher rate, relatively to studies reporting on single item measures. In Norway there was no study of NSSH when our paper on prevalence was conducted, but one study based on a national sample of adolescents has reported a prevalence of NSSH (measured with the same questions as our studies, labelling it NSSI) of 2.2% (Wichstrom, 2009). Notably, this relatively low figure may in part be due to the facts that it included only NSSH with no SA during a follow-up period and that data were from a longitudinal study.

#### Associated factors

*Demographics:* The vast majority of cross-sectional studies have reported that NSSH is related to age. Time of onset of non-suicidal self-harm is generally found to be at 12–14



years of age, with a peak in early adolescence (Nock et al., 2013). A majority of studies have reported NSSH to be more prevalent among girls than among boys with a ratio of 3:1 (Nixon, Cloutier, & Jansson, 2008). However, there are also some studies reporting no gender difference in NSSH (Hamza, Stewart, & Willoughby, 2012).

*Mental health:* Depression, anxiety, and post-traumatic stress are strongly associated with NSSH in adolescence (Nixon et al., 2008). Moreover, having a history of NSSH, previous suicidal thoughts and behaviour, drug and alcohol misuse, emotional dysregulation and low self-esteem are found to be associated with NSSH, as are personality characteristics such as traits from borderline personality disorder, but also other traits such as perfectionism (Andover, Morris, Wren, & Bruzzese, 2012; Nock, 2010; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006).

*Family factors/life events:* Childhood adversities, parental psychopathology, poor family functioning and single parent household are associated with NSSH. Other negative life events like sexual and/or physical abuse and exposure to peer NSSH are also found to be associated (Andover et al., 2012; Asarnow et al., 2011)

A recent meta-analysis of prospective studies longitudinally predicting NSSH (Fox et al., 2015), reported a broad range of risk factors. Mental health factors found to elevate the risk of NSSH, included depression, suicidal thoughts/behaviour, hopelessness, cluster B personality disorders ( Borderline, Antisocial, Histrionic and Narcissistic personality disorders), and emotional dysregulation. Family risk factors included parental psychopathology and poor family functioning/structure. The authors highlighted that there is substantial heterogeneity across studies.

### **1.2.3 Suicide attempts and non-suicidal self-harm: differentiating and common factors**

By definition, the criterion that distinguishes a suicide attempt from non-suicidal self-harm is whether or not there was an intention to die. Even though a substantial proportion of those who self-harm have no intention to die from it, they often appear ambivalent or have swiftly changing intent, which makes this distinction difficult (Favazza, 1998; Miller & Smith, 2008). Moreover, intent is a subjective construct. In population survey studies, suicidal intent is often embedded in the question (e.g. "Have you ever tried to take your own life?"), which leaves the respondents to make an evaluation of suicidal intent in a self-harm behaviour event. In clinical assessments, on the other hand, we often include other more objective information like notes, communicating plans or communicating about places to be found, as well as assessment of lethality, to ensure good enough information on which to base our conclusions.

Distinguishing between behaviours with and without suicidal intent is important both in research (Muehlenkamp et al., 2012; Nock et al., 2013) and in clinical practice, but this is not always easily done. It may be argued that it is wrong to reduce suicidal intent to a dichotomy (i.e. being present in the self-harm behaviour, or not), instead of conceptualizing it as a multidimensional construct which acknowledges the ambiguity and difficulty of arriving at a valid and reliable assessment of intent.

Based on this, some researchers and clinicians have suggested that SA and NSSH belong to a behavioural continuum with various degrees of suicidality (Hawton, Rodham, Evans, & Weatherall, 2002). Others have, however, claimed that SA and NSSH are separate, but related phenomena (Stanley, Gameroff, Michalsen, & Mann, 2001), because they differ in several ways; not only with respect to suicidal intention; they differ as noted above in terms of prevalence, but also in methods and frequency (Maddock, Carter, Murrell, Lewin, & Conrad, 2010).

First, the methods involved in the two are often different. Non-suicidal self-harm often involves cutting or injuries to the skin, but these injuries are rarely medically dangerous or lethal. Suicide attempts are often done by ingesting medicinal drugs in amounts exceeding

therapeutic dosages and these are potentially lethal and often require emergency visits and repeated hospitalizations (Andover et al., 2012).

Moreover, findings from clinical samples suggest that non-suicidal self-harm tends to occur more frequently and over longer periods of time, compared to suicide attempts. Thus, the majority of those who engage in repeated non-suicidal self-harm, do it as often as twice a week over periods as long as one or several years (Nock, 2010). Suicide attempts, on the other hand, are performed less frequently, and when a reattempt at suicide occurs, it is usually done within six months (Andover et al., 2012; Guertin, Lloyd-Richardson, Spirito, Donaldson, & Boergers, 2001; Hamza et al., 2012; Muehlenkamp & Gutierrez, 2007).

The most obvious *common* factor is that both behaviours represent self-inflicted physical harm to one's own body. Also, motives can be similar; that is, emotion regulation is a motive not only in non-suicidal self-harm, but also often in suicide attempts (Pisani et al., 2013). As noted in the section regarding associated factors for SA and NSSH, there is also a range of common factors associated with SA and NSSH, and in particular mental health problems and family/life event problems are shared.

As both SA and NSSH share common factors, it is expected that there is some overlap in engagement in both types of behaviour. There is now a general agreement that SA and NSSH often occur in the same individuals.

Studies from clinical samples of adolescent with self-harm, have found that between 14% and 70% of study participants reported histories of both NSSH and SA (Jacobson, Muehlenkamp, Miller, & Turner, 2008; Nock et al., 2006). In addition, survey studies of adolescents in the general population have found a substantial proportion of self-harming participants reporting both NSSH and SA. Some studies (Brausch & Gutierrez, 2010; Muehlenkamp & Gutierrez, 2007) report a history of both among adolescents, and a review of the literature concluded that NSSH and SA often co-occur (Hamza et al., 2012). However, only three of the studies included in this review were longitudinal, so there is little evidence to suggest what comes first: if there is a systematic time ordering of NSSH and SA. One longitudinal study found that non-suicidal self-harm is associated with an increased risk of suicide attempts in adolescents (Guan, Fox, & Prinstein, 2012). A Norwegian clinical follow-

up study reported that there is considerable co-morbidity between different forms of self-harm and that less severe forms constitutes risk factors for more severe forms (Groholt, Ekeberg, Wichstrom, & Haldorsen, 2000).

*Live revealed that since she was 13, she often harmed herself by cutting her arms. At these events, she did not intend to die, but she harmed herself to regulate her painful emotions. She had also constantly, from age 6 or 7, been thinking of suicide-related acts, but there was always something within her that made her stop. However, the last night before she was taken to see the doctor, she had made a suicide attempt. She said she wanted to die yesterday, but not now.*

#### **1.2.4 Characteristics of adolescents with both NSSH and SA**

Several studies indicate that adolescents with both non-suicidal self-harm and suicide attempts demonstrate a heavier burden of mental health problems than other self-harming adolescents (Guertin et al., 2001; Jacobson et al., 2008; Muehlenkamp & Gutierrez, 2007). One systematic review and one paper presenting current research of factors associated with co-occurring NSSH and SA, summarized that research demonstrated that those who engage in both types of behaviour report elevated levels of mental health problems (Andover et al., 2012; Hamza et al., 2012)

*Mental health:* The most prominent factors are depressive symptoms, symptoms of borderline personality disorder and eating problems. Among other factors characterizing those with both NSSH and SA are hopelessness, loneliness, aggressive behaviour and risk-taking behaviour, suicidal ideation, low self-esteem, alcohol and drug use, as well as social-cognitive problems (Andover et al., 2012; Brausch & Gutierrez, 2010; Wolff et al., 2013) .

*Family factors/life events:* Higher levels of family conflict and lower parental support is reported in one study (Asarnow et al., 2011), but this was a clinical sample of adolescents, and results may not generalize to adolescents in the community.

The studies included in the review by Hamza and co-workers mainly compared those with both NSSH and SA with either NSSH only or SA only. There are relatively few studies of adolescents that examined differences between several self-harm groups, differences between those who experienced both NSSH and SA, and those who experienced SA only and

NSSH only. Moreover, a better understanding of why people engage in the various types of self-harm is clearly needed, but beyond the scope of this thesis.

### **1.3 Clinical and theoretical approaches to understanding self-harm among adolescents**

Rapidly changing emotions is a normal feature of development during adolescence. To learn how to regulate such emotions is, however, necessary in order to develop a normal and stable adult life. Persistent major problems in emotion regulation in adolescence can lead to self-harm, eating disorders or drug abuse. Persistence of these emotion regulation problems into adulthood may also develop into a personality disorder (Miller, Muehlenkamp, & Jacobson, 2008). Several studies have shown that individuals who engage in NSSH or SA, and in particular both types of self-harm, also report higher levels of borderline personality characteristics as compared to individuals who do not engage in any self-harm, suggesting these characteristics may increase risk for both NSSH and SA (Jacobson et al., 2008). It is outside the aims of this thesis to fully describe the trajectory. Since self-harm is an episodic behaviour that may be more integrated over time with the person's coping or personality style, in this thesis we are interested in those who may have, or are at risk of developing, a pattern of self-harm and such personality disorder, who engage in SA and NSSH and thus harm themselves repeatedly; sometimes with – and sometimes without – suicidal intent. In such a group where NSSH and SA are related to a third factor, often BPD, both behaviours have shared experiential qualities (often relief) (Stanley et al., 2001). When the papers in this thesis were written, literature on the co-occurrence of NSSH and SA in community samples was scarce.

## **1.4 Models of self-harm**

A number of models intending to describe why people self-harm have been proposed, often building upon atheoretical empirical studies of correlates and risk factors, but the field also has theoretical models which lack empirical support. Based upon patients' reports in research and clinical settings, self-harm behaviours can have numerous reasons. That aside, one way to understand them is as a symptom of emotion/and/or interpersonal regulation difficulties. Even though it is widely acknowledged that suicide attempts and self-harm are multi-determined outcomes that arise from the complex interaction of associated factors, few studies examining complex models exist.

I have chosen to describe three models: (1) *The stress-diathesis model*, (2) *The biosocial theory*, and (3) *The four-function model*.

### **1.4.1 The stress-diathesis model for suicidal behaviour**

The stress-diathesis model proposed by Mann et al. 1999 for suicidal behaviour provides a broad framework for understanding distal and proximal risk factors for suicidal behaviour. The various factors that contribute to suicidal behaviour, and also to self-harm can be described in an explanatory model such as the stress-diathesis model. It is a commonly used model providing psychological explanations and categorization of the risk factors and the complex mechanisms that may contribute to overt suicidal behaviour (Mann, Waternaux, Haas, & Malone, 1999).

According to the model, a given biological/genetic vulnerability or predisposition (diathesis), in interaction with a given environment or life event (stressors), will lead to the disorder or behaviour. Proximal stressors like acute psychosocial crisis or psychiatric disorder can, in interaction with distal factors like pessimism, hopelessness, aggression or impulsivity, trigger suicidal behaviour (Hawton & van Heeringen, 2009). Most people experiencing stress and vulnerabilities do not engage in suicidal behaviour, suggesting a diathesis or predisposition to self-harming behaviour in particular. In addition to this, we need models that incorporate the fact that some people remain vulnerable to self-harm despite no longer being exposed to acute stressors, and develop a pattern of repeated self-harm. The next model serves as an example of this proposition.

### **1.4.2 Linehan's biosocial theory**

One way to understand this relationship between distress, vulnerability and a pattern of self-harming behaviour is the biosocial theory proposed by Marsha Linehan. The theory, on which DBT rests, describe the pathway to emotional dysregulation (Linehan, 1993). The theory was developed for understanding the emotional dysregulation underlying the development of borderline personality disorder. The theory suggests that many of those who develop personality traits similar to those seen in personality disorders, and in particular those who persistently and over time manifest impulsive behaviour, including suicidal and non-suicidal self-harm behaviours, develop such behaviour as a result of transactions between own biological vulnerability and pervasive negative factors in the environment.

Some, but not all who repeatedly self-harm have a diagnosis of, or at least several traits from, borderline personality disorder. Linehan's biosocial theory is relevant for understanding the development of self-harm among adolescents as well, as repetitive self-harming and suicidal behaviours appear to have very close functional associations with emotional dysregulation, and have also often been linked to emotionally unstable or borderline personality disorder among adolescents. This behavioural pattern and the link to emotional dysregulation is not unique to borderline personality disorder, but is seen across a range of other clinical syndromes such as anorexia nervosa (Muehlenkamp, Claes, Smits, Peat, & Vandereycken, 2011), traumatic stress syndromes (Weierich & Nock, 2008) as well as other axis I symptomatology or personality disorders (Klonsky, Oltmanns, & Turkheimer, 2003), but also in a number of rare syndromes linked to mental retardation (Finucane, Dirrigl, & Simon, 2001).

The biosocial theory claims that borderline personality disorder is primarily a disorder of emotion dysregulation. This disorder evolves due to transactions between individuals with biological vulnerabilities and specific environmental invalidating environment. The emotion regulation problems becomes a broad dysregulation across all aspects of emotional responding. As a consequence, individuals with borderline personality disorder have (a) heightened emotional sensitivity, (b) inability to regulate intense emotional responses, and (c) slow return to emotional baseline. The construct of emotion (and thus of emotion

dysregulation) is very broad in this perspective, and includes emotion-linked cognitive process, biochemistry and physiology, facial and muscle reactions, action urges, and emotion-linked actions. Emotion dysregulation leads to dysfunctional response patterns during emotionally challenging events.

In addition, Linehan proposed that the development of borderline personality disorder occurs within an invalidating developmental context. This invalidating environment is characterized by intolerance toward the expression of private emotional experiences, in particular emotions that are not supported by observable events. Furthermore, although invalidating environments intermittently reinforce extreme expressions of emotion, they simultaneously communicate to the child that such emotional displays are unwarranted and that emotions should be coped with internally and without parental support. Consequently, the child does not learn how to understand, label, regulate, or tolerate emotional responses and instead learns to oscillate between emotional inhibition and extreme emotional variation. The child also fails to learn how to solve the problems contributing to these emotional reactions (Crowell, Beauchaine, & Linehan, 2009).

### **1.4.3 The four-function model of self-harming behaviour**

The four-function model of self-harming behaviour (Nock & Prinstein, 2004) puts an emphasis on understanding how an episodic behaviour can become a pervasive pattern. Understanding what precipitates and maintains behaviour is essential in a modern treatment perspective. The assumption that emotion dysregulation is a core factor on the pathway towards self-harm is supported in the bulk of findings on why people engage in self-harm (C.M. Jacobson & M. Gould, 2007). A psychological model aiming to understand why people with emotion regulation problems then inflict harm on their own body is thus of interest.

The four-function model for understanding the functional (antecedents and consequences) processes of self-harm in relation to the struggle of regulating emotions provides an explanation of the process. The authors suggest that non-suicidal self-harm behaviour serves two primary functions: (1) an intrapersonal/automatic function (decreases aversive affective/cognitive states or increases desired states of mind) and (2) an interpersonal/social



function (increases social support or removes undesired social demands). The behaviour thus is under influence of four factors (figure 1). This model classifies behaviour according to the processes that may produce and maintain them. The model has received empirical support, both by studies of self-reported motives and experiential studies of participants (Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Nock, 2010; Nock, Prinstein, & Sterba, 2009).

Automatic Positive Reinforcement	Automatic Negative Reinforcement
Social Positive Reinforcement	Social Negative Reinforcement

Figure 1. The four-function model of self-harming behaviour.

## 1.5 Interventions

As we have seen, self-harm is highly prevalent among adolescents and is related to psychosocial problems. Identifying correlates and risk factors is a first step towards preventing self-harm, but is not enough. Adolescents who self-harm are, with some regularity, in contact with helpers who could intervene (Nock et al., 2013), but there exists no evidence base on prevention programmes or treatment and only very few studies focus on reducing self-harm directly.

### 1.5.1 Previous treatment studies of self-harming adolescents

The paucity of effect studies for treatments for self-harming adolescents is striking, and in fact, research has often excluded self-harming or suicidal behaviour. In addition, clinical experience has shown that self-harming adolescents are difficult to engage in treatment, and tend to drop out of treatment, which may explain why so little research have been conducted with this group. In one early study, family therapy sessions were added to routine care, finding however no treatment effect besides a drop in suicidal ideation amongst a subgroup with major depressive disorder (Harrington et al., 1998). Another study, with depressed adolescents (Treatment of Adolescent Depression Study) reported better improvement of suicidal ideation and less suicide-related events for those treated with combined cognitive behaviour treatment and medication (March et al., 2004). Another family-based intervention study found a reduction of self-harm among a sample receiving

multi systemic therapy (MST), but this finding is confounded by the fact that nearly half of the MST sample were in inpatient care during the MST treatment (Huey et al., 2004). Wood and colleagues found positive treatment effects in another study comparing an add on of group therapy to treatment as usual, as the experiment group to a lesser extent repeated self-harming behaviour (Wood, Trainor, Rothwell, Moore, & Harrington, 2001). However, when this study was repeated, the findings were not replicated (Green et al., 2011; Hazell et al., 2009). One large open trial of adolescent suicide attempters with depression was conducted (the Treatment of Adolescent Suicide Attempters study), reporting a reduction of repetition of suicide attempt in their sample (Brent et al., 2009). A recent RCT with a manual-based treatment, (mentalization-based treatment) by Rossouw and Fonagy, found that mentalization-based treatment for adolescents was superior to treatment as usual in reducing self-harm and depression (Rossouw & Fonagy, 2012).

### **1.5.2 What is Dialectical Behaviour Therapy?**

Dialectical Behaviour Therapy was originally developed in the USA by professor Marsha Linehan as a treatment for adult women with borderline personality disorder who had self-harmed or attempted suicide (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991). The theoretical background for the treatment is described in numerous articles and books over the years.

The basic components of DBT are weekly sessions (60 minutes) of individual psychotherapy in a structured manner, 1 weekly session (multifamily for adolescents) of skills training (120 minutes) and intersession coaching. Therapists work together in consultation teams where they help each other to observe their personal limits, to maintain a non-judgmental stance and to balance their therapeutic approach between validation and change.

The treatment has an explicit focus on balancing acceptance and change and these are core elements which run consistently throughout the therapy. The main treatment assumption is that core deficits in emotion regulation underlie the dysregulated behaviours and cognitions, as described in the biosocial theory earlier. Learning new behaviour (defined as thoughts, emotions and acts) to regulate emotions is therefore essential, and the treatment has a great emphasis on skills acquisition.

Miller and Rathus adapted the treatment for adolescents by shortening the length to 16 weeks and adapting its contents and phrasings for adolescents (A. L. Miller, J. H. Rathus, & M. Linehan, 2007). We, myself included, translated and adapted this version for use in our intervention studies.

In the 1990s, Linehan conducted the first trials in which adult patients with suicidal behaviour were treated with DBT (Linehan, Heard, & Armstrong, 1993). The purpose of the treatment was to reduce life-threatening behaviour and to help patients build a life worth living. Since then, a large number of well-controlled studies with adults in multiple settings (Koons et al., 2001; Linehan et al., 1993; Linehan et al., 1991; Linehan et al., 2006) have been conducted, and have established DBT as the treatment with the strongest evidence base for effectiveness in reducing self-harm among female adult outpatients with borderline personality disorder. This evidence base has not yet included adolescents, but in many adolescent treatment settings, DBT has been implemented based on suggestions of observed reduction of self-harm found in smaller open trials.

### **1.5.3 Research on Dialectical Behaviour Therapy for adolescents**

Although DBT assumes that self-harm is a symptom of devastating problems with regulation of emotions and acknowledges that such problems are developed gradually during childhood and adolescence, no randomized controlled studies have so far investigated the efficacy of DBT for adolescents.

Fourteen adolescent DBT outcome studies have been published between 1997 and to date. Two quasi-experimental studies on DBT with adolescents have been conducted to date, both of which indicate that the treatment is promising in reducing target behaviours found among suicidal adolescents (Katz, Cox, Gunasekara, & Miller, 2004; Rathus & Miller, 2002). The study by Rathus & Miller compared a 12-week DBT programme similar to the programme we evaluated in Papers III and IV for outpatient adolescents ( $n=29$ ) to treatment as usual ( $n=84$ ). The DBT group had fewer hospitalizations, lower suicidal ideation and completed the treatment to a greater extent. Unfortunately this study did not address non-suicidal self-harm. Katz's study did, but studied DBT as inpatient care and with only 4 individual DBT therapy sessions and 10 DBT skills group sessions. Reduced non-suicidal self-harm in both

the DBT group ( $n=32$ ) and in the treatment as usual group ( $n=30$ ) were found (Katz et al., 2004).

Uncontrolled open studies of a similar patient group (non-suicidal self-harm and suicidal behaviour), but with variations over DBT programmes, has shown promising results. First, 16 adolescents reported a reduction of non-suicidal self-harm after one year of ordinary DBT (James, Winmill, Anderson, & Alfoadari, 2011). In addition, (Fleischhaker et al., 2011) found that 12 adolescents treated with 16–24 weeks of DBT reported less self-harm four weeks after treatment and one year after treatment than before start of treatment. Another study included DBT in a community-based setting and found reduced self-harm among participants (Woodberry & Popenoe, 2008). Adolescents diagnosed with bipolar disorder were found to reduce their self-harming behaviour (Goldstein, Axelson, Birmaher, & Brent, 2007) and studies of adolescents diagnosed with externalizing disorders in forensic (Trupin, Stewart, Beach, & Boesky, 2002), and outpatient settings (Nelson-Gray et al., 2006) found promising results. Also adolescents diagnosed with eating disorders, including bulimia, binge eating, and anorexia nervosa (Safer, Robinson, & Jo, 2010; Safer, Telch, & Agras, 2001; Salbach-Andrae, Bohnkamp, Pfeiffer, Lehmkuhl, & Miller, 2008) are reported to reduce their core symptoms in smaller studies. Finally, some studies have implemented DBT for adolescents into completely different settings like juvenile correctional or school settings (Shelton, Sampl, Kesten, Zhang, & Trestman, 2009).

#### **1.5.4 Why treat self-harm explicitly and directly?**

Self-harm provides temporary relief, but is not a joyous activity either for those engaging in the behaviour, or for those who naturally or professionally care for them. Treating adolescents with repeated self-harm is difficult, as is being close to one who engages in it. The literature is full of descriptions of how self-harm, in particular non-suicidal self-harm, has a profound impact on people around. Feelings of helplessness, guilt, sadness and disgust which even turns to hate are described (Favazza, 1998). As previously described, it has a profound impairment for the person itself, often preventing from coping with everyday problems, minor negative life events, or substantial problems like traumas or the consequences of earlier traumatic experiences. Their dysregulation often leads to many uncontrolled acts that may elicit the view among treatment providers that the person is not responsible for their own safety, and a history of involuntary inpatient stays or the use of involuntary treatment methods is often seen. Repeated self-harm also represent a massive economic burden for families, communities and societies, and it is a major risk factor for completed suicide (Carroll, Metcalfe, & Gunnell, 2014). The notion that nothing else can be more important in therapy than the threat to the life of the patient is shared among many therapeutic approaches. A treatment programme that has a major focus on survival of the patient through gaining self-control over suicidal behaviour is DBT. In line with this, a primary treatment target in DBT is explicitly to reduce self-harming behaviour.

To sum up: self-harm is prevalent and related to later adverse outcomes. We need to know more about the combination of NSSH and SA among young people, since they seem to be at particular risk for adverse life conditions and later negative outcomes. In Norway, little is known about their use of psychiatric services, and overall there is a lack of evidence-based treatment. Thus, there is a great need to develop and test various treatments for this group. Given the positive outcomes of previous open, uncontrolled and quasi-experimental trials, DBT seems to be a promising alternative.

## **2. AIMS OF THE THESIS**

The overall aim of this thesis was to describe prevalence and clinical characteristics of a lifetime history of types of self-harm among adolescents. More specifically, we wanted to explore the finding that those with both suicide attempts and non-suicidal self-harm constitute a subgroup with regard to more psychosocial problems, and that this would imply their contact with help services. Further, we wanted to study the feasibility and efficacy of a tailored treatment programme for adolescents who self-harm.

This thesis addresses the following research questions;

1. What is the prevalence of non-suicidal self-harm, suicide attempts, and the combination of these two behaviours among adolescents in the general population?
2. What are differences and similarities between adolescents who have a history of past suicide attempts, non-suicidal self-harm or a combination of both behaviours with respect to demographic and psychosocial characteristics?

These two research questions are addressed in Paper I.

3. To what extent have adolescents who report both non-suicidal self-harm and suicide attempts been in contact with child and adolescent outpatient psychiatric services compared to other adolescents?
4. Which psychosocial variables characterize those who have been in contact with child and adolescent outpatient psychiatric services?

These two research questions are addressed in Paper II.

5. Could therapists effectively learn and provide adherent DBT for adolescents?
6. Could treatment retention among adolescents be possible to achieve in a 16-week programme of DBT?
7. Did self-harm behaviour decrease among those who completed treatment?
8. Did the improvement endure over a one-year follow up period?

These four research questions were addressed in Paper III.

9. Is DBT-A superior to usual care in reducing self-harm behaviour, suicidal ideation and depressive symptoms in self-harming adolescents with features from borderline personality disorder?

This research question was addressed in Paper IV.

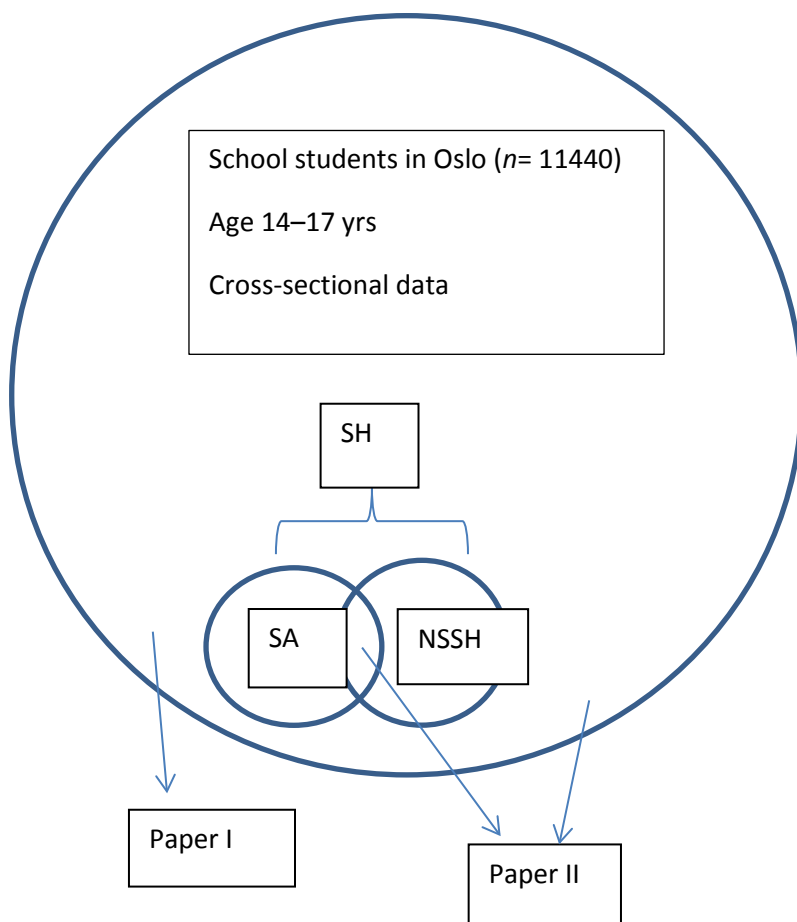
### 3. METHODS

The studies in this thesis have adopted quantitative methods with a cross-sectional design in the two first papers, and a longitudinal design in Papers III and IV. All studies included data from adolescents in the greater Oslo area. The data from a large population study, “Young in Oslo” were used to assess in what way adolescents with NSSH, SA, both, or those without self-harm may differ. To study the feasibility of DBT adapted for adolescents within a Norwegian child and adolescent psychiatric setting we used a non-controlled study. Finally, to study treatment efficacy we choose a randomized controlled design. This design is seen as the most rigorous way of determining whether a cause-effect relation exists between treatment and outcome, and one can rule out that the association was caused by a third factor linked to both intervention and outcome.

#### 3.1 Design and participants in Papers I and II

Data from a cross-sectional school-based survey, “Young in Oslo”, were used.

Figure 2a. Illustration of the sample used in the two first papers included in the thesis



The data included in the two first papers were collected from a cross-sectional survey completed during school hours by adolescents in the city of Oslo. All junior and senior high schools ( $N=91$ ) were asked to join the study, and 75 (82%) of these schools agreed to participate. There was a geographically even distribution of non-attending schools in the city. All pupils in grades 9, 10, and 11 in the study schools were invited to participate, and a strategy for including those who were not attending on the particular day of the survey in a second distribution was conducted. The gross sample comprised adolescents aged 14–17 years and the response rate among the pupils at the participating schools was 92.7%, giving a net sample of 11,440 adolescents. The mean age was 15.4 years, and 51.2% of the sample was girls. Data from all these participants were reported in Paper I. In Paper II we reported on and discussed the adolescents who had answered both questions regarding self-harm and contact with child and adolescent psychiatric services and therefore the second paper had a somewhat lower  $n = 10,920$  than the first paper. The pupils all completed a comprehensive questionnaire at school during two school hours.

### **3.1.1 Variables and instruments**

**Self-harming behaviour and suicidal behaviour** were assessed using two questions: (1) on self-harm (SH), “Have you ever taken an overdose of pills or otherwise tried to harm yourself on purpose?” (“No”, “Yes, once”, and “Yes, more than once”), which was a question derived from the CASE study (Hawton et al., 2002) and also used in several other studies; and (2) on suicide attempt (SA), “Have you ever tried to kill yourself?” (“No”, “Yes, once”, and “Yes, more than once”), a question previously used in a Norwegian study of school adolescents (Rossow & Wichstrom, 1994).

**Current suicidal ideation** was assessed using one item from the Hopkins Symptom Checklist (SCL-90) (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). For this analysis, we used the single item on suicide ideation to get restricted and specific information on suicidal ideation in relation to our dependent variables on self-harm, and it is found to be a valid approach (Desseilles et al., 2012). Subjects were asked whether, during the previous week, they had had thoughts about ending their life, which was rated on a 1–4 scale (“Not at all”, “A little”, “Rather often”, and “Very often”). For statistical analysis, this variable was dichotomized into “None or a little” vs “Rather often or very often”.



**Contact with CAPS** was assessed through the question “Have you ever been in contact with or received help from child and adolescent psychiatric outpatient services?”

**Socio-demographic information** were collected with questions on gender, age, and if the adolescent was living with none, one or both parents. Parents’ socioeconomic status was classified according to a Norwegian version of the International Standard of Classification of Occupation (ISCO-88) based on the profession of the parent with the highest level occupation. The variable was dichotomized into low or high socio-economic status. Adolescents were categorized as having a non-western immigrant background if the adolescent and one or both of the parents were born in Asia/Africa.

**Substance use variables** comprised information about current and past smoking and the frequency of use of various substances (i.e. drinking alcohol to intoxication, use of cannabis, and use of other illicit drugs) in the 12 preceding months. Because of a skew in distribution, the answers were classified into dichotomous categories: “Not smoked” vs “Former, occasional, or daily smoker”; “Not been drunk” vs “Been drunk”; “Not used cannabis” vs “Used cannabis”; and “Not used other illicit drugs” vs “Used other illicit drugs”.

**Self-perceived health:** the adolescents were asked how they perceived their current general health status and the response categories were on a five-point ordinal scale ranging from “Very good” to “Very poor”. The distribution on this variable was also very skewed, and the responses were therefore dichotomized into “Good self-perceived health” vs. “Poor or very poor self-perceived health”.

**Depressive symptoms** were assessed with six items from the *Hopkins Symptom Checklist* (SCL-90) (Derogatis et al., 1974), using the previous week as a reference period. The items were rated on a 1–4 scale, resulting in a total score ranging from 6 to 24, with higher scores indicating higher levels of depressive symptoms.

**Current eating problems** were assessed using a Norwegian eight-item version of the *Eating Attitudes Test* (Garner, Olmsted, Bohr, & Garfinkel, 1982; Lavik, Clausen, & Pedersen, 1991). The items were rated on a 0–3 scale, with total scores ranging from 0 to 24.

**Antisocial behaviour** was assessed using 19 variables addressing criminality, rule breaking and other types of antisocial behaviour in the previous 12 months. The variables were

derived from a Norwegian version of a questionnaire used originally in the National Youth Longitudinal Study and from the Olweus Scale for Antisocial Behaviour (Olweus, 1991; Windle, 1990). Those that responded affirmatively were attributed a score of 1 on each of the items and a sum score ranging from 0 to 19 was computed, with a higher score reflecting a higher amount of antisocial behaviours in the respondent.

**Self-esteem** was measured using the Global Self-Worth subscale *of Harter's Self-Perception Profile for Adolescents* (Harter, 1988), which consists of 10 items scored on a 1–4 scale, with total scores on current self-esteem ranging from 10 to 40, with a higher score indicating higher self-esteem.

**Loneliness** was assessed using the revised *UCLA loneliness scale* (Russell, Peplau, & Cutrona, 1980), which has been found to have good validity. The five items are scored on a 1-4 scale, with total scores on loneliness ranging from 5 to 20, with a higher score indicating the presence of more frequent feelings of loneliness.

See Table 2 for an overview of variables in this thesis.

### **3.1.2 Statistical analyses**

The statistical package for the Social Sciences (SPSS) for Windows versions 15 and 21 were used (SPSS Inc., Chicago IL, USA) to register and analyse data. In the quantitative analyses in the cross-sectional studies, we tested differences between different groups. As reported in both papers, one-way between-groups analyses of variance or F tests were completed to assess group differences in continuous variables. In the latter we used the Bonferroni post hoc test when the overall test was significant, and eta squared to measure effect size.

Comparisons between categorical variables were analysed through cross-tabulation and Chi-squared tests. Variables found to be bivariately significant were considered for multivariate analyses, using Wilks's lambda as a selection criteria for further inclusion. Stepwise functional discriminant analyses to identify category membership and explore characteristics of the four categories of self-harming behaviour were then applied. To explore the association between groups who reported self-harming behaviour and contact with help services, we further conducted logistic regression analyses with a stepwise procedure based

on model-fit criteria (log likelihood ratio). The same tests were used on a sub-sample of those who had confirmed doing both suicide attempts and non-suicidal self-harm.

### **3.2 Design and Participants in Paper III**

In Paper III, results from an uncontrolled naturalistic study of the feasibility of DBT-A are reported. All participants were assessed at baseline and data on self-harm and the use of treatment were collected during and at the end of treatment, as well as one year after treatment. Eleven study therapists, new to DBT, and trained for the purpose of the study, delivered the treatment. Adherence scores of therapists adherence to the treatment content were based on the coding of 37 videotaped treatment sessions.

Participants were recruited from patients that had newly been referred to treatment to five participating child and adolescent psychiatric outpatient clinics in Oslo. The clinical staff at these participating units had screened the referred patients for current and past history of self-harm. If positively screened, and after an introduction to the overall aim of the study and the nature of the assessments, 37 patients were invited to a further diagnostic interview.

The inclusion criteria were:

*(1) Age between 12 and 18 years, (2) more than one episode of self-harm, with one of the episodes within the last four months before referral, (3) three or more criteria of borderline personality disorder, (4) willingness to receive DBT and (5) ability to speak Norwegian. Self-harm was defined as an act with nonfatal outcome in which the person deliberately engaged in behaviour intended to cause harm, such as cutting, jumping from a height, overdosing or eating non-digestible objects. Exclusion criteria were (1) mental retardation, (2) autism spectrum disorder, (3) psychotic disorder or (4) current severe anorexia nervosa or severe substance abuse disorder requiring specialized treatment.*

#### **3.2.1 Assessments**

At the diagnostic interviews, eligibility criteria were reassessed, resulting in a final group of 27 adolescents being included in the study after providing informed consent (signed also by the caregivers). Patients were interviewed by masters or doctoral level clinicians, myself included, and all attended training in the diagnostic instruments led by experienced clinical professors in the field of diagnostics of mental disorders. Consultations regarding inclusion

could be made with other clinicians involved in the treatment at the National Centre for Suicide Research and Prevention.

### **3.2.2 Variables and Instruments**

**Sociodemographics** were collected through an extended **K-SADS** socio-demographic interview.(Kaufman et al., 1997b)

**Psychiatric axis I diagnoses** were evaluated through the **K-SADS** (Kaufman et al., 1997a) at baseline.

**Borderline personality disorder** was evaluated through the **SCID-II** (First, Spitzer, Gibbon, & Williams, 1997) at baseline.

**Global level of severity of disturbance** was measured through the **C-GAS** (Shaffer et al., 1983a) at baseline.

**History of deliberate self harm behaviour** were evaluated through the **Lifetime Parasuicide Count** developed by Linehan & Comtois (Linehan & Comtois, 1996) at baseline.

**Deliberate self harm behaviour** were assessed daily in DBT patients through self-report **diary cards** (A. L. Miller, J. H. Rathus, & M. M. Linehan, 2007), daily for up to 20 weeks. The cards provide self-reported scores on a 5-point scale on a number of measures related to self-harm, suicidality, and feelings.

**Information on self-harm at follow-up** was gathered during a structured telephone interview done by the first author by asking the question, “Have you self-harmed in the period since you ended DBT treatment?”

**The number of psychiatric hospitalizations or other interventions during treatment** was reported by the individual therapist for each patient.

**Treatment retention** was defined by no more than three absences either in individual therapy or in skills-groups, and others were considered as dropouts.

***Adherence*** to DBT principles were measured using the *DBT global rating scale*, a 66 item adherence coding instrument where items are grouped into categories that follow the treatment components and scores range from 0-5 (Linehan & Korslund, 2003).

### **3.2.3 Intervention**

#### *Dialectical Behaviour Therapy*

DBT was delivered for 19 weeks (16 weeks+3 commitment sessions), consisted of one weekly session of individual therapy (60 minutes), one weekly session of multifamily skills training (120 minutes), and family therapy sessions and telephone coaching with individual therapists outside therapy sessions as needed. They were trained through an 80-hour seminar plus supervised practice on clinical training cases and were rated for adherence to DBT treatment principles.

#### *Assessing the intervention: Adherence*

Therapists were instructed to tape all sessions and deliver tapes consecutively for adherence coding without being told about the number or which of the tapes would be coded. A coder trained to reliability by the Linehan Research and Therapy Clinic assessed the therapists' adherence to DBT principles by coding videotaped individual therapy sessions and skills group sessions, using the DBT Global Rating Scale, a 66-item adherence coding instrument. The items are grouped into categories that follow the treatment components, and scores range from 0–5. Altogether 37 treatment sessions were coded. Four of these sessions were multifamily skills groups, as adherence coding in the course of the ongoing development of adherence coding for adolescent skills training groups was a part of the implementation process.

### **3.3 Design and Participants, Paper IV**

The design was prepared in line with the Consolidated Standards for Reporting Trials (CONSORT), and registered in ClinicalTrials.gov. With the design of a single blind randomized controlled trial, comprising two treatment arms, we compared 19 weeks of DBT for adolescents with 19 weeks of enhanced usual care. EUC was psychotherapeutic intervention delivered at child and adolescent psychiatric services, a part of specialized health care in Norway. EUC treatment was not checked for fidelity, but a survey was conducted in planning

the study, and therapists reported their work to be either psychodynamic or cognitive oriented therapy combined with psychopharmacological treatment as needed.

The five outpatients clinics participating in the project were engaged in screening 987 out of 1999 referred patients aged >12 for deliberate self-harm. The screening was conducted from March 2008 to March 2012, and a number of 241 patients confirmed self-harm (Groholt, Haga, Tormoen, Ramberg, & Mehlum, 2014). Out of these a number of 152 plus additional 142 adolescents referred directly to the study from general practitioners, child protection services, or school health services were recruited to a diagnostic interview in which the remaining inclusion criteria were checked. This resulted in 97 adolescents further assessed through interviews. Finally 77 adolescents were included in the study. This progress of all participants is visualized in a CONSORT flow chart as shown in Paper IV.

Inclusion criteria from the feasibility study were kept, with one change. Participants could fulfil one criterion in addition to the self-harm criterion plus at least two subthreshold-level criteria from borderline personality disorder. The change was made because we wanted to speed up the recruitment to the study. It was argued that adolescents with dysregulation severe enough to score subthreshold on several criteria from borderline personality disorder could benefit of treatment and to be in the target group.

Treatment allocation of participants after baseline assessments was based on a permuted block randomization procedure with an undisclosed and variable blocking factor, and daily management of the randomization procedures was performed by an external group.

### **3.3.1 Assessments**

Assessments were performed by independent interviewers blind to treatment allocation at baseline (interview and self-report) before randomisation and then at 9 (self-report), 15 (self-report), and 19 weeks (interview and self-report) after the first treatment session. Two child and adolescent psychiatrists and two doctoral level clinicians, blinded to treatment allocation, conducted the baseline interviews. Ten independent assessors, blinded to treatment allocation and to results from baseline interviews, conducted interviews at trial completion.

Interviewers' attended trainings, seminars and regular meetings led by a child and adolescent psychiatrist, professor Anne Mari Sund, an expert in the relevant assessment instruments. Interviews were audio-taped and interrater reliability (IRR) for diagnoses and outcome variables was checked by her. Based on 26 IRR-rated interviews, mean Cohens Kappa value was 0.68 for all symptoms rated with The Schedule for Affective Disorders– Present and Lifetime version (Kaufman et al., 1997b). Intra-class correlation (ICC) was used to test interrater reliability for the Children's Global Assessment Scale (C-GAS) (Shaffer et al., 1983b) (ICC = 0.42), Montgomery–Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979b) (ICC = 0.76), The Lifetime Parasuicide Count (LPC) (Linehan & Comtois, 1996) (IRR = 0.99) and Structured Clinical Interview for DSM-IV (SCID II) (First et al., 1997)(ICC = 0.66).

### **3.3.2 Variables and Instruments**

**Sociodemographics** were collected through an extended K-SADS (Kaufman et al., 1997a) socio-demographic interview at baseline.

**Psychiatric axis I diagnoses** were evaluated through the K-SADS (Kaufman et al., 1997a) at baseline.

**Borderline personality disorder** was evaluated through the SCID-II (First et al., 1997), at baseline.

**Global level of severity of disturbance** was measured through the C-GAS (Shaffer et al., 1983a) at baseline.

**History of deliberate self harm behaviour** was evaluated through the Lifetime Parasuicide Count developed by Linehan & Comtois (Linehan & Comtois, 1996) at baseline.

**Deliberate self harm behaviours, emergency medical care and supplementary treatment caused by risk of deliberate self harm behaviours during treatment** were also assessed according to a specifically designed self report instrument filled in by both DBT and EUC patients, at 10 and 16 weeks.

**The level of borderline symptoms** were assessed through the borderline symptoms, assessed through the 23-item self-report Borderline Symptom List (BSL-23); (Bohus et al., 2007), at baseline, 10, 16 and 20 weeks.

**Depressive symptoms** were measured through the Moods & Feelings Questionnaire (MFQ) (Angold, 1989). We used a shortened version consisting of 13 out of the 25 original items. The individuals are asked to report on own feelings during the previous two weeks. Responses are made to statements on a three point scale. Depressive symptoms are also evaluated through the interviewer-rated 10-item Montgomery–Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979a), at baseline and at 20 weeks.

**Suicidal ideation** was measured through the Suicidal Ideation Questionnaire SIQ-JR (Mazza & Reynolds, 1999), at baseline, 10, 16 and 20 weeks. The severity of suicidal ideation is measured by the 15-item self-report (suicidal thoughts rated on a 7-point scale from “I never had this thought” to “Almost every day”).

**Suicide intent** was evaluated to find the most severe self-harm episode during the last 4 month through the Suicide Intent Scale (SIS) (Beck, Schuyler, & Herman, 1974), at baseline.

**Hopelessness** was measured by the 20-item self-report Beck Hopelessness Scale (BHS) (Beck, Weissman, Lester, & Trexler, 1974), at baseline, 10, 16 and 20 weeks.

**Social competence and emotional and behavioural problems** was evaluated at baseline by parents on the Child Behaviour Checklist (CBCL) (Achenbach, 2001) .

### **3.3.3 Interventions**

#### *Dialectical Behaviour Therapy*

DBT was delivered for 19 weeks, consisted of one weekly session of individual therapy (60 minutes), one weekly session of multifamily skills training (120 minutes), and family therapy sessions and telephone coaching with individual therapists outside therapy sessions as needed. Fifteen psychologists and psychiatrists previously unfamiliar with DBT were recruited for the purpose of the studies. They were trained through an 80-hour seminar plus supervised practice on clinical training cases and were rated for adherence to DBT treatment principles. From these candidates, 8 therapists (2 psychiatrists, 5 clinical psychologists, and 1



educational psychologist) were selected after having completed a consistently adherent training case, that is, a patient for whom the therapist under training (in DBT-A) was able to deliver the treatment consistently at the adherent level (score of 4.0 or above) throughout the 19 weeks of treatment of that patient. Adherence to DBT continued to be assessed throughout the trial. Altogether, 169 individual DBT sessions from the 39 DBT patient-therapist dyads and 56 multifamily skills-training group sessions were scored for adherence. The mean score for individual therapy sessions was 4.11 ( $SD=0.14$ ; range=3.43–4.37) and for multifamily skills-training sessions, 4.18 ( $SD=0.10$ ; range=3.93–4.36), both within the adherent range.

#### *Enhanced Usual Care*

Nineteen weeks of standard care (enhanced for the purpose of the study by requiring that therapists agreed to provide on average no less than one weekly treatment session per patient throughout minimum of 19 weeks) was delivered by the hospitals participating in the study. Therapists were 4 psychiatrists, 16 clinical psychologists, 6 clinical social workers, 2 clinical pedagogues, 1 specialist nurse, and 1 psychology graduate student not trained in or practicing DBT. EUC was not manualized or checked for fidelity and consisted of either psychodynamically oriented therapy or cognitive behaviour therapy combined with psychopharmacological treatment as needed.

#### *Patient Safety*

The study complied with National Institute of Mental Health (NIMH) recommendations for intervention research with patients at high risk for suicidality (Pearson, Stanley, King, & Fisher, 2001). All study therapists received suicide risk assessment and management training before patient treatment commenced. For both treatment modalities, results from the baseline assessments of suicide and self-harm risk, psychiatric diagnoses, and symptom severity were made available to the attending therapists before the first therapy session. Also, when a patient's follow-up data indicated high risk of self-harm or suicide, the study management immediately notified the patient's therapist.

### **3.4 Statistical analyses in papers III and IV.**

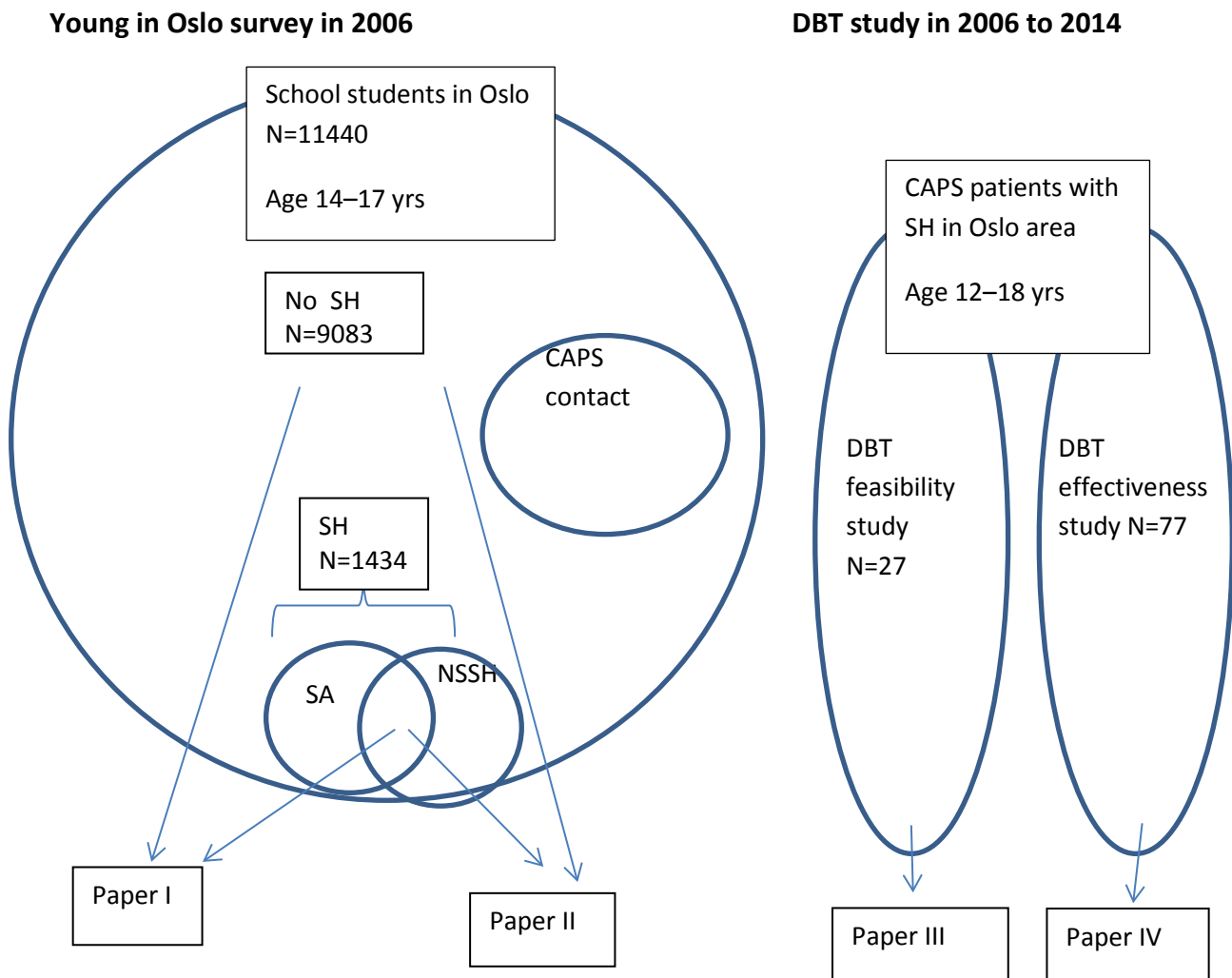
The statistical package for the Social Sciences (SPSS) for Windows version 20 and 21 were used (SPSS Inc., Chicago IL, USA) to register and analyse data. In Paper IV, the STATA

programme for survival analysis was used (Statistical software computer programme, Stata Corporation 2011). For categorical variables we used McNemar chi square test and for continuous paired samples *t*-tests were used to assess change in self-harm during treatment course. Differences between group proportions were tested by a Pearson chi-squared test of Fisher's exact tests, whereas differences over time were examined by mixed effects multiple regression with the sum scores as dependent variables. For the variable on average numbers of repeated self-harm, generalized estimating equations with Poisson and robust variance were used. Mediation analyses using structural equation models or generalized structural equation models were used.

### 3.5 Similarities between samples and variables in the studies

*Some characteristics of the samples used in the four papers in this thesis are illustrated in Figure 2b.*

Figure 2b. Illustration of samples used in the four papers included in the thesis



The samples used in all four papers included adolescents from Oslo or the Oslo area. The sampling strategy differed for the sample employed in Papers I and II versus the samples employed in Papers III and IV. Thus, the sample of school students employed in Papers I and II included both adolescents with and without self-harm experience and with and without CAPS contact, whereas the clinical samples recruited from CAPS, which were employed in Papers III and IV, included only adolescents with self-harm experience and recent CAPS contact.

Although the samples were derived from different populations and contexts (i.e. general population and school context versus clinical population and context), some common characteristics of the samples were found when comparing a sub-sample of school students who reported both types of self-harm and CAPS contact and the two clinical samples. This is illustrated in Table 1. Thus, mean age was between 15 and 16 years and there was a clear majority of females and Norwegian ethnic background.

**Table 1. Characteristics of the three samples with CAPS contact in this thesis**

<i>Baseline characteristics</i>			
Characteristics	DBT feasibility <i>N</i> =27	DBT RCT <i>N</i> =77	NSSH+SA w/CAPS contact  <i>N</i> =168
Age, median (SD)	15.7(1.4)	15.9(1.4)	15.1(0.8)
Female, % ( <i>n</i> )	96(26)	88.3(68)	70.8(119)
Norwegian ethnicity, % ( <i>n</i> )	85(23)	84.9(62)	80.2(134)

In addition to this, they resembled one another when it comes to co-occurrence of self-harming behaviour. In the samples of self-harming patients who were actually referred to treatment, we found that slightly over half in the feasibility study and 30% in the RCT reported suicide attempts in the past. The lower percentage in the latter could be due to

differences in the definition of a suicide attempt, in the latter self-harming behaviour with ambivalent intent regarding whether to die was not counted as a suicide attempt.

While all three data sets included a broad range of variables and measures related to self-harm, mental health and psychosocial impairment, most of these measures were not identical across the general population and the clinical samples. Therefore, a direct comparison of most measure scores between the two types of samples could not be obtained. This is illustrated in Table 2. However, based on a clinical and qualitative judgment of scores on important mental health measures including depression, anxiety and suicide ideation, all three samples of self-harming adolescents with CAPS contact present a picture of adolescents with a heavy load of psychosocial burdens.

**Table 2. Variables included in the studies in the thesis**

<b>VARIABLES</b>	<b>PAPER I</b>	<b>PAPER II</b>	<b>PAPER III</b>	<b>PAPER IV</b>
Age	x	x	x	x
Gender	x	x	x	x
Ethnicity		x	x	x
Social class		x		
Living arrangement	x			
<b>TYPE OF SELF-HARM</b>				
Self-harm	x	x	x	
Non-suicidal self-harm	x	x	x	x
Suicide attempt	x	x	x	x
Suicidal ideation	x	x	x	x
<b>SYMPTOMS, DIAGNOSES AND BEHAVIOURS</b>				
Personality traits			x	x
Borderline personality disorder				x
Depressive symptoms	x	x		x
Depression			x	x
Any other primary axis I disorder			x	x
Eating problems	x	x		
Antisocial behaviour	x	x		
Substance use	x	x		
Loneliness	x	x		
Intimate friendship		x		
Self-perceived poor health	x	x		
Self-esteem	x			
Hopelessness				x
Global assessment of functioning			x	x

### **3.6 Ethical considerations**

Studying suicidal behaviour and other forms of self-harm raises several ethical considerations. The school survey employed in Papers I and II was anonymous, hence a license from the Data Inspectorate to process personal sensitive data was not required, but permissions from the Ministry of Research and Education, the local school authorities and the school boards were obtained by NOVA. Participation from the pupils was based on their informed consent and a passive parental consent was also required (Valset & Øia, 2006). In the planning of the study the question of whether asking about suicidal behaviour in a survey could trigger such behaviour in some vulnerable individuals was considered. The questions were dealt with partly by consulting experts and reviewing the literature in the field. As part of the ethical considerations in a similar Norwegian school survey, conducted in 2002, the project team consulted two experts (Lars Mehlum and Keith Hawton) in this respect and was advised that the survey questions were ethically acceptable (Rossow & Bø, 2003). This applies also to the Young in Oslo survey where professor Mehlum was directly involved in the inclusion of these questions. The only study having investigated this empirically suggests that this danger is very low (Gould et al., 2005). Moreover, the pupils were instructed that they could skip answering questions they did not want to respond to and they were given contact information to a teacher assigned to be present at school that day if they did not want to participate.

For Papers III and IV, the Regional Committees for Medical Research Ethics approved the studies, and all patients and their parents or formal caregivers were included only if they gave written informed consent. The clinical research team members responsible for obtaining informed consent from the families made every effort to ensure that the participants fully understood what participation involved. All patients were offered treatment irrespective study participation. Study participants were informed that they could withdraw from the study at any time.

The intervention study was planned and conducted in line with ethical standards for intervention studies (Declaration of Helsinki) and we also applied a patient safety system, in line with recommendations from the National Institute of Mental Health US (Pearson et al., 2001). In the intervention study, all staff directly involved in assessments were trained to do

face-to face assessment, and we developed clear rules about whether to break confidentiality if scores on such measures were high. If a researcher believed that a study participant was at imminent risk for suicide, necessary safety interactions were initiated. All safety procedures and their results were systematically documented in patients' clinical records. Despite that safety procedures may greatly enhance patients and clinicians capacity to interact in treatment while high levels of safety is maintained, clinical research with suicidal individuals can never totally rule out all risk. Adolescents who self-harm are generally considered a vulnerable population, both because of the potential for unanticipated injury in the course of self-harm and because of the possible presence of comorbid issues, such as suicidal thoughts and behaviours. Balancing the need for a better clinical and public health understanding of the phenomenon with the individuals' need for privacy and safety produced ethical issues and dilemmas in planning the survey study. There has been a clear tendency to exclude adolescents with self-harming behaviour from treatment studies due to the potential risk for suicide or self-harming behaviour, and this may preclude the development of tailored treatments for this particular group. Our experience is that research is possible and necessary to do with this high-risk group. With the format of an RCT, an ethical dilemma of ending the treatment within fixed amount of time arised. While DBT was terminated after 19 weeks, EUC was not, as it may last longer in natural settings. It would be unethical to demand contamination of treatment in this group, but it was done in the DBT group because the treatment itself was developed to be time-limited. Finally, to our knowledge, this was the first treatment study in Norway to compensate participants with a small amount of money. We argued that it was of importance to get additional information from the participants and that the participants should get some compensation for traveling and showing up at another location, answering questions. Discussions concerning economical compensation have been part of several intervention studies, and our arguments were discussed in the Regional Committees for Medical Research Ethics. They concluded that it was in line with ethical standards and they approved it.



## **4. SUMMARY OF THE INDIVIDUAL PAPERS**

### **Paper I**

#### **Purpose**

To measure the prevalence of self-harm (SH) behaviours and examine potential differences in characteristics among adolescents reporting on self-harm (SH), depending on whether they had attempted suicide (SA), performed nonsuicidal selfharm (NSSH), or both.

#### **Methods**

Cross-sectional survey of 11,440 adolescents aged 14–17 years in the city of Oslo, Norway. Responses regarding measures of lifetime SH and risk factors were collected. The response rate was 92.7%. Data were analysed by segregating SH responses into the categories of NSSH, SA, and NSSH + SA.

#### **Results**

Among all respondents, 4.3% reported NSSH, 4.5% reported SA, 5.0% reported both NSSH and SA, and 86.2% reported no SH. The group reporting to have engaged in both behaviours comprised more girls and reported more suicidal ideation, problematic lifestyles, poorer subjective health, and more psychological problems compared with the other groups. The four groups could be distinguished by one discriminant function that accounted for most of the explained variance.

#### **Conclusions**

Our findings suggest that NSSH and SA are parts of the same dimensional construct in which suicidal ideation carries much of the weight in adolescents from a school-based sample. They also indicate the group of adolescents who seems to alternate between NSSH and SA is more burdened with mental ill-health and behavioural problems compared with others. These adolescents should therefore be targeted by clinicians and school health personnel for identification and provision of adequate help and services.

## **Paper II**

### **Background**

Studies have shown that adolescents with a history of both suicide attempts and non-suicidal self-harm report more mental health problems and other psychosocial problems than adolescents who report only one or none of these types of self-harm. The current study aimed to examine the use of child and adolescent psychiatric services by adolescents with both suicide attempts and non-suicidal self-harm, compared to other adolescents, and to assess the psychosocial variables that characterize adolescents with both suicide attempts and non-suicidal self-harm who report contact.

### **Methods**

Data on lifetime self-harm, contact with child and adolescent psychiatric services, and various psychosocial risk factors were collected in a cross-sectional sample (response rate = 92.7%) of 11,440 adolescents aged 14–17 years who participated in a school survey in Oslo, Norway.

### **Results**

Adolescents who reported any self-harm were more likely than other adolescents to have used child and adolescent psychiatric services, with a particularly elevated likelihood among those with both suicide attempts and non-suicidal self-harm (OR = 9.3). This finding remained significant even when controlling for psychosocial variables. In adolescents with both suicide attempts and non-suicidal self-harm, symptoms of depression, eating problems, and the use of illicit drugs were associated with a higher likelihood of contact with child and adolescent psychiatric services, whereas a non-Western immigrant background was associated with a lower likelihood.

### **Conclusions**

In this study, adolescents who reported self-harm were significantly more likely than other adolescents to have used child and adolescent psychiatric services, and adolescents who reported a history of both suicide attempts and non-suicidal self-harm were more likely to have used such services, even after controlling for other psychosocial risk factors. In this high-risk subsample, various psychosocial problems increased the probability of contact with

child and adolescent psychiatric services, naturally reflecting the core tasks of the services, confirming that they represents an important area for interventions that aim to reduce self-harming behaviour. Such interventions should include systematic screening for early recognition of self-harming behaviours, and treatment programmes tailored to the needs of teenagers with a positive screen. Possible barriers to receive mental health services for adolescents with immigrant backgrounds should be further explored.

### **Paper III**

#### **Aims**

To evaluate the feasibility of DBT training, adherence, and retention preparing for a randomized controlled trial of Dialectical Behaviour Therapy adapted for Norwegian adolescents engaging in self-harming behavior and diagnosed with features of borderline personality disorder.

#### **Methods**

With an uncontrolled naturalistic design we implemented DBT into CAPS settings in Norway. Therapists were intensively trained and evaluated for adherence. Adherence scores, treatment retention, and present and previous self-harm were assessed.

#### **Results**

Twenty-seven patients were included (mean age 15.7 years), all of them with recent self-harming behaviors and at least 3 features of borderline personality disorder. Therapists were adherent and 21 (78%) patients completed the whole treatment. Three subjects reported self-harm at the end of treatment, and urges to self-harm decreased. At follow up, 7 of 10 subjects reported no self-harm.

#### **Conclusions**

DBT was found to be well accepted and feasible. Therapists were able to learn and adhere to treatment principles in a manner well received adolescents and their families. The clear reduction in the proportion of adolescents who engaged in self-harm yields support for DBT to be tested in a larger study. Randomized controlled trials are required to further test the effectiveness of DBT for adolescents.

## **Paper IV**

### **Objective**

We examined whether a shortened form of dialectical behaviour therapy, dialectical behaviour therapy for adolescents (DBT-A) is more effective than enhanced usual care (EUC) to reduce self-harm in adolescents.

### **Method**

This was a randomized study of 77 adolescents with recent and repetitive self-harm treated at community child and adolescent psychiatric outpatient clinics who were randomly allocated to either DBT-A or EUC. Assessments of self-harm, suicidal ideation, depression, hopelessness, and symptoms of borderline personality disorder were made at baseline and after 9, 15, and 19 weeks (end of trial period), and frequency of hospitalizations and emergency department visits over the trial period were recorded.

### **Results**

Treatment retention was generally good in both treatment conditions, and the use of emergency services was low. DBT-A was superior to EUC in reducing self-harm, suicidal ideation, and depressive symptoms. Effect sizes were large for treatment outcomes in patients who received DBT-A, whereas effect sizes were small for outcomes in patients receiving EUC. Total number of treatment contacts was found to be a partial mediator of the association between treatment and changes in the severity of suicidal ideation, whereas no mediation effects were found on the other outcomes or for total treatment time.

### **Conclusion**

DBT-A may be an effective intervention to reduce self-harm, suicidal ideation, and depression in adolescents with repetitive self-harming behaviour.

## **5. DISCUSSION**

### **5.1 Summary of main results**

The four papers in this thesis has focused on the prevalence of co-occurrence between NSSH and SA and associated factors regarding self-harm, and tested the feasibility and efficacy of a novel treatment for adolescents. Our main findings were 1) that one-third of adolescents with a history of self-harm reported both NSSH and SA, and that these adolescents were significantly more likely to report psychosocial problems, and 2) were more often in contact with help-services than any other group. Further, in the first study of feasibility of DBT for adolescents in Scandinavia we found that 3) DBT-A was feasible to implement in a Scandinavian culture and language context as therapists reached adequate adherence levels and treatment retention among the adolescents were high. Lastly, in the first randomized trial of the efficacy of DBT-A, we further found that 4) DBT was superior to EUC in reducing frequency of self-harm, suicidal ideation and depressive symptoms. The main findings will be addressed in more detail in the following, as well as methodological issues and implications of the findings.

### **5.2 Results in relation to other studies**

#### **5.2.1 Prevalence of co-occurrent NSSH and SA**

Our finding that 9.3% of adolescents reported self-harming behaviour (irrespective of the intent) corresponds well with findings from previous community samples of adolescents (Colleen M. Jacobson & Madelyn Gould, 2007). An important finding was that one-third of adolescents with a history of self-harm reported both NSSH and SA and this co-occurrence was associated with high levels of mental health problems. This has been reported in a few previous studies of adolescents, from both general population samples and clinical samples (Jacobson et al., 2008; J. Muehlenkamp & P. M. Gutierrez, 2007). The larger sample used in our study and the variable set covering a broader range of psychosocial dimensions is believed to provide a more nuanced picture of the prevalence and psychosocial characteristics of adolescents with co-occurring SA and NSSH, compared to the few previous studies on this topic.

### **5.2.2 Contact with help-services**

In our sample, one third of adolescents with co-occurring SA and NSSH had been in contact with help-services, which is a higher proportion than among adolescents in the other SH groups. Within this group with co-occurrent suicidal and nonsuicidal behaviour, the likelihood of such contact was significantly higher among those with substance use and mental health problems, the latter is in line with findings from a study of adolescents presenting to emergency crisis services (Cloutier, Martin, Kennedy, Nixon, & Muehlenkamp, 2010). While such an association stands to reason, a more problematic finding was that a large proportion (63%) of self-harming adolescents with additional psychosocial problems had not been in contact with CAPS, despite their likely need of treatment. Yet, it is also noteworthy that our findings, in line with those of Nock and co-workers (Nock et al., 2013), suggest that the more severe self-harm behaviour and additional problems were, the more likely the adolescents were to receive treatment.

### **5.2.3 Implementation of treatment**

Our feasibility study concluded that DBT-A is feasible to implement in a Scandinavian culture and language context. Therapists reached adequate adherence levels within a relatively short time and treatment retention among the adolescents was high. Whether DBT for adolescents could be implemented in a different cultural and language context from where it was developed, was also investigated in a German pilot study (Fleischhaker et al., 2011) and similar results were obtained with respect to acceptance and feasibility. Reporting of treatment adherence is of course important to demonstrate the extent to which the intervention has been delivered according to the treatment developers intentions. Our study was the first to report adherence ratings of the DBT therapists, and we demonstrated that therapists with substantial clinical experience, but new to DBT when trained through a standard intensive training program in DBT could reach adequate levels of adherence rapidly. Furthermore that the treatment was given in line with the programme's stated intentions and quality indicators.

#### **5.2.4 Efficacy of treatment: self-harm, suicidal ideation and depressive symptoms**

When investigating the efficacy of DBT-A in a randomized controlled trial (RCT) design, reported in Paper IV, we concluded that DBT adapted for the treatment of self-harming adolescents with multi-problems and features of borderline personality disorder was superior to enhanced usual care in reducing frequency of self-harming behaviours with and the severity of suicidal ideation and depressive symptoms. We found generally large effect sizes for self-harming behaviour, suicidal ideation and depressive symptoms in the DBT-A condition, but weak or moderate changes in these dimensions in the EUC condition. Prior to this study, no effectiveness study of DBT for adolescents existed. However, similar findings regarding a reduction in self-harm had been reported from DBT studies on adults as described above (Panos, Jackson, Hasan, & Panos, 2014).

#### **5.3 Some reflections on these findings**

We found a high co-occurrence of both suicide attempts and non-suicidal self-harm in the school-based population and that this association was linked to high levels of suicidal ideation, depressive symptoms and impulsive behaviour (rule-breaking as well as substance use), compared to those with only NSSH or only SA. It is possible that this strong association between NSSH and SA relates to an underlying variable. SH and associated behaviours have been found to be linked to each other and to underlying problems with emotion regulation in other groups with suicide risk, and to interact with environmental factors (e.g. lack of social support, availability of self-harm methods, contagion from social media) (Guertin et al., 2001). It may be that a person proceeds from NSSH to SA when having severe problems over time. A person who perceives burdensomeness or social alienation for a long time will at some point may desire to die, i.e. have suicidal ideation. At the same time we as humans are driven by a strong basic instinct for self-preservation, but those who have developed a fearlessness of pain and injury, often acquired through a process of repeatedly harming oneself like in NSSH may develop a dangerous habituation to physical and emotional pain. This can lower the threshold for a behaviour such as suicide attempts, but also rule-breaking or risk-taking behaviours (Andover et al., 2012; Joiner, Brown, & Wingate, 2005). The connection of high suicide ideation, the capability to use self-harm in combination with a



tendency to act impulsively (either under influence of substance/alcohol or without) is a dangerous combination for adolescents. However, it is not clear whether NSSH precedes SA or vice versa, neither in our studies, nor in the literature elsewhere, thus further research is needed.

All human beings need to self-regulate emotions, but most of us use noninjurious ways. This thesis was not designed to study theoretical models, but a reflection upon why some use injurious ways to regulate emotions are of interest. According to the theory of the intrapersonal (biological/cognitive) and interpersonal (social) functions described in the introduction to this thesis, several possibilities may exist.

One example of the *intrapersonal* function of self-harming behaviour is that harming oneself is a naturally available, quick and effective response to distress. Partly due to the effectiveness, it tends to have a self-rewarding effect, i.e. getting relief or less of an emotion serves as negative reinforcement to continue. Among those engaging in repeated self-injurious behaviour, a different neurochemistry is reported. This neurochemical difference could have several causes, among them chronic and severe childhood stress (Stanley et al., 2010), which could also explain a tendency of frequently repeated NSSH and SA events among some young people. Sher and Stanley proposes that the co-occurrence of nonsuicidal self-harm and suicide attempts can be understood partly by shared neurochemistry, and that both behaviours may be attempts to restore their neurochemistry to normal concentrations of endogenous opioid (Sher & Stanley, 2008).

One example of how the *interpersonal* function could operate is that NSSH may be especially effective as a means of social communication and influence other profoundly precisely because it is harmful and thus perceived as important to others. As many who self-harm may have experienced that other communication strategies have failed partly due to an invalidating and/or unresponsive environment they will learn that NSSH elicit responses from others and thus they are perceived as effective. Combinations of intrapersonal and interpersonal aspects may explain why pattern of repeated self-harm may develop.

The next step is to reflect on the lack of contact with help-services. Our finding that only one in three in the group with both NSSH and SA reported having been in contact with help

services could be explained in several ways. One possibility is that self-harming behaviour, as we have pointed out above, indeed has a powerful short-term emotion regulating effect and this effect could reduce adolescents' motivation to seek help, since this coping strategy to deal with emotional problems actually works. Self-harm behaviour has immediate desired consequences, and these consequences serve to reinforce the behaviour which then sooner or later develops into a pattern (Nock et al., 2009). At the same time, the problem behaviour substitutes more constructive coping behaviours such as seeking help and treatment. It is noteworthy that, although the majority of adolescents in our community sample reporting having self-harmed had not been in contact with help services, a sizable minority (37%) actually had. We don't know what the actual content of this contact was, but we know that this would have represented an important opportunity for care providers to engage the adolescents in treatment.

However, adolescents who received DBT-A in the clinical trials reported in this thesis, reduced their self-harming behaviour significantly more than participants who received usual care and improved some of their mental-health problems. We have not studied directly the mechanisms of change underlying this therapeutic effect preventing us from making any firm assumptions about such, but we presume that this treatment has some central structure and ingredients involved in this change.

One reason that DBT has stronger tendency than usual care in reducing self-harm frequency (as shown in Paper IV) is probably the early and explicit focus on reducing self-destructive behaviours. Some of the tools in the treatment are designed to help the person understand factors that set off or maintain self-harming behaviour, as well as to generate alternative solutions. Change strategies developed to counteract excessive emotional vulnerability and difficulties in emotion modulation are central to the treatment. Self-harming adolescents are often plagued by chronic, aversive affective experiences and failure to inhibit maladaptive mood-dependent actions. DBT was developed exactly to counteract such mechanisms.

A model for understanding how treatment goals are defined and worked with can be illustrated by Linehan's description of Gottman and Katz's work on ineffective behaviour (Linehan, 1993). According to them, modulating ineffective behaviour involves four tasks (1)

changing the arousal associated with the emotion, (2) reorienting attention, (3) inhibiting mood-dependent behaviour, and (4) organizing behaviour in the service of non-mood dependent goals. This model of emotion modulation, published in the '90s, inspired Linehan to work directly with this inability to moderate or increase affect. The DBT programme is full of principles, strategies and skills that address this problem. In view of the knowledge that our clients are extremely emotionally aroused several times during the day, strategies at the first level of modification of arousal, seen in Gottman's model, will more likely succeed than strategies at higher levels, simply because the extreme arousal involved in negative affect is the physiological part of the emotion, and all emotions have associated action urges.

A major goal in DBT is to help patients experiencing emotions, both negative and positive instead of inhibiting them, or to moderate emotions. Several skills have been developed to assist patients in achieving this. To what extent skills acquisition is essential to the efficacy of DBT is currently debated and studied. It seems that other treatments that do not involve modification of arousal in such an explicit way will have slower or weaker effect. MBT-A for adolescents (Rossouw & Fonagy, 2012) is one of the few other treatments that has shown effect in this patient group, and also this treatment interestingly includes skills-training on emotion regulation. This suggests that skills training as a way of reducing emotional arousal and gaining emotion regulation capacity is an important element in the treatment of self-harm in adolescents.

Research from treatment studies of DBT for adults supports that clients' use of DBT skills is important for increased life-quality and reduction of self-harm. Skills are actually reported as a mediator of treatment effect (Neacsiu, Rizvi, & Linehan, 2010), and a newly conducted study indicates that a treatment programme consisting of skills only gives treatment effects superior to DBT standard or other treatment with support and groups (Linehan et al., 2015). All patients in DBT learn and have to practice such modification skills, and often together with their therapist they can experience that emotions decrease, or that they are simply emotions that you can have without acting on them and although they are intense, by nature they only last seconds to minutes and then fade away.

*Live was so angry at her therapists and foster care parents in several sessions that she either went out or screamed when strong emotions came up. Her therapists asked her*

*to rate on a scale how angry she was, and instead of wringing her hands or running out, she should sit down with her hands open, or even sit on them and speak with a quiet voice. The therapist called this Opposite Action.*

## **5.4 Methods: Strengths and Limitations**

There are several advantages of having included data on self-harming behaviour from adolescents in both a general population sample and a clinical sample, with study participants from broadly the same geographical area, of similar age, and within the same time period (2006 and onwards). It has allowed us to assess the prevalence of problem behaviours and symptoms in the general population of adolescents and assess to what extent a clinical population of self-harming adolescents deviate from characteristics of self-harmers in the general population.

Clinical trials of novel treatments are relatively rare within the field of self-harming adolescents, and for good reasons. It cannot be denied that it was experienced as very demanding to both train as a therapist, deliver trial treatments throughout the duration of the project period and to conduct the research involved. However, it has given me a hands-on experience with all aspects of treatment and of data collection and with analysis and interpretation of results within a broader range of understanding.

### **5.4.1 Strengths and limitations in the cross-sectional study (papers I and II)**

*Strengths:* A major strength in the first two papers is the large dataset obtained from the general school-population including a large number of respondents and a broad array of relevant psychosocial measures (with good psychometric qualities). This allowed for assessment of complex associations in multivariate analyses with good statistical power. The high response rate suggests adequate representativeness of school sample in the city of Oslo. The use of anonymous responses likely enhanced honesty and reliability and thereby minimized underreporting of sensitive issues.

*Limitations:* A major important limitation with the cross-sectional design is that the temporal sequence of events is not known, which hampers causal inferences from observed associations. This is particularly problematic with respect to our analyses of associations between lifetime measures (e.g. of self-harm and use of CAPS) and current/past year

measures (e.g. mental health and substance use), as reported self-harm events may have preceded risk exposure. The difference here may underestimate the association of mental health/substance use and self-harming behaviour.

Another limitation of the measures in the “Young in Oslo study” is that the participants reports on self-harm lacked detailed information about the various episodes, such as time, method, and motives of the behaviour. Moreover, recall bias may have affected the retrospective lifetime measures of self-harm.

#### **5.4.2 Strengths and limitations in the intervention studies (paper III and IV)**

##### **Paper III**

*Strengths:* While a feasibility study with its uncontrolled design does not have the capacity to conclude on treatment effects, it provides valuable information on implementation of the treatment method and allows for evaluating whether the intervention is feasible within the treatment system and also acceptable to patients and therapists. A major strength in the feasibility study was that we used a systematic instrument and an external coder trained to reliability with staff at the treatment developer’s milieu for coding of therapists’ adherence to DBT-A treatment principles, which allowed for assessing the extent and variation in adherence to the programme principles.

Furthermore, the feasibility study prepared us for conducting a randomized controlled trial for evaluating the effectiveness of interventions, by providing valuable information about referrals to CAPS, training of therapists, and obtaining programme compliance and programme acceptance in the patient group.

*Limitations:* The most important limitation of this feasibility study was that we did not collect information about whether anyone declined to attend for interviews, how many, and reasons for that, which could have given us better information about acceptability to a broader clinical population. As we did not follow up on those who dropped out, we have no information about why they dropped out, which would be of value for assessment of treatment acceptance.

##### **Paper IV**

*Strengths:* One important strength in this study is the use of a RCT design, making it possible

to draw conclusions about treatment efficacy. Moreover, instruments used to determine diagnoses and measure symptoms in this study are all widely used and standardized as well as accepted in clinical suicidological research. All the interviews and assessments were performed by specially trained personnel, and interviewers were supervised and attended consensus meetings led by an expert in the field of diagnosing disorders in adolescence, and interrater reliability of diagnoses was found to be satisfactory. All interviewers were blind to treatment allocation and could not influence estimation of treatment effect.

Detailed questions about self-harm, intention, hospital treatment, lethality, methods and the reason given for most recent self-harm episode, give this study a chance to minimize biases such as misunderstanding of concepts, recall bias and under/overreporting of such behaviour. The absence of dropout from the research is also enabling us to report on all participants who were included, and the delivering of treatments in a community mental health setting all strengthen the external validity of the findings. This strengthens the possibility to conclude on efficacy for a broader population of self-harming adolescents.

*Limitations:* The most important weakness of this clinical trial was the limited sample size, and findings should be interpreted with caution. However, conducting clinical intervention studies is time- and cost-consuming and in reality, these concerns are balanced with considerations about sufficient sample size. While the sample was sufficiently large to detect overall treatment effects of moderate magnitude, the study was not sufficiently large to address whether treatment effects differed by various patient characteristics and other predictors.

The study used rather liberal inclusion criteria, which allowed most adolescents referred and screened for repeated self-harm, to be included. However, it is quite possible that a selection-bias for seeking CAPS treatment and/or for providing informed consent may have impacted the study sample. Thus, it is possible that the most disturbed or multi-problem adolescents could be underrepresented in this sample. Consequently, the present study may underestimate the difficulties that some patients with self-harming behaviour experience with committing and adherence to treatment, simply because we could have a selection of those with highest functioning.

The study also excluded those who were not able to speak and understand Norwegian, thus parts of the migrant population are excluded, and we know from our Paper II that self-harm is as high or even higher among subgroups of migrants in Norway. Generalizations of our findings should therefore be made with due caution.

Internal validity could also be threatened, as we do not have total control over other factors that may influence treatment effects. Implementing a new treatment that has already been shown to be effective for adults could make the therapists and the patients feel more enthusiastic about giving or receiving this new treatment. It could be that such factors are more related to change than the treatment ingredients itself. On the other side, other threats to internal validity were minimized by well-organized data collection outside the clinics and use of well-trained personnel.

## **5.5 Implications**

### **5.5.1 Implications for further research**

The past decades have brought significant advances in the understanding of self-harm. The hypotheses that self-harm is related to various factors interacting, thus increasing the risk of the behaviour, should be further investigated, including prospective studies where actual measurement of day to day thoughts, feelings, emotional symptoms and behaviour are studied directly instead of reported in retrospect, as many of the studies on associations and risk factors have done.

Combining clinical studies that intervene, but also measure with a direct method such as, e.g. an APP for direct registration or Ecological Momentary Assessment a method regarded as a feasible and valid approach to collect data on self-harm, would provide more knowledge on emotional dysregulation, self-harm and fluctuations in those from a time-to-time basis. Future research on treatment effect is needed, and should also include larger samples followed over a longer time so that one could clarify whether positive results persist. It is also of importance for future research to clarify if DBT or central elements of the treatment could be used for transdiagnostic problems with emotion regulation relevant to the majority of psychological disorders, and in line with the transdiagnostic approach to treatment e.g. (Mansell, Harvey, Watkins, & Shafran, 2009). Further, to clarify what parts of treatment are

of importance, and dismantling studies, where one selects ingredients of the treatment, which would enable us to see if there is necessary and unnecessary content, would be preferred.

Further, studies of those with assumed treatment needs, but who do not necessarily come to treatment would be important, and qualitative studies of what barriers may be involved, are indicated. One identified group in this thesis is adolescents with non-western background. Research on whether they are hesitant or if there are cultural or language issues that keep them from CAPS, or studying health personnel or treatment providers on possible system barriers would be of interest.

### **5.5.2 Implications for practice**

Since our study indicates that many adolescents alternate between SA and NSSH and that these adolescents are the ones who are most burdened with health and behavioural problems, it would seem important for clinicians and school health personnel to target these adolescents for further assessment and provision of adequate help and services. We would recommend that adolescents who are in contact with health personnel are asked about both behaviours, and that assessments of reasons or motives the adolescents may have, are carefully addressed.

We found that non-western immigrant background appeared to be an important barrier for CAPS contact. Thus, lowering the threshold for contact with CAPS among suicidal and self-harming youths of ethnic minority is therefore highly important. We need to know what barriers there are, either in the system or on individual levels, for receiving help, and reducing the effect of such potential barriers.

For adolescents in need of treatment, but with difficulty in committing to longer treatment plans, our finding that a short version of DBT can be effective is important to motivate to receiving help. Also leaders and clinicians in the health-care systems could be advised to implement DBT as one valuable treatment option offered for families who have a self-harming adolescent, with the expectation that a process of recovery and control over self-harm may make long treatment courses unnecessary, or facilitate other therapeutic treatment effects that are of importance for a good quality of life.



Approaches like DBT or other psychotherapy or even more widely distributed school-based prevention programmes, will not be sufficient to prevent self-harm, given the scope and seriousness of these problems coupled with the fact that most adolescent who self-harm do not present for treatment. There is need for a range of preventive models to make self-harm prevention a national priority. In line with this, the Norwegian Directorate of Health has already used my colleagues and me to work out a national electronic material available for all community workers, as one effort to reduce self-harm in Norway. This may be a direct result of publishing the papers on DBT.

## **6. CONCLUSIONS**

This thesis contributes new knowledge about the prevalence and characteristics of self-harming behaviours in adolescents; the use of child and adolescent psychiatric services among self-harming adolescents, and the feasibility and effectiveness of a novel treatment programme delivered within regular CAPS in the capital of Norway. Self-harming behaviours were often reported by Norwegian adolescents and co-occurring suicide attempt and non-suicidal self-harm was in particular associated with psychosocial problems. These problems could in part explain the elevated likelihood of CAPS contact among adolescents with co-occurring SA and NSSH. Moreover, within CAPS, repeated self-harm can be prevented with treatment, and Dialectical Behaviour Therapy for adolescents seems feasible to deliver with treatment fidelity in publicly funded outpatient clinics. DBT was found to be an effective treatment for self-harming adolescents as it reduced self-harm, suicidal ideation and depressive symptoms.

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## **8. ORIGINAL PAPERS**

Papers I, II, III and IV

