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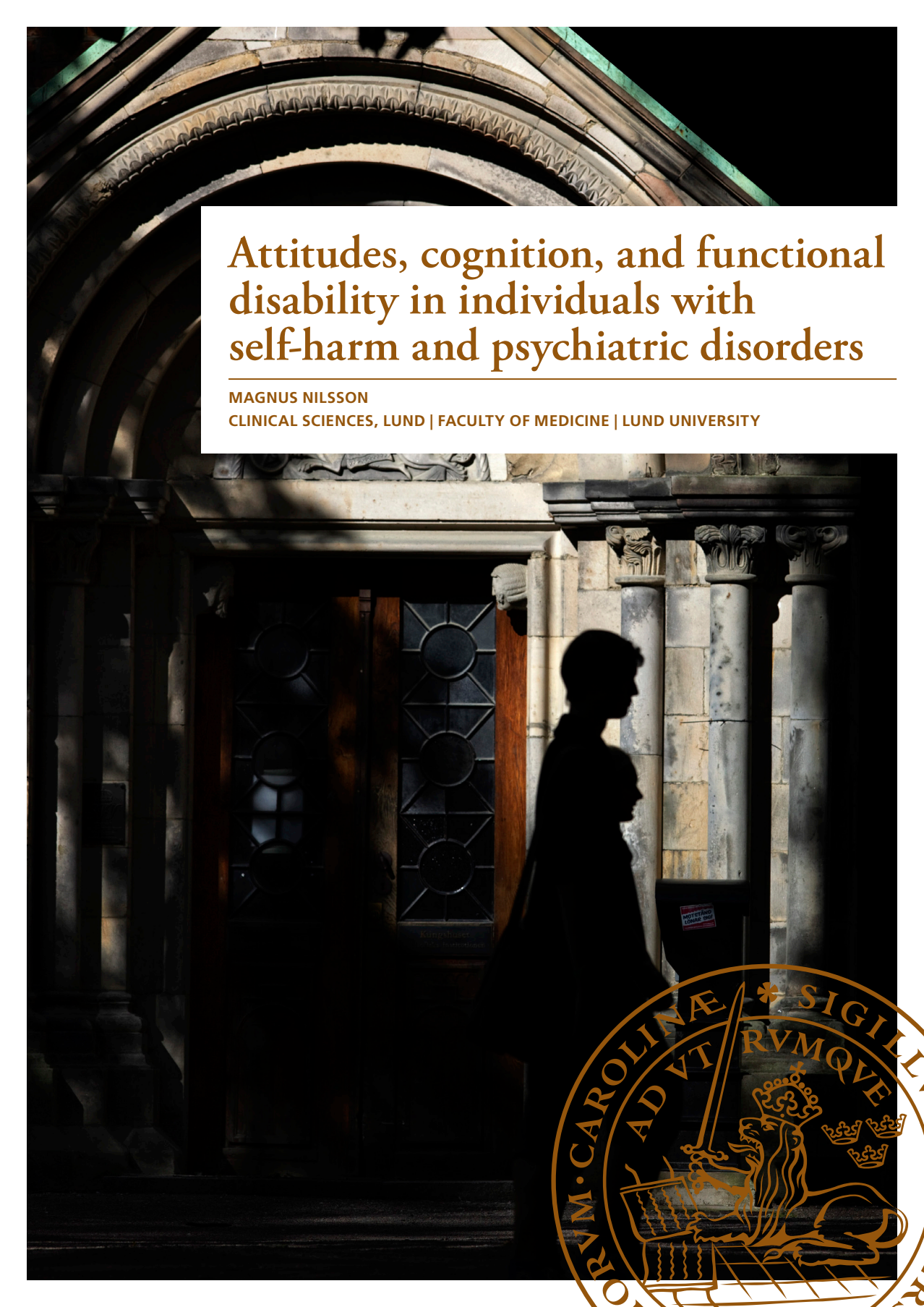
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Attitudes, cognition, and functional disability in individuals with self-harm and psychiatric disorders

MAGNUS NILSSON

CLINICAL SCIENCES, LUND | FACULTY OF MEDICINE | LUND UNIVERSITY





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Attitudes, cognition, and functional disability in individuals with self-harm and psychiatric disorders

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Abstract		
<p>Background: Self-harm is common and is associated with stigma and an increased risk for suicide attempts. There is a lack of knowledge about this behaviour, especially in clinical samples. Executive functions might be associated with self-harm, and there is also evidence that adverse childhood experiences and self-hatred are of relevance. However, there is a lack of studies in clinical samples. Similarly, there are few studies that explore the impact of self-harm on functional disability. Finally, tolerance towards self-harm could be of importance, but there's currently no available measure that assesses tolerance towards self-harm in the general population.</p> <p>Aim: The current study aimed to develop a scale to measure tolerance towards self-harm, as well as to explore executive functions, functional disability, tolerance towards self-harm, self-hatred, and adverse childhood experience in a clinical group of individuals with self-harm, as compared to a clinical and a healthy control group.</p> <p>Method: A questionnaire on tolerance towards self-harm was constructed and validated against other instruments in a community sample of 336 respondents and a psychiatry staff sample of 582 respondents. Furthermore, 65 individuals with psychiatric conditions, with and without self-harm, and 29 healthy controls were interviewed and assessed with relevant instruments.</p> <p>Results: The questionnaire, named Lund Tolerance towards Self-harm Scale (LUTOSH), proved to have acceptable statistical characteristics. As compared to clinical and healthy controls, individuals with psychiatric conditions and self-harm exhibited deficits in one aspect of executive functions. They also reported significantly higher functional disability as compared to clinical controls. In addition, individuals with self-harm reported more childhood emotional abuse. Self-hatred mediated the impact of emotional abuse on self-harm.</p> <p>Discussion: Despite some limitations, the results have expanded our understanding of self-harm in clinical samples. The results, as well as the developed instrument, can be used for further studies as well as for developing new interventions.</p>		
Key words Deliberate self-harm, non-suicidal self-injury, attitudes, adverse childhood experiences, stigma, executive functions, functional disability, self-hatred.		
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Table of Contents

Svensk sammanfattning	9
List of papers	11
Abbreviations	13
Introduction	15
Self-harm	15
The history of self-harm	15
The epidemiology of self-harm	16
Functions of self-harm	16
Studying self-harm in clinical settings	18
Attitudes and self-harm	18
Cognition and self-harm	20
The consequences of self-harm	21
Adverse childhood experiences, self-hatred, and self-harm	22
Aims	25
Method	27
Paper 1	27
Sample, procedure, and ethics	27
Measures	28
Paper 2-4	29
Sample, procedure, and ethics	29
Measures	31
Statistical analysis	35
Results	37
Paper 1	37
Paper 2	38

Paper 3	39
Paper 4	40
General discussion	43
Main findings	43
Attitudes and self-harm	43
Cognition and self-harm	44
The consequences of self-harm	45
Adverse childhood experiences, self-hatred, and self-harm	45
Limitations	46
Implications and future directions	51
Acknowledgements	53
References	55

Svensk sammanfattning

Självskadebeteende, d.v.s. att upprepat och avsiktligt skada sig själv, är ett vanligt symptom, särskilt förekommande bland personer med psykisk ohälsa. De personer som utför sådana handlingar är ofta stigmatiserade och löper även ökad risk att genomföra senare suicidförsök. Tack vare forskningsframsteg är det nu relativt belagt att den vanligaste anledningen till att en person skadar sig själv är för att hantera ansträngande känslor och tankar. Mycket är dock okänt, bland annat varför vissa personer väljer att börja skada sig, varför de fortsätter, samt vad det har för konsekvenser i deras liv.

Olika aspekter har förts fram som viktiga för att förstå självskadebeteende. Dels kan de som lider av detta problem ha svårare att anpassa sitt tankesätt och beteende efter nya sammanhang, vilket kan påverka deras förmåga att sluta med självskadebeteendet. De som skadar sig själv kan även ha mer hat mot sig själv vilket möjligen härrör från ansträngande uppväxtförhållanden. Detta kan i sin tur innebära att självskadebeteendet fyller en självbesträffande funktion. Denna avhandling syftade till att öka kunskapen om personer som skadar sig inom psykiatrin beträffande dessa aspekter, samt att utveckla ett formulär som kan mäta allmänhetens attityder gentemot självskadebeteende.

I det första delarbetet fick ett stort antal personer ur allmänheten samt personer som arbetar inom psykiatrin fylla i ett framtaget formulär som innehöll påståenden kring tolerans för självskadebeteende. I de resterande delarbeten fick psykiatriska patienter med och utan självskadebeteende samt friska kontrollpersoner genomgå intervjuer, svara på frågor och fylla i tester och formulär.

Det utarbetade formuläret visade sig kunna mäta allmänhetens attityder på ett tillfredställande sätt. Resultaten från intervjuerna och testerna visade också att kvinnor som skadar sig själv verkar ha svårare för att skifta tankesätt och har svårt för att ta hand om sig själv i vardagen. Som förväntat är de också mer självhatande vilket troligen härrör från en känslomässig utsatt uppväxt. Sammantaget kan dessa resultat bidra till att öka förståelsen för självskadebeteende och till att utveckla nya sätt att hjälpa de som lider av det.

List of papers

Nilsson*, M., Hellström, C., Albin, V., Westrin, Å., Lundh, L.-G., & Westling, S. (2020). Measuring tolerance toward self-harm: Introducing the Lund Tolerance Toward Self-Harm Scale (LUTOSH). *Stigma and Health*, 5(3), 315–322. <https://doi.org/10.1037/sah0000199>

Nilsson*, M., Lundh, LG., Westrin, Å., Westling, S. (Accepted for publication). Executive functioning in psychiatric patients with deliberate self-harm, as compared with a psychiatric and a healthy comparison group. *Journal of Clinical and Experimental Neuropsychology*. Accepted for publication Feb 16th 2021. <https://doi.org/10.1080/13803395.2021.1894094>

Nilsson*, M., Lundh, L-G., Westrin, Å., & Westling, S. (2021). Functional disability in psychiatric patients with deliberate self-harm as compared to a clinical control group. *Frontiers in Psychiatry*, [579987]. <https://doi.org/10.3389/fpsy.2021.579987>

Nilsson*, M., Lundh, LG., Westling, S. (Submitted). The role of adverse childhood experiences, self-hatred, and attitudes for self-harming behaviour among individuals with psychiatric disorders, as compared to clinical and healthy comparison groups.

*Corresponding author

Abbreviations

ACE	Adverse childhood experiences
ANOVA	Analysis of variance
BPD	Borderline personality disorder
BSL-23	The Borderline Symptoms List-23
CAMI-S	The Community Attitudes towards the Mentally Ill S
CFI	Comparative fit index
CI	Confidence interval
CTQ	Childhood Trauma Questionnaire
CWI	Colour Word Interference
D-KEFS	Delis-Kaplan Executive Function System
DSM-V	Diagnostical and Statistical Manual of Mental Disorders V
DSH	Deliberate self-harm
EF	Executive functions
FSCRS	The Forms of Self Criticizing/ Attacking and Self Reassuring scale
GAF	Global assessment of functioning
ISAS	The Inventory of Statements about Self Injury
LUTOSH	Lund Tolerance Towards Self-Harm Scale
MAKS	The Mental Health Knowledge Scale/Schedule
MADRS	Montgomery Åsberg Depression Rating Scale
MANOVA	Multivariate analysis of variance
MINI	MINI International Neuropsychiatric Interview 6.0
NSSI	Non-suicidal self-injury
RDoC	Research domain criteria
RIBS	The Reported and Intended Behaviour Scale
RMSEA	Root mean square error approximation
SHAS-SR	The Self-Harm Antipathy Scale-Swedish
TMT	Trail Making Test
WAIS-IV	Wechsler Adult Intelligence Scale IV
WHO	World Health Organization
WHODAS	World Health Organization Disability Assessment Scale 2.0 (WHODAS 2.0)

Introduction

Self-harm

The history of self-harm

Our current understanding of human behaviour is based on the notion that the overarching purpose is to increase the chance of survival for the individual, his- or her group or offspring (Walters & Williams, 2019). To inflict damage on oneself is seemingly against this purpose. And still, there are records of self-harm that stretch from the ancient era, through the centuries, and to our time. Self-harming behaviours seem to have been a part of many religious or cultural contexts in which they occur (Favazza & Rosenthal, 1993; Favazza, 1996). However, despite being described in historical records, it is unclear if the purposes and functions of self-harm behaviour are similar or the same as what we understand them to be today (Gilman, 2013; Angelotta, 2015).

The interest in self-harm as a psychological or psychiatric illness; the origin of our current understanding, can be traced far back, at least to the beginning of the 20th century. At the time, clinicians and researchers attempted to distinguish self-mutilating acts from truly suicidal ones, as well as acts resulting from a serious mental illness versus those that didn't (Angelotta, 2015). Subsequent efforts around that time included influential writings such as Menninger's *The Man Against Himself* (1938), which is one of the first attempts to describe the behaviour as a mean to cope with emotional experiences. Although much of these early descriptions are valid today, our understanding of self-harm has transformed over the last decades. In the 80's, the first attempts were made to describe self-harm as a separate condition (Pattison & Kahan, 1983), and the amount of studies focusing on this topic has since increased greatly. This increase in interest of knowledge around self-harm is possibly prompted by the perception that self-harm has increased among the population (e.g. Tørmoen et al., 2020).

The epidemiology of self-harm

There is now an increasing body of knowledge regarding the prevalence of self-harm. In the general population, the lifetime prevalence of self-harm is estimated to 4-5.9 % (Klonsky et al., 2003; Koyanagi et al., 2015) with higher estimates for women (Bresin & Schoenleber, 2015) and lower for ethnic minorities (Kuentzel et al., 2012). Among youth, the figure is substantially higher with reports between 16 and 18% (Muehlenkamp et al., 2012; Swannell et al., 2014). Fortunately, but for unclear reasons, most self-harming behaviours among adolescents tend to resolve after a period of time (Moran et al., 2012), usually after a peak in the behaviour around 16-18 years of age (Plener et al., 2015). The prevalence among clinical samples is high, with estimates up to 54,5% (de Klerk et al., 2011). With regards to self-harm among individuals with psychiatric disorders, it seems as if the behaviour is trans-nosological, i.e. occurs among various clinical groups (Bentley et al., 2015; Nock et al., 2006; Singhal et al., 2014; Tuisku et al., 2012). Among the psychiatric conditions described in the DSM-V (American Psychiatric Association, 2013) self-harm is a symptom exclusively of Borderline Personality Disorder (BPD) and the behaviour is indeed common and usually severe in individuals with this disorder (Brickman et al., 2014; Nock et al., 2006).

Functions of self-harm

Several models have emerged attempting to map the mechanisms involved in the causes, perpetuation, and reinforcements of self-harm. As part of the emerging research, there has been a debate over how the behaviour should be labelled, and at the heart of this debate is the question whether the definition should include acts with suicidal intention or not (e.g. Nock & Favazza, 2009; Edmondson et al., 2016, p 9). *Non-suicidal self-injury* (NSSI) has become a commonly used term. NSSI defines this behaviour as a “direct, deliberate destruction of one's own body tissue in the absence of suicidal intent” (Nock & Favazza, 2009). This definition was suggested as a separate psychiatric diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V; e.g. Selby et al., 2012) and was subsequently included in the appendix (American Psychiatric Association, 2013). Another alternate definition is *Deliberate self-harm* (DSH). This concept is broader in the sense that it includes self-harm irrespective of the motivation; That is, whether the self-harm is with suicidal intent or not (Hawton et al., 2002). What these two

definitions have in common is the description of self-harm as a pattern of repeated self-destructive acts that have a non-fatal outcome.

Beyond the potential suicidal intent, a multitude of models have attempted to describe the reinforcing mechanisms of self-harm, and recently, a few models with significant support have emerged. Firstly, there are models involving biological rationales for the behaviour, reminiscent of models such as serotonin for depression (Albert et al., 2012) and dopamine for schizophrenia (Brisch et al., 2014). For self-harm, these models have primarily been focused on the role of opioids as part of the reinforcement mechanism. This approach is based on the assumption that there is a deficiency or imbalance in the opioid system (Bresin & Gordon, 2013; Stanley et al., 2010), however research on this has been hampered by methodological difficulties (e.g. Kirtley et al., 2015),

Other models have focused primarily on the intra-personal and extra-personal functions of self-harm, such as the influential Four-Function Model proposed by Nock & Prinstein (2004). This model was derived from studies of self-reported functions and encompasses the reinforcing mechanisms of self-harm across two dimensions: positive vs negative reinforcement and intrapersonal vs interpersonal functions. That is, the behaviour either adds a positive affect or experience (positive intrapersonal reinforcement), reduces an aversive affect or experience (negative intrapersonal reinforcement), removes the individual from a social situation or demand (negative interpersonal reinforcement), or achieves a positive environmental social response or inclusion (positive interpersonal response). This model has spurred further research and has helped pinpoint which areas that are in need of more research (Bentley et al., 2014). Supported by laboratory, experimental, as well as epidemiological data, Hooley & Franklin (2018) recently proposed the Benefits and Barriers Model of self-harm. According to Hooley & Franklin, studies across several research disciplines suggest that emotional reactivity is not clearly associated with self-harm. This contradicts with other models, including the Four-Function Model. Although the model shares the conclusion with other models, that self-harm improves affect, less is known regarding the reason why self-harm, in lieu of other strategies, is used towards this end. The theory subsequently suggests that the benefits of self-harm (improves affect, gratifies self-punishing desires, provides peer group affiliation, communicates distress and strength) are applicable to most people. What distinguishes individuals who self-harm from those who don't, however, is the lack of psychological, social and biological barriers (lack of awareness of self-harm, positive view of the self, physical pain, aversion to self-harm related stimuli and social norms). Hooley and Franklin (2018) propose that all barriers need

to be eroded for the individual to engage in self-harm. Thus, these barriers are more suitable treatment targets, as compared to the benefits of self-harming.

Taken together, reasons for self-harming behaviours have been extensively researched and debated (Hooley & Franklin, 2018; Klonsky et al., 2015). Despite advancements in the past decades however, our understanding of the causes and mechanisms of self-harm is still limited (e.g., Bentley et al., 2014; Cipriano et al., 2017; Nock, 2010)

Studying self-harm in clinical settings

Although self-harm is common in community settings (Klonsky et al., 2003), estimates in clinical psychiatric settings are higher (de Klerk et al., 2011; Odelius & Ramklint, 2014). Unfortunately, a significant part of the research that has been done in the field, have primarily used community or mixed samples (e.g. Dixon-Gordon et al., 2014; Liu et al., 2018). Since both self-harm (Mars et al., 2019) and psychiatric disorders (Gili et al., 2018) are risk factors for future suicide attempts, a group of individuals with a psychiatric illness and self-harm could constitute a high-risk population for suicide. Therefore, it is of great importance to assess and treat this group as successfully as possible. Individuals with psychiatric disorders also have impaired daily functioning (Buist-Bouwman, 2006; Tanner et al., 2019) and are at risk of suffering from stigma (Parcesepe & Cabassa, 2013) related to their psychiatric conditions. Thus, a group with combined self-harm and psychiatric illness is of much need of adequate studies and tailored interventions.

Attitudes and self-harm

The Benefits and Barriers Model proposes that attitudes towards self-harm itself, could be important for the development and perpetuation of self-harming behaviours (Hooley & Franklin, 2018). Previous efforts at exploring attitudes towards self-harm have primarily been focused on health care providers (Patterson et al., 2007; Karman et al., 2015; Saunders et al., 2012). This research has produced valuable insights into the implications of these attitudes on the care provided to individuals with self-harm. Negative attitudes seem to be common among health-care providers (Karman et al., 2015; Saunders et al., 2012) and this is commonly experienced as problematic by individuals suffering from self-harm. This in turn, leads to negative implications for providers (Karman et al., 2014) as well as for patients (Lindgren et al., 2004;

Commons Treloar et al., 2008). Research suggests that emergency care nurses in general see at least one person with self-harm each shift (Holdsworth et al., 2001) which makes this a field where research and interventions can contribute with a significant positive impact for providers and patients alike.

Less is known about the attitudes towards self-harm outside of clinical settings and which implications they might have on individuals with self-harm. Existing research points towards that self-harm is associated with public stigma (Law et al., 2009; Lloyd et al., 2018). Among others, Nielsen and Townsend (2018) conducted a study indicating that community attitudes towards self-harm affected the cognitive, behavioural and emotional responses by the community. Thus, attitudes towards self-harm most likely leads to consequences for individuals with self-harm. These and other findings have prompted a recent attempt to gather existing knowledge in a theoretically founded model, guiding future research endeavours (Staniland et al., 2020).

In the Benefits and Barriers Model (Hooley & Franklin, 2018), the knowledge of, and attitudes towards, self-harm are considered important as both benefits and barriers for this behaviour. Thus, it is likely that the social context may play a significant role for individuals with self-harm. Self-harm often occurs following interpersonal conflicts (Turner et al., 2016). Hypothetically, a context in which family, friends and relatives might express negative feedback based on negative attitudes towards self-harm, could decrease the risk of the behaviour re-occurring, since it's not being socially reinforced. Alternatively, the risk of self-harm could increase since negative feedback could lead to conflicts causing negative emotion, which, in turn, leads to more self-harm. Paradoxically, positive attitudes towards self-harm could also be a component of a peer-group effect, which is considered to be one of the benefits of self-harm (Hooley & Franklin, 2018), thus increasing the behaviour. Indeed, there is some research that showed that an increase in self-harming incidents increases the perceived support, which in turn leads to more self-harm urges the following day (Turner et al., 2016). Despite these intriguing results, little is known of public attitudes towards self-harm in general. More information is needed regarding in which contexts attitudes differ, and which role these attitudes may play in the development and perpetuation of self-harm.

Further, little is also known regarding the attitudes towards self-harm among individuals who suffer from self-harm. Some previous research has indicated that individuals with positive attitudes towards self-harm may be at greater risk for developing self-harm themselves (Kenning et al., 2010; McAuliffe et al., 2003). Similarly, negative attitudes towards self-harm are associated with less self-harm and more time since the most recent self-harm episode (Franklin, et

al., 2014). Most of these studies, however, have been conducted using community samples with less frequent and less severe self-harm than what is seen in clinical samples. Considering that most treatment for self-harm in Sweden is conducted in psychiatric settings, more research is needed to understand the impact of attitudes towards self-harm in individuals with psychiatric disorders.

Cognition and self-harm

The role of cognition and cognitive processes related to self-harm has drawn attention in the research community, especially around the concept of *executive functions* (EF; Dixon-Gordon et al., 2014; Fikke et al., 2011; Hamza et al., 2015; Legris et al., 2012; Miranda et al., 2012; Williams et al., 2015). EF encompass cognitive processes responsible for regulating, inhibiting, and controlling our thoughts and behaviours (Diamond, 2013). There is an ongoing debate on how to accurately categorize these functions (e.g. Doebel, 2020), but the most widely used model includes three main functions: *working memory* (to hold and update information for a task), *inhibition* (to control and suppress and override behavioural and cognitive impulses), and *cognitive flexibility* (to shift perspective from different tasks and to revise the behaviour based on feedback; Miyake et al., 2000). EF have been associated with both clinical and academic outcomes (e.g. Cotrena et al., 2020; Best et al., 2011). Related to self-harm, previous research also explored EF in BPD, without conclusive results (Ruocco et al., 2005; McClure et al., 2016). However, there is some support for the idea of a relationship between EF and suicidal behaviour (Legris et al., 2012; Williams et al., 2015). With regards to self-harm, studies have suggested that deficiencies in working memory could make it more difficult for individuals with self-harm to distract themselves from negative moods and that inhibition is important to stop self-destructive impulses (Fikke et al., 2011). Finally, some researchers have suggested that self-harm is associated with cognitive flexibility, with the rationale that these individuals could have difficulties shifting their focus to other stimuli and to use strategies other than self-harm in face of an emotionally challenging situation (Dixon-Gordon et al., 2014; Garreto et al., 2017). The study populations used for these studies, however, have primarily been mixed or community samples and there is a lack of studies on clinical samples.

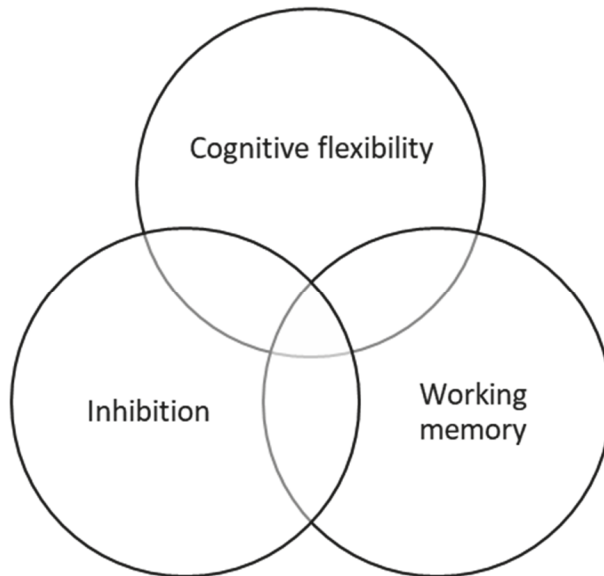


Figure 1: A model of executive functions according to Miyake et al., (2000).

The consequences of self-harm

Self-harm is associated with negative psychological well-being (Çimen et al., 2017; Lundh et al., 2011; Selby et al., 2012; Wolff et al., 2019). Despite being a common behaviour in clinical and non-clinical samples, there is a lack of studies exploring the consequences of self-harm with regards to daily functioning. In general terms, psychopathology comes with a decline in daily functioning (Depp et al., 2012; Levola et al., 2014), since this is one of the requirements to establish a psychiatric diagnosis (APA, 2013). With regards to self-harm, previous studies have predominantly focused on daily functioning in BPD (e.g. Zanarini, 2010).

Selby et al., (2012) studied daily functioning in a clinical sample with and without self-harm, including a comparison group of BPD. According to this study, individuals with psychiatric disorders and self-harm had a significantly lower level of daily functioning as compared to individuals with psychiatric disorders, but without self-harm. The results were comparable to those of individuals with BPD. However, the measurement was limited to the use of Global Assessment of Functioning (GAF), which is a brief, clinician-based rating of functioning between 0-100 that previously was part of the Diagnostic and Statistical Manual (APA, 2000). The more comprehensive World Health Organization Disability Assessment Scale 2.0 (WHODAS 2.0) has been

developed by The World Health Organization (WHO) to measure the concept of *functional disability* (Ustün et al., 2010). This concept includes the impact of any pathology on daily functioning across several dimensions and domains. Included under the dimension of Activity and Participation, six sub-domains are described: Cognition, Mobility, Self-care, Getting along, Life activities, Participation in society (Ustün et al., 2010). To our knowledge, no previous research has attempted to describe the impact of self-harm on functional disability as measured by the WHODAS 2.0.

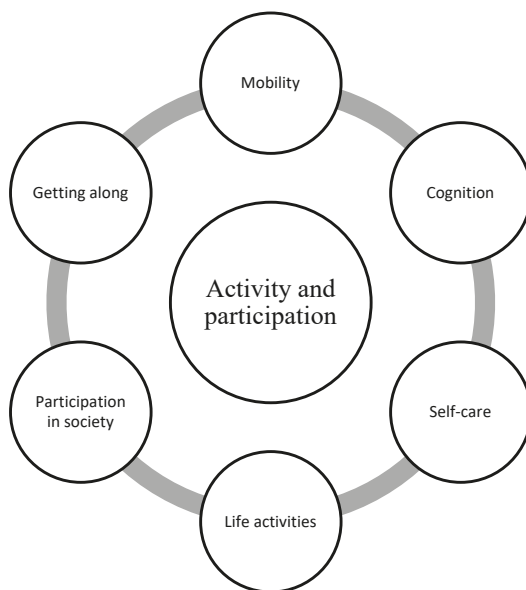


Figure 2: The activity domain of functional disability according to the World Health Organization (WHO).

Adverse childhood experiences, self-hatred, and self-harm

As described in The Benefits and Barriers Model, attitudes towards oneself is important for the development and perpetuation of self-harming behaviours (Hooley & Franklin, 2018). This suggestion has been strengthened through other studies. With regards to self-perception, for example, it seems well supported that self-harm is associated with a comparably negative self-perception and a negative self-inference style across a number of populations (Forrester et al. 2017; Gilbert et al., 2004). However, there seems to be less data regarding whether this is applicable in comparable clinical samples.

Further, as suggested by Hooley & Franklin (2018), self-harm does often seem to have a self-punishing function (Claes et al., 2010; Edmondson et al., 2016). A well-established theorem in psychology is that people tend to behave in accordance with their values, and that attitudes towards constructs affect behaviour (Festinger, 1957). Hence, not only the role of attitudes towards oneself is important for self-harming behaviour, but also the attitudes towards self-harm itself. Despite the fact that the social aspects of self-harm, such as peer group identification and other social reinforcements, have been identified as a field in need of more research (Bentley et al., 2014), this particular topic has received less attention than others. The development of negative self-perception has been the focus of many research efforts. At the heart of these efforts is the concept of *adverse childhood experiences* (ACE). Having endured ACE is associated with negative self-perception in adulthood (Irons et al., 2006; Sachs-Ericsson et al., 2006; Wright et al., 2009). *Emotional abuse*, which includes rejection from a caregiver, degradation, terrorization, isolation, and denial of emotional needs, seems to be particularly important, even when compared to sexual and physical abuse (Gibb, 2003). It is also the most common form of ACE (Stoltenborgh et al., 2014). ACE, in turn, is associated with the development of self-harm (Brown et al. 2018; Kaess et al., 2013; Li et al., 2019; Liu et al., 2018.; Nock & Kessler, 2006; Yates, 2004). Less is known regarding the role of self-perceptions. Some attempts have been made to study the mediation effects between these constructs in community samples (Glassman et al., 2007; Swannell et al., 2012), and to a limited extent in clinical samples (Low et al., 2000; Muehlenkamp et al., 2011).

Aims

The overall goal of this thesis was to expand our knowledge of individuals with psychiatric disorder and self-harm, and to develop a scale measuring attitudes towards self-harm in the general population.

The thesis included papers with the following aims:

1: To develop a brief scale measuring tolerance towards self-harm in the general population.

2: To explore whether individuals with psychiatric conditions and self-harm have deficits in executive functioning, compared to individuals with psychiatric conditions without self-harm as well as healthy controls. The study also aimed to explore if self-harm is associated with executive functioning deficits independently of BPD-features.

3: To explore differences in functional disability in individuals with psychiatric conditions and self-harm, as compared to individuals with psychiatric conditions but without self-harm.

4: To explore whether individuals with psychiatric conditions and self-harm report more adverse childhood experiences, more self-hatred and more positive attitudes towards self-harm, as compared to individuals with psychiatric conditions without self-harm and healthy controls; and to explore whether the relationship between adverse childhood experiences and self-harm is mediated by self-hatred.

Method

Paper 1

Sample, procedure, and ethics

Two samples were recruited for the purpose of developing the Lund Tolerance Toward Self-Harm Scale (LUTOSH). Sample 1 was a convenience sample of 343 individuals (189 women and 142 men), recruited online through social networks (n=283), as well as a dog training club, three high school classes, and a mechanical workshop via paper copies (n=60). With regards to sample 1, ethics committee approval was not needed since Swedish law (SFS, 2003:460) stipulates that approval isn't required for questionnaire studies where no information is collected that relates to an identified or identifiable living individual, or that can lead to the identification of a particular person. The first page of the questionnaire provided information about the purpose of the study and informed the participants that they would be completely anonymous, and that the questionnaire would take about 15 minutes to complete. For the online questionnaire, consent was provided by clicking the participation link. For the paper and pencil form, verbal consent was obtained. Sample 2 consisted of 593 individuals (440 female, 150 male, and 3 others; all employed by the public health care provider for psychiatric services in Region Skåne, a county in southern Sweden. For this sample, ethical approval was provided by the regional ethical review board at Lund University (Reg. No. 2017/774, revised 2018/332). Participants were recruited through an e-mail sent to all staff (4676 addresses of which 3507 were in service at the time) within the organization. The email contained information about the study and consent was given by clicking the participation link. All managers at psychiatric units were offered an in-person information sitting and the opportunity to participate via paper and pencil, in which written consent was provided. A total of 14 individuals responded via paper and pencil.

Measures

Lund Tolerance Toward Self-Harm Scale (LUTOSH) was developed for paper 1 by formulating six statements of relevance to the tolerance of self-harm. The items were formulated by a group consisting of the doctoral student and psychiatrists and psychologists with extensive experience in research of self-harm and suicidality. A 1-10 Likert scale was used for each statement to make the measure sensitive to change; 1 signifying *completely disagree* and 10 *completely agree*. Items 2, 4 and 5 were reversed. The total score ranges between minimum 6 and maximum 60, where a higher score indicates higher tolerance towards self-harm.

Due to the absence of a scientific consensus on how to define self-harm, no explicit definition was included in the questionnaire. The rationale was that defining it might also limit what future respondents would consider as self-harm.

The six statements were the following, in English translation.

Item 1: It's understandable that people harm themselves.

Item 2: The thought of self-harm makes me upset.

Item 3: People who self-harm shouldn't be blamed.

Item 4: Self-harm is incomprehensible to me.

Item 5: It's morally reprehensible for people to harm themselves.

Item 6: I'm provoked when people get angry about self-harm.

The Community Attitudes towards the Mentally Ill S (CAMI-S) is the Swedish version of a questionnaire developed by Taylor & Dear (1981) and was used to establish convergent validity in paper 1. Through the development of the Swedish version, multiple changes have been made (Högberg et al., 2008). Nine items from the Fear of and Behavioural Intentions toward the Mentally Ill (FABI; Svensson et al., 2011), as well as a dummy item have been added to the original 20 items. Thus, CAMI-S has a total of 30 items resulting in four factors (Högberg et al., 2008). The items are rated on a six-point Likert scale (*totally disagree* to *totally agree*). Eleven of the items are reversed and higher score indicate more positive attitudes.

The Reported and Intended Behaviour Scale (RIBS) is a questionnaire with 8 items with moderate consistency, developed to assess past and intended future behaviour towards people with mental illness (Evans-Lacko et al., 2011). It was used for the purpose of establishing convergent validity in paper 1. Respondents are asked to rate their experience and future willingness to work with, live with or nearby, or be friends with individuals with mental health problems on an ordinal scale from 1 (*disagree strongly*) to 5 (*agree*)

strongly). Hansson (2009) translated the scale into Swedish. Items 1-4 explore previous and current experiences. Items 5-8 assess the individuals' future intentions towards other people with mental health challenges. Items 5-8 were included in the study.

The Mental Health Knowledge Scale/Schedule (MAKS) is a 12-item questionnaire with moderate consistency. It measures knowledge of mental health on an ordinal scale from 1 (*strongly agree*) to 5 (*strongly disagree*). Neutral responses are scored as 3. Three items are reversed. MAKS has a moderate internal consistency (Evans-Lacko et al., 2010) and has been translated into Swedish (Hansson, 2009). It was used to establish convergent validity in paper 1.

The Self-Harm Antipathy Scale (SHAS-SR; Lantto et al., 2020), was added to establish convergent validity in sample 2 of paper 1. SHAS was originally developed by Patterson et al. (2007) to measure attitudes toward self-harm among nurses. The original questionnaire has 30 items and 6 factors. The Swedish version has 17 items and 3 underlying factors with acceptable internal consistency (Lantto et al., 2020). Each item is rated on a Likert scale from 1 to 7 (*strongly agree* to *strongly disagree*) and higher scores indicate more negative attitudes.

Questions on demographic factors, such as education, age and income were also included for both samples.

Paper 2-4

Sample, procedure, and ethics

For paper 2-4, ethical approval was provided by the regional ethical review board at Lund University (Reg. No. 2014/626).

Overall inclusion criteria included ability to provide consent, speak Swedish fluently, and be between 18-65 years of age. Due to factors related to the research queries, individuals with bipolar disorder type 1, schizophrenia, attention deficit/hyperactivity disorder, attention deficit disorder, autism, current substance or alcohol abuse disorder, severe depression, and some somatic illnesses were not offered participation. Individuals currently being treated with anti-psychotics, sedatives, opioids/opiates, mood stabilizers apart from lamotrigine, were not included, as well as individuals who had received electroconvulsive therapy within the past 6 months.

Three study groups were recruited: one group of individuals with psychiatric disorders and self-harm (n=34); one group with psychiatric disorders but without self-harm (n=31); and one healthy control group (n=29). The two clinical groups were recruited through the standard intake procedure for a team working specifically with self-harm, at a general psychiatric outpatient unit, as well as through the psychiatric research unit. Staff and managers employed in the outpatient services were also informed about the project and asked to inform individuals who might be eligible. Healthy controls were recruited through fliers placed on public advertisement boards at a university, a gym, and two grocery stores.

The group of individuals with psychiatric conditions and self-harm was recruited first, followed by the healthy controls and individuals with psychiatric conditions but without self-harm. As only females were recruited to the first group, only females were subsequently recruited for the latter groups. Initially, attempts were made to match the clinical controls for primary psychiatric disorder as well as exact age. This proved to be significantly harder than anticipated, especially for individuals with BPD. Efforts were instead made to match for gender and approximate age.

The consent process entailed detailed information about the study and its purpose as well as the reimbursement and the possibility of receiving verbal information about the individual's test results. Potential participants were encouraged to ask questions about the study and informed that they could withdraw their consent at any time.

One participant was excluded from the group of individuals with psychiatric conditions and self-harm after consent due to severe depression; three others in this group chose not to complete the study after consent. Three participants in the group with psychiatric conditions without self-harm chose not to complete the study after consent. One healthy control group participant was excluded after providing consent due to previous self-harm.

After consent, the participants were scheduled to complete the research procedures after the double half-life of any sleep medication or sedatives. Also, in case of somatic illness, stress, or sleep deprivation, participants were encouraged to reschedule their appointments. The research procedure included structured clinical interviews, cognitive instruments, and self-report measurements as well as questionnaires. Measures of functioning level and a brief scale measuring tolerance towards self-harm were also administered. Information regarding demographic factors was collected. All measures were administered by the doctoral student during daytime. Participants were offered a reimbursement of 500 SEK for participation.

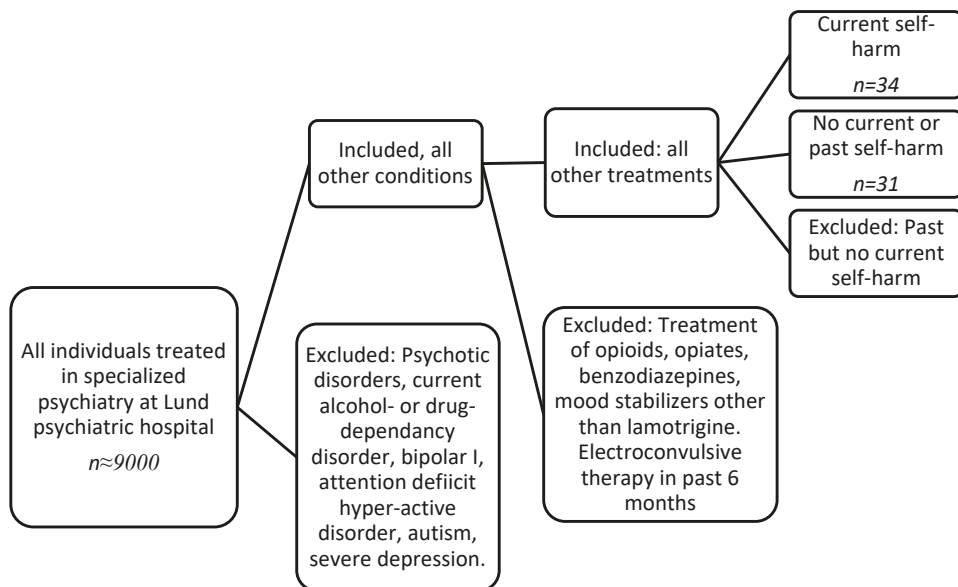


Figure 3: Recruitment of clinical samples for paper 2-4.

Measures

Structured interviews. The MINI International Neuropsychiatric Interview 6.0 (MINI 6.0; Sheehan et al., 1998) and the Structured Clinical Interview of the DSM-IV 2 (SCID-2; First et al., 1997) were used for diagnostics in paper 2-4.

Symptom rating scales. Severity of depression was measured using the 10 item Montgomery Åsberg Depression Rating Scale, MADRS (Montgomery & Åsberg, 1979; paper 2-4). The MADRS is a clinician rated depression scale consisting of 10 items rating depression on a Likert scale ranging from 0 to 6. The total score ranges between 0-60, where higher results indicate more severe depression. A score between 7 and 19 indicates mild depression, 20 to 34 moderate depression, and a score above 34 indicates severe depression (Snaith et al., 1986). The scale has a Cronbach's alpha of .87 (Cunningham et al., 2011). A version where item 9 was removed from the mediation analysis was used in paper 4 since this item asks about self-criticism. This abbreviated version is referred as MADRS-X and thus consisted of the composite score of items 1 to 8 and 10.

The Borderline Symptoms List-23, BSL-23 is a self-report questionnaire used to measure borderline symptom severity (Bohus et al., 2009; paper 2-3). This scale is divided into three sections. The first section contains the primary measure with 23 items rated on a Likert scale ranging from 0 to 4. The total score ranges between 0 and 92, with higher scores indicating more severe borderline symptoms. The second section contains a supplementary rating of general well-being from 1 to 100. Finally, the third section consist of 11 items where the respondent is asked to rate number of behaviours related to borderline symptomatology during the last week. Each item produces a score between 0 and 4 (*none to daily or more often*). The scale has a Cronbach's alpha of .94.

Table 1: Instruments used in papers 2-4.

Type of measure	Paper 2	Paper 3	Paper 4
Structured interviews	MINI 6 SCID-2	MINI 6 SCID-2	MINI 6 SCID-2
Symptom rating scales	MADRS BSL-23 ISAS	MADRS BSL-23 ISAS	MADRS MADRS-X ISAS
Measures of self-harm	ISAS	ISAS	ISAS
General cognitive functioning	WAIS-IV, 5 tests	WAIS-IV, 5 tests	
Neuropsychological tests	D-KEFS TMT D-KEFS CWI WAIS-Digit span		
Measures of functional disability		WHODAS 2.0	
Measures of adverse childhood experiences			CTQ
Measures of attitudes			FSCRS LUTOSH

Note: Abbreviations explained in 'Abbreviations'.

Measures of self-harm. Self-harm was defined as: “An act with non-fatal outcome in which an individual deliberately did one or more of the following:

- Initiated behaviour (for example self-cutting, jumping from a height) with which they intended to cause self-harm;
- Ingested a substance in excess of the prescribed or recognised therapeutic dose;
- Ingested a recreational or illicit drug that was an act that the person regarded as self-harm;
- Ingested a non-ingestible substance or object”. (Hawton et al., 2002, p1208)

The Inventory of Statements about Self Injury, ISAS (Klonsky & Glenn, 2009) was used to measure life-time frequency and functions of NSSI (paper 2-4). ISAS consists of two sections. In the first section the respondent is asked to report the total number of twelve predefined forms of NSSI. This is followed by questions about age of onset, pain, and impulsiveness aspects. The second section consists of 39 items where the respondent is asked to score the accuracy of statements regarding the reason for self-harming. Each statement is scored between 0 and 2 (*not relevant, somewhat relevant or very relevant*) and produce 13 factor scores named Affect regulation, Anti-dissociation, Anti-suicide, Marking stress, Self-punishment, Autonomy, Interpersonal boundaries, Interpersonal influence, Peer bonding, Revenge, Self-care, Sensation seeking and Toughness. Thus, each factor has a total score between 0 and 6. The scale has a Cronbach’s alpha of .84 and has been validated and translated to Swedish by Lindholm et al. (2011).

To obtain a comprehensive measurement of self-harm, participants were also asked questions to rate life-time events of other self-harming behaviours and suicide attempts: jumping from heights, intoxication through medication and swallowing sharp objects. Finally, the participants were asked to list and rate any other self-harming behaviour that hadn’t been assessed through previous questions.

General cognitive functioning instruments. For an estimation of general cognitive functioning (paper 2-3), five subtests from the Swedish version of the WAIS-IV, (Pearson Assessment, 2008) were used: Digit Span, Block Design, Vocabulary, Information and Symbol Coding. A sum composite score was used to calculate an estimated general cognitive functional level.

Normative reference-based scores were used for all tests to control for age-related differences.

Neuropsychological tests. The subtest Digit span (WAIS-IV DS) from the Wechsler Adult Intelligence Scale IV (WAIS-IV; Pearson assessment, 2008) was used to measure working memory (paper 2). This test consists of three parts where the participants are required to repeat back orally given strings of numbers with increasing difficulty. In the first part the participant is asked to repeat the numbers in the order they were provided. In the second part the participant is asked to repeat the numbers in reverse order, and in the third part to repeat them in ascending order. The total score consists of the accurately repeated items from the three subtests. The total score was used as a primary outcome measure.

The subtest Colour Word Interference (CWI) from the Delis-Kaplan Executive Function System, D-KEFS (Delis et al., 2001) was used to measure inhibition (paper 2). This test consists of colour-words that are inked differently from what the word is saying. The test is separated into four timed subtests: colour naming (CWI-1), word reading (CWI-2), colour-word reading (CWI-3), and colour-word shifting (CWI-4), measuring speed of processing colours, reading speed, inhibition and a combination of inhibition and cognitive flexibility respectively. All subtests produce scores for number of errors and time for completion. The completion times for CWI-3 and CWI-4 were used as primary outcome measures.

The Trail Making Test (TMT) in D-KEFS was used to measure cognitive flexibility and inhibition (paper 2). This test consists of five timed subtests where the participant is first asked to cross out numbers to measure visual detection speed (TMT-1), and then to draw lines in ascending order between circled numbers (TMT-2) and letters (TMT-3) as a measure of processing speed. Subsequently, the participant is asked to draw lines between a sequenced combination of numbers and letters (TMT-4) as a measure of cognitive flexibility. Finally, the participant is asked to follow a dotted line (TMT-5) to measure motor speed. All subtests produce scores for number of errors and time for completion. The completion time for TMT-4 was used as a primary outcome measure.

Measures of functional disability. The 36-item, self-administered World Health Organization Disability Assessment Schedule, WHODAS, 2.0 (Ustün et al., 2010) was used to measure functional disability (paper 3). The scale consists of 36 items where the respondent is asked to rate the impact of their condition on daily functioning from 0 to 5 (*none to extremely/unable*) in six domains: Cognition, Mobility, Self-care, Getting along, Life activities and Participation in society. It also includes supplementary questions about the

number of days in the last 30 days when these problems have been present, and for how many of these days the respondents have been totally (Days totally unable) or partially unable (Days partially unable) to carry out their normal activities. These supplementary questions, as well as the total domain scores, were used as primary outcome measures. Alongside WHODAS 2.0, the number of sick days and days admitted to an inpatient unit in the last year were obtained as measures of functional disability.

Measures of adverse childhood experiences (ACE). The Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) was used to measure childhood trauma and neglect (paper 4). It consists of 28 Likert items ranging from 1 to 5 (*never true* to *very often true*). The scale is meant to capture 5 forms and severity levels of trauma and neglect: *emotional abuse*, *emotional neglect*, *physical abuse*, *physical neglect* and *sexual abuse*. The CTQ raw scores for all domains were used in the current project. The scale has a Cronbach's alpha of .98 (Bernstein et al., 1997).

Measures of attitudes. The Forms of Self-Criticizing/Attacking and Self-Reassuring scale (FSCRS; Gilbert et al., 2004) was used to measure attitudes towards oneself (paper 4). The FSCRS has 22 items where the respondent is asked to indicate the accuracy of statements when things go wrong for the respondent, on an interval between 0 and 4 (*not at all like me*, *a little bit like me*, *moderately like me*, *quite a bit like me*, and *extremely like me*). Gilbert's et al. validation resulted in a model of two different factors of negative self-attitudes; Hated self and Inadequate self, as well as the factor Reassured self. The scale has a Cronbach's alpha between .86 and .90 for the three factors. It has been translated to validated and translated into Swedish by Lekberg & Wester (2012).

Lund Tolerance Toward Self-Harm Scale (LUTOSH) was developed for paper 1 through formulating six statements of relevance to the tolerance of self-harm. The total score ranges between minimum 6 and maximum 60, where higher score indicates higher tolerance towards self-harm. It was used to measure tolerance towards self-harm. For further description, please see measures used in paper 1.

Statistical analysis

Data analysis was done through IBM SPSS Statistics 22 and R version 3.5.2 (R core team, 2018). Calculation of Cronbach's alpha was used for calculating internal consistency. A principal component analysis was also conducted

through Quartimax and Kaiser normalization method. To explore the convergent validity, correlation analyses between the test scales were made through two tailed Spearman's ρ . Correlation through Spearman's ρ was done for analysis between included measures. Analysis of missing data was done with Chi-square tests. Independent sample *t*-test was conducted to compare the results for versions administered differently. Confirmatory factor analyses were carried out for both samples to evaluate the model fit. Correlation analyses through Pearson's *r* were conducted between suggested factors.

Skewness and kurtosis were calculated for test variables and demographic variables results. Levene's test was used to compare test results variances, and Brown-Forsyth tests of homogeneity were used for the variables whenever the variances weren't equal. Chi-square tests were used to check if the number of test errors was equal and to explore differences in psychiatric diagnosis, education level, as well as medication use. Independent sample *t*-tests, Mann-Whitney tests and one-way ANOVA with Tukey's and Games-Howell post-hoc analyses were used to assess group differences on outcome measures. Cohen's *d* was used to calculate effect sizes. Spearman's Rho was used to explore whether number of demographic factors and state measures correlated with outcome measures. MANCOVA was used to analyse the group differences in primary outcome measures, correcting for other factors. Multiple regression and multiple logistic regression used to assess the extent to which symptoms impacted the primary outcome measures. The PROCESS-Macro (Hayes, 2017) was used for mediation analysis.

Results

Paper 1

The six original statements of the suggested tolerance scale provided a low Cronbach’s alpha of .60. When removing item 2 however, the suggested scale yielded an acceptable Cronbach’s alpha of .72 in sample 1. All remaining items are seen in table 2. A principal component analysis was subsequently conducted with these five remaining items. The components explained 47% and 22% of the variance respectively. The two factors were named Tolerance and Intolerance. Confirmatory factor analysis (CFA) resulted in a poor fit in sample 1 with CFI=.85, RMSEA=.21 (90% CI: .16 -.25) In sample 2: The analysis indicated that the five LUTOSH items generated a Cronbach’s alpha of .64 which is slightly lower than for the general population sample. The CFA resulted in a fair fit with CFI= .97, and RMSEA= .07 (90% CI: .03 - .11). The scale was named Lund Tolerance Toward Self-Harm Scale (LUTOSH).

In sample 1, there was a strong and highly significant correlation between the five items and CAMI-S ($r_s=.55, p < .001$). Similarly, there was a moderate but highly significant correlation between the RIBS5-8 and LUTOSH ($r_s=.45, p < .001$). The correlation between LUTOSH and MAKES was moderate ($r_s=.35, p < .001$) and LUTOSH showed a significantly stronger correlation with CAMI-S than with MAKES ($z=3.96, p < .001$). In sample 2, the correlation between LUTOSH and CAMI-S was moderate but highly significant ($r = .42, p < .001$). The correlation between LUTOSH and SHAS-S was also moderate and highly significant ($r_s=.37, p < .001$).

Table 2: Factors for the Lund Tolerance Toward Self-Harm Scale

Factor	Item
Tolerance	It’s understandable that people hurt themselves
	People with self-harm should not be blamed
	I’m provoked when people get angry about self-harm.
Intolerance	Self-harm is incomprehensible to me.
	It’s morally reprehensible for people to harm themselves.

Paper 2

The results indicated that individuals with psychiatric conditions and self-harm had greater deficits in cognitive flexibility and inhibition when compared to healthy individuals ($d=.75$, $p=.017$ and $d=.96$, $p=.002$, respectively). When compared to individuals with psychiatric conditions but without self-harm, the group with self-harm had greater deficits in cognitive flexibility ($d=.59$, $p=.043$), but not in inhibition. There were no significant differences between the groups in working memory. The significant results were not due to differences in general cognitive functioning. There was no significant difference in level of depression between the self-harm group and the clinical control group, as measured with MADRS. Both the self-harm group ($d=2.84$, $p<.001$) and the clinical control group ($d=3.38$, $p<.001$) had significantly more depressive symptoms, as compared to the healthy control group. The self-harm group ($d=7.60$, $p<.001$) and the clinical control group ($d=7.61$, $p<.001$) reported more borderline symptoms than the healthy control group, as measured with the BSL-23.

Although MADRS and BSL-23 showed correlations of a similar magnitude with most neuropsychological measures, BSL-23 showed a significantly stronger correlation than MADRS with cognitive flexibility, as measured by TMT-4 ($r_s = -.32$ vs. $r_s = -.20$, $z=2.33$, $p=.001$). Multiple regressions analyses were carried out with TMT-4 as the dependent variable. In the first model, self-harm (binary variable: present vs. not present) and depression (MADRS) were entered as independent variables. The results indicated that self-harm was an independent predictor of cognitive flexibility ($\beta = -.27$, $p=.019$), whereas depression showed no significant effect ($\beta = -.10$, $p=.40$). In the second model, self-harm and borderline symptoms (BSL-23) were entered as independent variables. In this model, both variables in combination predicted cognitive flexibility ($R^2=.14$, $p=.002$), but neither self-harm ($\beta = -.19$, $p=.097$) nor borderline features ($\beta = -.22$, $p=.062$) was a significant independent predictor.

Table 3: Demographic information of the three study groups

	DSH	NDSH	HC
<i>n</i>	34	31	29
Age <i>M (SD)</i>	24.2 (5.4)	29.2 (7.4)	23.1 (3.1)
Location of upbringing			
Major city	7	5	7
Middle size city	7	11	10
Small city	14	11	9
Countryside	6	4	3
Education			
Not completed grade school	0	0	1
Grade school	6	3	2
High school	19	19	23
University	6	9	3
Relationship status			
Never been in relationship	7	6	6
Not currently but in the past	13	9	8
Currently, less than one year	6	2	4
Currently, more than one year	8	14	11
Current cohabitants			
Lives alone	10	13	13
Lives with common-law or spouse	5	8	7
Lives with parents	11	5	2
Lives with other adults	8	5	7

Note: DSH= Deliberate self-harm group, NDSH= No deliberate self-harm psychiatric comparison group, HC= Healthy comparison group.

Paper 3

Patients with self-harm reported lower WHODAS-Self-care ($p=.001$, $d=.90$) as compared to the clinical control group. Also, the self-harm group reported significantly more WHODAS-Days totally unable to carry out their usual activities in the past month ($p=.008$, $d=.70$). Furthermore, they were admitted to an inpatient setting significantly more days over the last year when compared to the clinical control group ($p<.001$, $d=.58$). The group with self-harm reported significantly higher levels of borderline symptoms ($p=.013$, $d=.64$), as well as higher current suicidality ($p<.001$, $d=1.32$), when compared to the clinical control group.

The logistic regression analyses showed that self-harm (binary variable: present vs. not present) predicted low WHODAS-Self-care independently of depression ($\beta=0.40$, $p=.001$) and independently of borderline symptoms ($\beta=-0.31$, $p=.01$). Self-harm also predicted WHODAS-Days totally unable

independently of depression ($\beta=0.32, p=.005$), although when controlled for borderline symptoms the effect was no longer significant ($\beta= 0.21, p=.076$). In addition, depression and borderline symptoms were independent predictors both of WHODAS-Self-care and WHODAS-Days totally unable.

Paper 4

The results showed that the group with self-harm had significantly higher results on FSCRS-Hated self as compared to both the clinical ($d=0.76$) and the healthy control group ($p<.05, d=2.72$). Further, the self-harm group also had significantly lower scores on FSCR-Reassured self as compared to the clinical ($p<.05, d=1.65$) and the healthy control group ($p<.05, d=3.6$). With regards to adverse childhood experiences, the group with self-harm had significantly higher results on CTQ-Emotional abuse than both the clinical control group ($p<.05, d=0.68$) and the healthy control group ($p<.05, d=1.51$). The difference in attitudes towards self-harm between the self-harm group and the clinical control group, as measured by LUTOSH, was close to significance ($p=.076$). There was, however, a significant difference between the group with self-harm and the healthy control group ($p=.005, d= 0.83$) on LUTOSH.

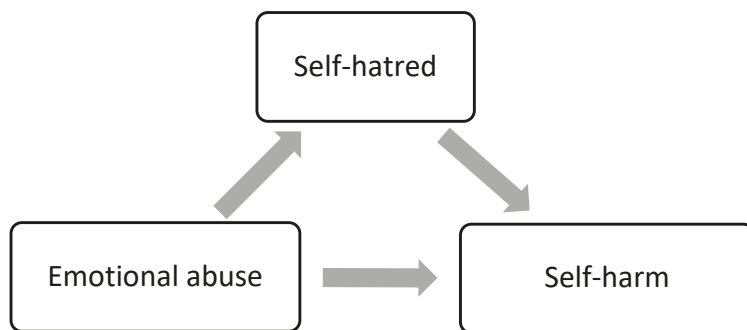


Figure 4 Suggested mediation model. Emotional abuse and self-hatred on self-harm.

The mediation analysis indicated a mediation effect of 43%. There was a direct effect of CTQ-Emotional abuse on self-harm with a log odds coefficient of 0.157 ($p=.01$) and an indirect significant mediation effect of FSCRS-Hated self with a log odds coefficient of 0.117 (CI: 0.058-0.217). When level of

depression was added as covariate, the direct effect of CTQ-Emotional abuse was 0.166 ($p=.01$) and the indirect effect was 0.042 (CI:-0.005-0.113) and thus close to, but no longer significant. The potential mediation effect of FSCRS-Hated self would then have been 20%.

General discussion

Main findings

Lund Tolerance Toward Self-Harm Scale (LUTOSH) proved to have an acceptable internal consistency and an acceptable correlation with instruments measuring attitudes towards other aspects of mental health. With regards to cognition and self-harm, results indicated that executive functioning could be a potential underlying vulnerability specifically associated with self-harm in women with psychiatric disorders, explained by neither level of depression nor general cognitive functioning. However, it remained unclear to what extent cognitive flexibility was related to borderline symptoms. Furthermore, the results indicated that psychiatric patients with self-harm had more severe functional disability as compared to psychiatric patients without self-harm, especially related to self-care. Similarly, the impact of borderline symptoms on these results remained unclear. Finally, the results pointed towards emotional abuse, tolerance towards self-harm, and self-hatred as important constructs for understanding self-harm in clinical samples.

Attitudes and self-harm

The brief questionnaire, named Lund Tolerance Toward Self-Harm Scale (LUTOSH), was developed as a tool for exploring public attitudes, which in turn could be important to understand the development and consequences of self-harm (Bentley et al., 2014). The questionnaire proved to have an acceptable internal consistency and adequate correlations with instruments measuring attitudes towards other aspects of mental health. Although the questionnaire's statistical characteristics were acceptable, they were by no means optimal. Since no other scales exist that measure public tolerance towards this subject, it was challenging to find suitable instruments for cross-validation of the scale. Thus, the factor fit turned out to be poor in the general population sample but fair in the staff sample. Despite these limitations, the

results speak in favour of using the questionnaire in various contexts. Future research will test whether this instrument can successfully map tolerance of self-harm in various contexts, which in turn could provide information regarding which subgroups might be of interest for future interventions.

Although patients with self-harm were not significantly more tolerant towards self-harm when compared to patients without self-harm, there was a clear tendency. Indeed, when doing a pairwise comparison, the results would be significant, which is an indication that this is still a topic that requires further studying. When comparing patients with self-harm to healthy controls, there was a significant difference, which is in line related research in the field (Doyle, 2018; Knowles & Townsend, 2012).

Although LUTOSH can be used for multiple purposes, it is still a new, relatively untested instrument. Additionally, it is not clear to which extent these attitudes affect the nature and frequency of self-harming behaviour. Thus, more research is needed to map the relationship between these constructs.

Cognition and self-harm

Female individuals with psychiatric disorders and self-harm showed greater deficits in cognitive flexibility when compared to females with psychiatric disorders without self-harm as well as healthy controls. This could indicate that cognitive flexibility is an underlying vulnerability for self-harm in women. Previous studies have indicated a relationship between self-harm and deficits in other aspects of executive functioning (Fikke et al., 2013; Dixon-Gordon et al., 2014; Miranda et al., 2012). However, there are many potential reasons why cognitive flexibility, specifically, could play an important role for self-harm. Firstly, it is most likely an important factor in problem solving and relationship management. Hence, a lack of cognitive flexibility could therefore lead individuals to end up in emotionally challenging situations. Further, cognitive flexibility likely affects the ability to shift focus away from triggering stimuli. Thus, cognitive flexibility also facilitates the utilization of emotion regulation strategies.

Compared to other studies in this field, the current project contributes to the body of research by using a psychiatric as well as a healthy comparison group. With these study groups, attempts could be made to control for confounding factors that could otherwise explain the deficits in cognitive functioning. The results indicate that the differences found were neither due to depression nor

general cognitive functioning. However, there remains an uncertainty around to which extent differences in borderline symptoms affected the results.

The consequences of self-harm

The results from the current thesis indicate that the consequences of self-harm in clinical groups seem to be significant. Compared to clinical controls, individuals with self-harm were admitted to inpatient units significantly more days and reported greater difficulties in self-care. Self-care includes washing themselves, getting dressed, eating, and being alone for a few days. They also reported that they were totally unable to do their normal activities significantly more days than the clinical controls. The reasons for this could be multifactorial. Firstly, it is unknown to what degree borderline personality symptoms affected these results. And if they did, it is unclear which component of the borderline symptomatology was causing the difference in self-reported functional disability. For example, individuals with BPD tend to report more severe symptoms when the information is collected through self-reporting versus interview-based assessments (Hopwood et al., 2008). Other explanations that require further research include the role of self-stigma, self-punishment, and social rejection. The results are in line with the only publication on this matter (Selby et al., 2012) by indicating a difference in daily functioning between patients with self-harm and clinical controls. To summarize, there is an obvious lack of knowledge of the impact of self-harm on daily functioning which makes this an area in much need of more research.

Adverse childhood experiences, self-hatred, and self-harm

The results from this thesis clearly suggest that patients with self-harm have more self-hatred than patients without self-harm. This is in line with previous studies (Forrester et al., 2017; Muehlenkamp et al., 2011) and fit in the Benefits and Barriers Model (Hooley & Franklin, 2018) by highlighting that negative self-perceptions are associated with self-harm.

The development of this self-hatred could partly be due to adverse childhood experiences, which also is in line with previous research (Glassman et al., 2007). The study groups differed regarding one specific form of ACE:

Emotional abuse, suggesting this form of ACE as important for the development of self-harm. There has previously been an interest in the role of sexual abuse related to self-harm (e.g. Gratz, 2003). The results from this thesis are, however, in accordance with more recent studies that have also highlighted the particular importance of emotional abuse in the development of self-harm (Kaess et al., 2013; Liu et al., 2018; Thomassin et al., 2016).

The current thesis contributes to this field by using a relevant comparison group (i.e. individuals with psychiatric disorders, without self-harm). It should be noted however, that the strength of the observed mediation was not conclusive enough to suggest that this is the only or even the most important factor involved. More research regarding social and cultural influences needs to be conducted. Still, despite the small study sample, the results clearly point towards the pivotal role of self-hatred and emotional abuse among individuals with self-harm. Thus, self-hatred is an important factor for self-harm that needs to be taken into consideration, both in future clinical intervention designs, as well as in research endeavours.

Limitations

Design and sampling. With regards to the first part of the project, when LUTOSH was designed, more efforts should have been made in the initial part of the process. A pilot phase, where more items could have formulated and assessed, would have allowed for a better selection. This could have been achieved partly by involving individuals with lived experience of self-harm, and the attitudes and stigma surrounding it, in the design process. Additionally, a subsequent test phase could have excluded the less useful items. Exclusion of item 2 indicated the lack of such a comprehensive pilot phase. Similarly, it needs to be mentioned that no measure for public attitudes towards self-harm was available for establishing convergent validity. With regards to the sampling, sample 1 was most likely not fully representative of the general population. In this sample, there were significantly more females and a lower mean age as compared to the general population (SCB, 2019). In sample 2, the response rate was 17%, which is substantially lower than what was expected. This constitutes a significant limitation since it's possible that the sample was biased. The results regarding the factor structure also left some questions unanswered, especially for sample 1. This could partly possibly be explained by the fact that this sample was smaller and probably more heterogeneous than sample 2. It could also be due to the lack of the abovementioned pilot phase.

The second part of the project set out with many aims, spanning multiple topics, and thus needed to include multiple measures. The power was calculated primarily with paper 2 in mind. Consequentially, the sample size wasn't adapted for the hypotheses in papers 3 and 4. Thus, it would have been preferable to include a larger number of participants for papers 3 and 4 with less stringent exclusion criteria. This limitation probably affected the outcome of primarily paper 4, since there was a clear tendency, albeit non-significant, towards a difference between the clinical study groups regarding attitudes towards self-harm. Similarly, the exclusion- and inclusion criteria were primarily based on the hypothesis of paper 2, and to some extent, paper 3. This resulted in the exclusion of individuals in paper 3-4 when there was no research rationale for doing so. For example, in the psychiatric groups, it would have been preferable to include individuals who were treated with medications that were used as exclusion criteria in paper 2. Individuals taking mood stabilizers other than Lamotrigine were excluded due to the possible effects on cognition. There is a possibility that this resulted in the exclusion of individuals with more severe symptoms since these medications primarily are used for treating severe psychiatric symptoms and disorders. Also, individuals with various psychiatric diagnoses were excluded due to the impact on cognition of these disorders. Considering the extent of self-harm in various clinical populations (Bentley et al., 2015), this severely limits the conclusions that can be drawn from the studies. Additionally, the study groups consisted exclusively of younger or middle-age female participants. This doesn't reflect the prevalence of self-harm in general (Bresin & Schoenleber, 2015), and thus limits the conclusions that can be drawn. No record was kept of numbers and characteristics of patients deemed not eligible. Thus, it is unclear how well the clinical study groups represented a true subsample of individuals with regards to these factors. A general limitation is also that a cross-sectional analysis means absence of claiming causal relationships.

Further, with regards to the conclusions that can be drawn from papers 2-3, there is an uncertainty around to which extent differences in borderline symptoms between the groups affected the results. This also applies to the role of depressive symptoms in paper 4. Initial attempts were made to match individuals with self-harm for both age and primary psychiatric disorder. It became evident however, that this approach was not feasible in the current setting. Specifically, clinical controls with BPD with no self-harm were difficult to recruit. Hypothetically, the reason for this could be that individuals with BPD who are treated in psychiatric settings most likely have severe self-destructive symptoms, as a part of the reasons for them receiving specialized treatment in psychiatry. Thus, finding controls with BPD is hard in psychiatric

settings. The design of paper 2 required that individuals taking certain forms of medications, as well as suffering from higher level of depression, needed to be excluded, which further complicated the recruitment of clinical controls. Consequently, the recruitment aimed instead at finding clinical controls of the same gender and approximately the same age. The rationale for such a cross-diagnostic approach was partly inspired by the Research Domain Criteria (NIMH, 2021). The age and the diagnostic composition in the two study groups therefore turned out different. Despite efforts to correct for this, there is a possibility that some of the group differences were related to factors other than self-harm. It became evident that this approach, in the eyes of journal reviewers, did not benefit the deductions that could be made from the results.

Finally, although removing one item in MADRS for paper 4 was necessary, it had the implication that statistical information regarding this updated scale, MADRS-X, was lacking.

Gender and intersectionality. Despite self-harm being more prevalent in females (Bresin & Schoenleber, 2015; Odelius & Ramklint, 2014), it was still surprising that the recruitment of the self-harming group resulted in a female-only population. There are many potential reasons for this. Firstly, the exclusion criteria may have skewed the intake in favour of females. Among other factors, individuals with substance use disorder and attention-deficit/hyperactivity disorder were excluded. This could have excluded male participants since both these groups of disorders are more common in men (McHugh et al., 2018; Ramtekkar et al., 2010, Slade et al., 2010). Secondly, and more likely, more women were referred to the specialized clinic for self-harm. This could mean that the lack of male participants was mainly due to aspects in the surrounding population, i.e. that the organizational setting unintentionally excluded men, or that men didn't seek treatment through these channels.

A part of the explanation could be found in the nature of self-harm itself. Self-harm in clinical settings more commonly involves cutting (Odelius & Ramklint, 2014). Men's self-harming behaviour more commonly involves burning and hitting, as well as indirect forms of self-harm, which possibly are not labelled as self-harm or are interpreted differently from self-harm in women (Claes et al., 2007; Whitlock et al., 2011; Green & Jakupcak, 2016). Thus, it is possible that men's self-harming behaviour wasn't captured to the same extent as women's, and that more women, therefore, were referred to the clinic and subsequently to the research project. Further, men seek help to a lesser extent than women (Addis & Mahalik, 2003), which in turn also could contribute to the fact that they are not referred to the specialized clinic.

The case report file, which was based on similar report files used in the research group, didn't contain questions on race or sexual orientation and identity. In hindsight, this seems to be a significant flaw since research indicates that the pattern and prevalence of self-harm could vary with race (Chesin et al., 2013; Kuentzel et al., 2012) and sexual identification (Arcelus et al., 2016). It is the authors' perception, however, that very few, if any, of the participants in the self-harming group were from any other background than native Swedish (Caucasian). Taken together, it is reasonable to assume that the organization had difficulties capturing a diverse population of individuals with self-harm. This current project thus shares this lack of intersectional analysis with similar research (Bowleg et al., 2012).

Implications and future directions

The current thesis set out with two overall goals 1. To develop a scale for measuring tolerance towards self-harm and 2. To increase our understanding of self-harm in clinical populations.

LUTOSH was developed and proved to have acceptable statistical characteristics. The results from paper 4 provided support for the notion that attitudes towards self-harm is a topic of interest, since individuals with self-harm were more positive towards this behaviour than healthy controls. There are many potential directions for future research regarding this matter. Firstly, there is a possibility that lower public tolerance towards self-harm is linked to having less knowledge about the topic, and thus could be a barrier to self-harm, similar to what has been suggested in the model proposed by Hooley and Franklin (2018). Low tolerance could also indicate an aversion towards self-harm, which could be a barrier in a similar sense. Alternatively, high tolerance could mean that individuals suffering from self-harm can receive help and validation from their social environment more easily. Low tolerance, or stigma, is a barrier to seeking help (Eisenberg et al., 2009) in general, and thus it is likely that high tolerance, in turn, would lead to the opposite. For that reason, improving tolerance in the public could lead to more individuals with self-harm seeking help. Taken together, high and low tolerance towards self-harm could have both advantages and disadvantages in the efforts towards decreasing self-harm. Another possible future topic, related to this, is whether tolerance acts as a predictor for future self-harm. This would allow researchers to identify high risk groups for self-harm. Such studies would require a longitudinal research procedure with a relatively large sample. Finally, there is a lack of knowledge regarding the nature and implications of stigma and self-harm in general (Staniland et al., 2020). LUTOSH is a possible tool for future exploration of this important topic.

The current project highlights the role of deficiencies in cognitive flexibility among individuals with self-harm. Despite a theoretical foundation and encouraging study results, more research is needed to fully understand the mechanisms in which flexibility becomes a factor in this behaviour. Future studies would benefit from having more matched comparison groups and from

the application of laboratory based or daily monitor-based approaches where the effects of cognitive flexibility on self-harm can be tracked in detail. To treat individuals with self-harm as successfully as possible, adaptations of existing interventions as well as development of approaches may be necessary. These should take in consideration possible deficiency in cognitive flexibility among individuals with psychiatric disorders and self-harm.

The consequences of self-harm on daily functioning in clinical groups seem to be significant. There is a lack of knowledge on the reason of these results, however. Future research is needed to explore the mechanisms involved and should include the role of cognition and attitudes related to this. For example, there is also a relationship between executive functioning and functional disability in other conditions (e.g. Henry et al., 2013) that should be considered. Furthermore, it is a possibility that the lack of self-care fulfils self-punishing purposes and its relation to self-hatred should be to be explored. Future studies could include in depth studies of the motivation and role of such behaviours. Interventions may also benefit from including this aspect.

Adverse childhood experiences and self-hatred seem to be important constructs worth further studying. Future research could benefit from specifying the role of self-critical cognition in the process of self-harm. Additionally, research on protective as well as detrimental factors for the development of self-harm among those subjected to emotional abuse could be of interest. Both of these approaches can be directly helpful in finding new preventive interventions as well as treatments for this group. Beyond this, clinicians need to be more mindful of the importance of emotional abuse when treating populations who self-harm.

Although the results of this research are beneficial, there are also negative aspects that need to be considered. There is a risk of stigmatizing individuals with self-harm. For example, the point could be made that the lack of self-care is due to a lack of motivation. Also, there is a risk that some may interpret the executive dysfunction as a reason to believe that individuals with self-harm can't improve. This is false. Instead, the results should be interpreted as relevant information needed to adapt interventions. By doing so, the likelihood for more beneficial outcomes increases.

Taken together, this project generated a new scale for measuring attitudes towards self-harm as well as new information around some aspects of self-harm in psychiatric populations. This adds valuable information for clinicians and researchers alike, to adapt future interventions. Despite these results, more research is needed to understand the nature of self-harm.

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