The Prediction Paradox

*Exploring assessment and prediction of self-harm and suicidal behaviour*

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Submitted as main dissertation at the Department of Psychology

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IV
Abstract

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Self-harm and suicidal behaviour have enormous consequences for the individual, the family and the society as a whole. More than 800 000 people die by suicide every year. For every suicide there are many more people who self-harm and self-harm is one of the most robust risk factors for subsequent death by suicide. Those bereaved by suicide will themselves have an increased risk of mental illness and suicide. The cost burden on the health and social care system is considerable.

Suicidology is the scientific study of suicide and suicidal behaviour. Despite substantial efforts in both research and clinical practice to establish the risk factors that can predict high risk of self-harm and suicide this issue remains currently unresolved. It can be argued that prediction of suicidal behaviour is not yet empirically based. One of the main reasons for this is that the risk factors studied in epidemiological research have been too general. There is a lot of knowledge about which factors that can predict suicidal thoughts. However, less is known about what makes some of these people act on their suicidal thoughts. The transition from suicidal urges to suicidal behaviour is still poorly understood.

During the last decade there has been an increased attention aimed at the transition from suicidal thoughts to suicidal behaviour. Newer theories within the ideation-to-action framework aim to separate the factors that predict suicidal thoughts from the factors that predict suicidal action. It remains to be seen whether they will succeed with this or not. However, focusing solely on risk factors is not enough, there is also a need to pay attention to how these factors interact and how they change over time.

In this paper I critically examine research evidence when it comes to assessment and prediction of self-harm and suicidal behaviour. It is a common assumption that clinicians are able to predict suicidal behaviour with accuracy. However; research does not yet support this assumption. Exciting and promising proposals in the field of suicidology will also be explored.
Selvskading og suicidal atferd har enorme konsekvenser både for individet, familien og samfunnet som helhet. Mer enn 800 000 mennesker dør av selvmord hvert eneste år. For hvert selvmord finnes det mange flere mennesker som med vilje skader seg selv, og selvskading har vist seg å være en av de mest robuste risikofaktorene for senere død ved selvmord. Etterlatte etter selvmord vil selv ha en økt sannsynlighet for å bli rammet av psykisk lidelse eller dø av selvmord. Kostnadsbelastningene på helse- og omsorgstjenestene er enorme.


Det siste tiåret har det vært en økt oppmerksomhet rettet mot overgangen fra suicidale tanker til suicidal atferd. Nyere teorier innenfor ‘Ideation-to-action’ rammeverket forsøker å skille de faktorene som predikerer suicidale tanker fra de faktorene som predikerer suicidal atferd. Det gjenstår å se hvorvidt de lykkes med dette. Å fokusere utelukkende på risikofaktorer vil imidlertid ikke være tilstrekkelig, en må også vere oppmerksomhet til hvordan disse faktorene interagerer og hvordan de varierer over tid.

Preface

First and foremost, I would like to thank my excellent supervisor, Bergljot Gjelsvik, at the University of Oxford. Ever since she held the inspiring lecture for us in the 7th semester I have been fascinated by the complex and extremely important subject of suicidology. Thank you, Bergljot, for your feedback, your positive attitude and your patience. I could never have done this without you!

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Oslo, April 2018

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1 Why is Prediction of Suicidal Behaviour Important?

More than 800 000 people die by suicide every year (World Health Organization, 2017). Approximately 600 people die by suicide annually in Norway (Norwegian Institute of Public Health, 2017). Every suicide is a tragedy for the individual, the family and the community. There will be at least six close relatives or friends bereaved by every suicide, these people will themselves have an increased risk of mental illness and suicide (Berman, 2011; Chapple, Ziebland & Hawton, 2015; Hawton & Simkin, 2003; Pitman, Osborn, King & Erlangsen, 2014).

Over the past 50 years suicide rates in elderly people have decreased in many countries; however, during the same period rates in younger people have risen, in particular in men (Hawton & van Heeringen, 2009; Pritchard & Hansen, 2005; Wasserman, Cheng & Jiang, 2005). For every suicide there are many more people who self-harm (World Health Organization, 2017), and hospital-treated self-harm is the strongest independent risk factor for subsequent death by suicide (Bergen et al., 2012a, 2012b; Carroll, Metcalfe & Gunnell, 2014; Haw, Bergen, Casey & Hawton, 2007; Hawton et al., 2015; Hawton, Saunders & O’Connor, 2012; Ribeiro et al., 2016). Moreover, the life expectancy is severely reduced in people who self-harm. Compared to the general population, people who self-harm have a greater risk of early death from any cause (Bergen et al., 2012b). This means that most of the people who die by suicide could have had many more years left of their lives. This explains why it is not only important to be able to predict suicide, it is also of great value to be able to predict episodes of self-harm. The pain and suffering of people who harm themselves is significant (Hawton, Taylor, Saunders & Mahadevan, 2011; Williams, 2014). This makes prediction and prevention urgent. Self-harm not only affects the individual and his or her family, it also places a great cost burden on the health and social care system (Sinclair, Gray, Rivero-Arias, Saunders & Hawton, 2011; Tsiachristas et al., 2017). The economic cost of self-harm and suicide is considerable (Crosby, Ortega & Stevens, 2013).

Self-harm is one of the most important risk factors for suicide and therefore a better understanding of self-harm is of great importance in order to reach the goal to reduce death by suicide (Burke et al., 2016; Hawton & van Heeringen, 2009). The strong relationship between self-harm and subsequent death by suicide makes it clinically relevant to be able to predict
both self-harm and suicide. It seems to be a common assumption among both social- and healthcare workers and lay people that clinicians are able to predict these incredibly complex behaviours. However, empirical evidence does not yet support this assumption (Morriss, Kapur & Byng, 2013). Suicidology is the scientific study of suicide and suicidal behaviour (Gjelsvik, 2016). Despite major advances in both medical and psychological science, the devastating impact of self-harm and suicide has remained relatively constant during the last several decades (Franklin et al., 2016; Nock et al., 2008). Self-harm and suicide are the outcome of a complex, nonlinear and time-varying combination of a wide range of factors, and one needs to treat it like this when doing research (Nock, 2012; Nock, Kessler & Franklin, 2016). Among other things it is recommended that the field shifts from a focus on general risk factors in the population in an attempt to identify those at risk to a focus on risk algorithms for each specific individual and a greater emphasis on risk reduction in all patients (Franklin et al., 2016). It can notably be argued that the clinical practice of prediction of self-harm and suicide is not yet evidenced-based practice.

Self-harm and death by suicide are potentially preventable public health problems. Many countries now have suicide prevention strategies (Fleischmann & De Leo, 2014; World Health Organization, 2014). Predicting risk of self-harm and suicide is a clinical priority both from a clinical, ethical and legal responsibility (Gjelsvik, 2014; Norwegian Directorate of Social and Health, 2008; World Health Organization, 2014), yet this continues to prove difficult.

In 2004 the National Institute for Health and Care Excellence (NICE) produced a guideline on short-term management and prevention of self-harm in people aged eight years old and over (NICE, 2004). More recently, NICE (2011) produced an updated guideline focussing particularly on long-term management of self-harm. National guidelines provide recommendations for risk assessment yet there is no widely accepted standard of care. Exactly what constitutes a risk assessment is also an important question. While risk assessment is often synonymous with risk assessment tools or scales, at its most basic it represents a clinical encounter where a patient is asked about suicidal thoughts, plans and behaviour.

The prediction paradox concerns the fact that it is widely believed that clinicians should be capable of predicting episodes of self-harm and suicide; however, this is actually not evidence-based and assessment of self-harm and suicide risk in individuals is not precise (Large, Ryan, Carter & Kapur, 2017; Morris et al., 2013). It is of great value to be able to
predict self-harm and suicide because of the significant suffering and the many unfortunate consequences behaviour like this can have.

The prediction of human behaviour in general is a difficult task – as is known from social psychology and the theory of planned behaviour (Ajzen, 1991; Connor & Sparks, 2009). This is due to sudden and unexpected events, like loss of job opportunities, relationship-crisis or the death of a loved one. Events like this will affect us in our daily functioning, in our decision-making, in problem-solving and our behaviour in general. Also, the transition from thoughts and attitudes to behaviour and action is still poorly understood. The field of suicidology is no different in this respect.

Suicide is relatively uncommon and has a low base rate in the population (Larsen & Teigen, 2015). Self-harm has a somewhat higher base rate at the community level compared to suicide (Hawton et al., 2015). The base rate of non-fatal suicidal behaviour and self-harm is more uncertain than the base rate of fatal suicide. However, according to the Norwegian Directorate of Social and Health (2017) it is estimated that there are between 7 and 15 times more episodes of suicidal behaviour (i.e., “suicide attempts”) than complete suicide in Norway. Low base rates in the population makes prediction complicated (Altman & Bland, 1994b; Gjelsvik, 2014; Larsen & Teigen, 2015).

Nevertheless, prevention by restriction to means at the population level has proven to be successful in order to reduce suicidal behaviour and suicide (Barber & Miller, 2014). It is to this that I now turn.
2 Suicidal Behaviour at a Public Level

It is possible to prevent and reduce episodes of self-harm and suicide at a public level (Anestis et al., 2017; Barber & Miller, 2014; Pirkis et al., 2015). This can be done by restriction of means (i.e., gun locks, restricted prescription of medication, bridge barriers) and by restriction of cognitive availability (i.e., how accessible something is in one’s mind) (Florentine & Crane, 2010). The media can increase cognitive availability by distributing technical information about methods of suicide, by sensationalising it or by giving inaccurate portrayals that may encourage it. Cognitive availability is influenced by what is associated with suicide within a specific culture. Currently there are very few suicides by charcoal-burning in western countries because this method is not culturally associated with suicide even though charcoal is very physically available (Florentine & Crane, 2010). Cognitive availability is also influenced by what is considered an available method dependent on gender in different cultures (Värnik et al., 2008).

Historically, the impact of means safety can be seen through the significant decrease in suicide rates that have followed changes such as the detoxification of gas (Kreitman, 1976), reduced packaging quantity of medications lethal in overdose (Hawton, Bergen et al., 2013) and the installation of bridge barriers (Bennewith, Nowers & Gunnell, 2007; Pirkis et al., 2015). Anestis et al. (2017) argue that when it comes to prevention of suicidal behaviour at the population-level one should draw on lessons learned from other public health phenomena that have seen declines in frequency in recent decades, such as HIV, lung cancer and motor vehicle accidents. Further, the researchers propose that the theories in the ideation-to-action framework – and specifically the concept of capability for suicide – are promising when it comes to understanding and preventing suicide. It thus appears that one particularly promising area in which one might improve the potential for prevention would be through the development and implementation of interventions aimed at systematically reducing the capability for suicide. Decreased access to lethal means, safe storage of handguns and medications and barriers at suicide hotspots might represent opportunities to address an important aspect of the capability for suicide (Anestis et al., 2017). This is prevention at the population-level and not so much at the individual level. Individual-level interventions are far more complex (Barber & Miller, 2014). It is important to bear in mind that there are critical differences between prediction and prevention at the community level compared to prediction and prevention at the individual level (Larsen & Teigen, 2015). However, public barriers and
prevention at the population-level are probably useful because suicidal urges – and hence suicidal behaviour – are often fluctuating and ambivalent (Bryan, Rudd, Peterson, Young-McCaughan & Wertenberger, 2016). The fortunate consequence of this can be that restriction of means and restriction of cognitive availability (i.e., through media) probably provides valuable time by delaying the actual suicidal act. During this delay the suicidal urge may wane. However, interventions to relieve the distress of people in suicidal crisis are probably important in order to prevent later substitution of method (Florentine & Crane, 2010).

Currently, the suicide prevention field focuses on identifying people at risk of suicide (Barber & Miller, 2014; May & Klonsky, 2016b). Because of the low predictive power of risk scales and because the assessment of risk of suicidal behaviour is not adequate researchers are now talking about the need to move to trying to reduce risk in all individuals through safety planning and specific interventions (K. Hawton, personal communication, February 2, 2018). Clinicians need to be thinking about risk reduction for all patients, including safety measures, reducing access to means, communicating with relatives and friends and dissemination of plans. One step forward could potentially be to change the paradigm such that researchers, clinicians and the broader population understand that reducing access to lethal means has important life-saving potential (Barber & Miller, 2014). The first step is, however, to educate researchers and clinicians about the current evidence base.

When trying to prevent suicidal behaviour at a public level one needs information about the population so that one can make interventions and prevention efforts that will fit the particular population (Florentine & Crane, 2010). One needs to know which is the most popular method of suicide, how available it is and whether the method is easily substituted by another similar method. However, Florentine and Crane conclude by saying that limiting both physical and cognitive access to suicide can be an effective suicide prevention strategy in contexts where substitution of method is less likely to occur and, importantly, in conjunction with psychosocial prevention efforts. In line with this Pirkis et al. (2015) found that to restrict access to means can reduce deaths by suicide at suicide hotspots. In addition, they found evidence that encouraging help-seeking and increasing the likelihood of intervention by a third party both seem to be valuable strategies to reduce suicides at hotspots. Restriction to means and restricting cognitive availability at a public level are effective interventions in preventing suicidal behaviour and suicide. What is it then that makes prediction and treatment of suicidal behaviour so difficult at the individual level?
3 The Challenges of Prediction and How This Leaves Us within the Prediction Paradox

There are many uncertainties concerning suicidal behaviour and the prediction of self-harm and suicide at the individual level. This section will present a brief overview of some of them. Despite decades of research devoted to the study of risk and protective factors for suicide and suicidal behaviour, little is known about the short-term prediction of these behaviours. Traditionally, suicidal ideation and its risk factors have been studied using long periods of time (e.g., months, years) between measurements, precluding any short-term examination of real-time variation in suicidal ideation (Franklin et al., 2016). In order to improve the imminent risk for self-harm and suicidal behaviour one needs to know which factors predict the transition from thoughts to behaviour (Glenn & Nock, 2014). There is also a need for more knowledge concerning how these factors interact and how they are related to time (i.e., hours, days, weeks).

One recent study used a new technology, smartphone-based ecological momentary assessment (EMA), to monitor how suicidal ideation fluctuates over short periods of time (Kleinman et al., 2017). EMA is a reliable data collection method for assessing and recording psychological symptoms and behaviours in real time in one's natural setting. One finding was that suicidal ideation varied dramatically over the course of most days. This is indicative of suicidal ambivalence and the ebb and flow of the wish to live and the wish to die (Bryan et al., 2016). Well-known risk factors for suicidal ideation such as hopelessness, burdensomeness, and loneliness also varied considerably over just a few hours and correlated with suicidal ideation, however, these were limited in the prediction of short-term change in suicidal ideation. These results suggest that hopelessness, burdensomeness, and loneliness are most useful in identifying suicidal ideation as it occurs, but are less useful in predicting suicidal ideation over a very short period (Kleinman et al., 2017). It is also urgent to gain more knowledge about objective markers of short-term risk and which method of combining information about risk and protective factors yields the most accurate prediction. In line with this Burke and Alloy (2016) recognize the need for more research on proximal risk factors for suicidal behaviour, not only distal risk factors.
Another factor complicating the prediction of suicidal behaviour is the duration of the suicidal process and the concept of impulsivity. One study shows that nearly half of the people who had self-harmed reported that the suicidal process had taken shorter than ten minutes (Deisenhammer et al., 2009). This indicates that suicidal behaviour is often quite impulsive with short time for intervention. This study found no association between impulsivity and suicidal intent. A review of the literature on aggression, impulsivity and suicidal behaviour states that there is a lack of consensus regarding the relationship between impulsivity and the lethality of the suicidal behaviour (Gvion & Apter, 2011). This may partly be explained by the confusion between state impulsivity (i.e., characteristics of the situation) and trait impulsivity (i.e., characteristics of the person) dimensions of the association between impulsivity and suicidal behaviour (May & Klonsky, 2016a). Research also indicates that it matters whether the impulsivity is cognitive (i.e., planning, perseveration) or affective (i.e., mood driven, aversive affective states, urgency), and that in treating self-harm one should focus on affective impulsivity (Rawlings, Shevlin, Corcoran, Morriss & Taylor, 2015). The relationship between impulsivity and more planned self-harm is not clear, and it seems that even more planned self-harm and suicidal behaviour can be impulsive (Gvion & Apter, 2011). There is a great need for consensus regarding the definition and operationalization of the concept of impulsivity (Rimkeviciene, O’Gorman & De Leo, 2015). This has implications both for research and clinical practice.

Empirical evidence like this illustrates how complex the field of suicidology is. The clinician often surmises that patients start with suicidal ideation and thoughts about hurting themselves. Then they progress into making a plan, and finally they implement the plan of suicide (Oquendo, 2015). This assumption about linearity is, however, not always the case, and non-linearity is probably closer to the clinical reality (Bryan & Rudd, 2016).

Within the field of translational models of treatment development one assumes that in order to prevent and treat a phenomenon – like suicidal behaviour – one first needs to understand how and why the phenomenon occurs (Onken, Carroll, Shoham, Cuthbert & Riddle, 2014). This can, in turn, give clues to what should be the main focus in order to successfully develop and implement prevention strategies and treatment efforts. A new generation of theories that tries to address this has been developed during the last decades (May & Klonsky, 2016b). A closer examination of the theories within the ideation-to-action framework follows.
4 The Ideation-to-Action Framework

According to Williams (2014) many risk factors for suicidal behaviour have been established in epidemiological research (i.e., being male, single, living alone, unemployed, having a history of alcohol or drug abuse, mental illness). O’Connor and Nock (2014) found that factors associated with suicide risk could be classified into four groups. These are personality and individual differences, cognitive factors, social factors and negative life-events. Most patients who self-harm have psychiatric disorders, as are found in people dying by suicide (Hawton, Saunders, Topiwala & Haw, 2013). However, the majority of traditionally cited risk factors for suicide – including depression, hopelessness, psychiatric disorders in general – predict suicidal ideation (i.e., thoughts about harming oneself) but do not distinguish those who act on these thoughts (i.e., self-harm, suicide) from those who do not (Klonsky & May, 2014). The literature shows that there exists theories and empiricism regarding what makes people in risk of self-harm or death by suicide, however; these are not specific enough to predict who will self-harm, when and how (Franklin et al., 2016).

One study by May and Klonsky (2016b) found that anxiety disorders, PTSD, drug use disorders, and sexual abuse history were moderately elevated in those who exercised suicidal behaviour compared to ideators. However, most established risk factors do not distinguish between ideators and those who actually go on to harm themselves. There is a need to move beyond psychiatric categories if researchers and clinicians are to further understand the causes of self-harm and suicidal behaviour.

There is robust evidence of general risk factors in the population associated with self-harm and suicide, and of what makes people think about self-harm or suicide in the first place (May & Klonsky, 2016b). It is quite common to have thoughts about suicide; it is however less common to actually act on these thoughts (Klonsky, Qiu & Saffer, 2017).

There is far less knowledge about the transition from suicidal thoughts and urges to suicidal behaviour (Kessler, Borges & Walters, 1999; Klonsky & May, 2016; Klonsky et al., 2017; Klonsky, Saffer & Bryan, in press; Nock et al., 2016). The ideation-to-action framework stipulates that the development of suicidal ideation and the progression from suicide ideation to self-harm and suicidal behaviour are distinct processes with distinct explanations and predictors (Klonsky et al., 2017). The meta-analysis of May and Klonsky (2016b) highlights among other things the conflation of risk factors for suicide ideation with
risk factors for self-harm and suicidal behaviour. This, in turn, may have unwanted consequences for the development of precise and accurate assessment tools for suicidal behaviour, and hence the prediction of episodes of self-harm and suicide.

There is now a change in research focus and theory building. A new generation of theories is emerging within the field. These theories focus explicitly on the transition from thought to action and recognizes that these are in fact distinct processes (Burke & Alloy, 2016; Klonsky et al., 2017; May & Klonsky, 2016b). The most relevant theories in the ideation-to-action framework are the interpersonal psychological theory of suicide (IPTS; Joiner, 2005), the integrated motivational-volitional model of suicidal behaviour (IMV; O'Connor, 2011b), the three-step theory of suicide (3ST; Klonsky & May, 2015) and the fluid vulnerability theory of suicide (FVT; Rudd, 2006).

The ideation-to-action framework is an important idea, however, in the field of suicidology, it is argued that this framework is not an entirely new one (Kessler et al., 1999; Klonsky & May, 2016; Nock et al., 2008; Nock et al., 2016). Regardless of this, the ideation-to-action framework is intended to come up with new solutions and move the field forward by separating the general factors associated with suicidal thoughts from more specific risk factors and mechanisms associated with actual suicidal behaviour. This framework might move the field forward by providing knowledge concerning more clinically meaningful risk factors and specific mechanisms that increase the risk of suicide. The ideation-to-action framework has the potential to reduce the knowledge gap that exists today, both in the domain of research and in domains of theory, risk assessment, treatment, and prevention efforts (Klonsky & May, 2014; Klonsky & May, 2016). The hope is that these new theories will generate new research that eventually can provide knowledge which in turn may make assessment, prediction and prevention of suicidal behaviour more accurate and evidence-based (Klonsky & May, 2014; May & Klonsky, 2016b).

4.1 The Interpersonal Psychological Theory of Suicide

The interpersonal psychological theory of suicide (IPTS; Joiner, 2005) is regarded the first ideation-to-action theory of suicide, and it has likely spawned a new generation of suicide theories (Klonsky & May, 2015). The IPTS proposes that the most dangerous form of suicidal desire is caused by the simultaneous presence of thwarted belongingness and perceived
burdensomeness (Joiner, 2005). It is also assumed that hopelessness about these states is a necessary condition for suicidal desire to develop. Further, the theory proposes that the capability to engage in suicidal behaviour is separate from the desire to engage in suicidal behaviour. Presumably, the capability for suicidal behaviour emerges via habituation in which one experiences repeated exposure to stimuli that are fearsome and painful (Van Orden et al., 2010). Once developed, the acquired capability is assumed to engender a sense of fearlessness about pain, injury, and death, as well as an increased pain tolerance, which is supposed to be necessary for suicidal behaviour (Joiner, Ribeiro & Silva, 2012). The foundation of the interpersonal theory is the assumption that people die by suicide because they can and because they want to (Joiner, 2005). Thwarted belongingness and perceived burdensomeness are primarily related to suicidal desire, while acquired capability for suicide is related to behaviour (Van Orden et al., 2010).

4.1.1 Thwarted belongingness.

Humans are social beings with a basic need to belong. According to this theory, when the need to belong is unmet – a state referred to as thwarted belongingness – a desire for death develops (Joiner, 2005). This desire is also called passive suicidal ideation (Van Orden et al., 2010). Thwarted belongingness is a multidimensional construct and consists of the feeling of loneliness and the absence of reciprocally caring relationships. The loneliness factor is posited to give rise to observable risk factors for lethal suicidal behaviour, including among other self-report loneliness, not being married or not being in a relationship with a partner, not having children and friends, living alone and reporting few to no social supports. The absence of reciprocally caring relationships factor is posited to give rise to observable risk factors for lethal suicidal behaviour, and includes factors such as social withdrawal, low openness to experience, residing in a single jail cell, domestic violence, childhood abuse, and familial discord. The IPTS includes the assumption that thwarted belongingness is a dynamic cognitive–affective state rather than a stable trait, which is influenced by both interpersonal and intrapersonal factors (Van Orden et al., 2010). As such, the theory presumes that the experience of thwarted belongingness is likely to vary over time.

4.1.2 Perceived burdensomeness.

According to the IPTS, perceived burdensomeness comprises two dimensions of interpersonal functioning (Joiner, 2005; Van Orden et al., 2010). The first is beliefs that the self is so flawed as to be a liability on others and the second is affectively laden cognitions of self-hatred. The liability factor is posited to give rise to observable risk factors for lethal suicidal behaviour, such as distress from unemployment, homelessness, physical illness and belief that one is a burden on family. The other dimension of perceived burdensomeness is the affectively laden construct of self-hate, with three corresponding observable indicators with empirically demonstrated associations with lethal suicidal behaviour. These are low self-esteem, self-blame and shame, and agitated mental state (Van Orden et al., 2010). The concept of perceived burdensomeness is also presumed to be dynamic and to vary with time.

4.1.3 Acquired capability for suicide.

According to the IPTS, desire to die by suicide is not sufficient for lethal suicidal behaviour to result (Joiner, 2005). This is because dying by suicide is not an easy thing to do. To die by
suicide an individual must lose some of the innate fear associated with self-harm and suicidal behaviour (Van Orden et al., 2010). According to the theory, it is possible to acquire the capability for suicide (Joiner, 2005). This capability is composed of both increased physical pain tolerance and reduced fear of death through habituation and activation of opponent processes in response to repeated exposure to physically painful and fear-inducing experiences. Through repeated practice and exposure, an individual can habituate to the physically painful and fearful aspects of self-harm, which in turn will make it possible for him or her to engage in increasingly painful, physically damaging, and lethal forms of self-harm (Joiner, 2005). This happens through habituation and opponent processes. Through repeated practice, what was originally a painful and fear-inducing experience (i.e., self-injury) may become less frightening. Importantly, it may as well become a source of emotional relief (Van Orden et al., 2010). Both childhood maltreatment, combat experience, self-harm and previous suicidal behaviour can be regarded as painful and provocative experiences that may help develop acquired capability. Limiting access to lethal means may serve to block acquired capability. Acquired capability is presumed to be a multidimensional emergent latent variable that involves the dimensions of lowered fear of death and increased physical pain tolerance. Although the capability for suicide is conceptualized as a capability that is gained over time, it is also proposed that through genetic and temperamental predispositions to fearlessness, impulsivity, or greater physical pain tolerance, some individuals are more susceptible to acquiring the capability for suicide (Van Orden et al., 2010).

More specifically, the hypotheses of the IPTS are that thwarted belongingness and perceived burdensomeness are proximal and sufficient causes of passive suicidal ideation (i.e., “I wish I was dead”). The simultaneous presence of thwarted belongingness (i.e., “I am alone”) and perceived burdensomeness (i.e., “I am a burden”), when perceived as stable and unchanging (i.e., hopelessness regarding these states), is a proximal and sufficient cause of active suicidal desire (i.e., “I want to kill myself”). The simultaneous presence of suicidal desire and lowered fear of death serves as the condition under which suicidal desire will transform into suicidal intent (Van Orden et al., 2010). The outcome of serious suicidal behaviour (i.e., lethal or near-lethal suicidal behaviour) is most likely to occur in the context of thwarted belongingness, perceived burdensomeness (and hopelessness regarding both), reduced fear of suicide, and elevated physical pain tolerance (Joiner, 2005; Van Orden et al., 2010).
4.1.4 Risk assessment grounded in the IPTS.

Applying the IPTS to risk assessment suggests that predicting risk for self-harm and suicidal behaviour should explicitly address the degree to which patients are experiencing thwarted belongingness and perceived burdensomeness, as well as the degree to which they have acquired the capability for lethal self-harm (Van Orden et al., 2010). Whether the person is feeling hopeless is also crucial to investigate further. Joiner (2005) argues that when it comes to acquired capability two factors are particularly important. These are a history of repeated suicidal behaviour and the specific nature of current suicidal symptoms, with reference to whether the symptoms include resolved plans and preparations or suicidal desire. Clinical practice and risk assessment grounded in the IPTS depend on research testing the hypothesis of the theoretical model. If supported empirically, this model can be of value when it comes to predicting suicidal behaviour.

4.1.5 Empirical evidence.

The IPTS proposes that thwarted belongingness and perceived burdensomeness are related, but two separate concepts (Van Orden et al., 2010). This is only partly supported empirically. Research by Christensen, Batterham, Mackinnon, Donker and Soubelet (2014) found that these concepts best can be described psychometrically as one factor, and not two separate concepts. Translating the suicidal intent into suicidal behaviour requires the ability to tolerate the physical pain in self-harm and suicidal behaviour. One can according to this theory consider self-harm as a painful and provocative event which over time will strengthen the capability for suicide. Violence can also be considered a painful and provocative event. Violence involvement is actually found to differentiate between suicidal ideation and suicidal behaviour (Stack, 2014), and this may indicate that experience with violence can contribute to suicidal behaviour through the concept of acquired capability for suicide. However, Burke, Ammerman, Knorr, Alloy and McCloskey (2017) call in to question the utility of the concept of acquired capability for suicide, and demonstrate that this concept did not distinguish between individuals falling along the ideation-to-action spectrum. One recent systematic review of the predictions of the IPTS concludes by stating that the empirical support for the IPTS is mixed (Ma, Batterham, Calear & Han, 2016). This is the same that Joiner et al. (2012) concluded four years earlier. Continued research is crucial.
4.2 The Integrated Motivational-Volitional Model of Suicidal Behaviour

The integrated motivational-volitional model of suicidal behaviour (IMV; O’Connor, 2011b) is a three-phase model, and draws on the theory of planned behaviour (TPB; Ajzen, 1991), the diathesis-stress hypothesis (Schotte & Clum, 1987) and the arrested flight model of suicidal behaviour (Williams, 2001; Williams, 2014).

The TPB (Ajzen, 1991) provides a unifying theoretical framework for the IMV as it posits that the prediction of any behaviour can be divided into two groups of factors, motivational and volitional factors. These are represented in the IMV as the motivational and volitional phases (O’Connor, 2011b). In essence, the motivational phase describes those factors associated with the development of suicidal ideation and one’s intention to engage in suicidal behaviour. Volitional phase factors, on the other hand, are concerned with suicidal behaviour, those factors that increase the likelihood that suicidal action will emerge from suicidal thinking. Therefore, the TPB provides a clear theoretical distinction between suicidal ideation and suicidal behaviour.

The second major influence is the diathesis-stress hypothesis (Schotte & Clum, 1987). This model highlights a key role for cognitive and biological vulnerability factors, which become particularly dangerous when activated by stress. Together with environmental influences and negative life events, these diatheses characterize the pre-motivational phase of the IMV, setting the biosocial context in which suicidal ideation and suicidal behaviour may develop (O’Connor, 2011a).

The arrested flight model (Williams, 2001) is the third major influence on the development of the IMV, and this model is central in understanding the development of both suicidal ideation and suicidal behaviour. Situations of arrested flight (i.e., feeling defeated, trapped with no rescue) are presumed to be necessary conditions for suicidal behaviour. These can arise out of actual traumatic experiences (i.e., sexual abuse) or how one perceives life circumstances (i.e., being a failure). However, the IMV extends the arrested flight conceptualization (O’Connor, 2011b). This is done by specifying the moderators that account for the transition between defeat, humiliation and entrapment – called threat-to-self moderators. These are separate from the factors that account for the transition from entrapment to suicidal ideation and intent – called motivational moderators. Finally, the
factors which account for the transition from suicidal ideation and intent to suicidal behaviour are called volitional moderators (O’Connor, 2011a).

The IMV proposes that suicidal behaviour results from a complex interplay of factors. It maps the relationship between background factors and trigger events as well as the development of suicidal ideation and suicidal intent through to suicidal behaviour (O’Connor, 2011a, 2011b). The pre-motivational phase consists of the broader biosocial context, like environment and triggering events (i.e., life crises). The motivational phase describes the factors associated with the development of suicidal ideation and one’s intention to engage in suicidal behaviour. Defeat and humiliation can lead to a feeling of entrapment which in turn creates suicidal ideation and intent. The volitional phase is concerned with behaviour and the factors that increase the likelihood that suicidal behaviours will emerge from suicidal thinking, like access to means, capability, impulsivity and imitation (O’Connor, 2011a, 2011b).

4.2.1 Pre-motivational phase.

This is hypothesised to be the first phase and is presumed to consist of background factors and triggering life events (O’Connor, 2011a, 2011b). Background factors can be deprivation and cognitive and biological vulnerabilities. Triggering life events can be relationship crisis, loss of job opportunities, loss of a loved one, and so on. This is the broader biosocial context for suicidal behaviour, and these factors precede the formation of suicidal ideation (O’Connor, 2011a, 2011b).

4.2.2 Motivational phase.

This is the second phase proposed by the IMV, and it is assumed to consist of the formation of suicidal ideations and intentions (O’Connor, 2011a, 2011b). In this phase it is hypothesised that defeat and humiliation can lead to feelings of entrapment. This is moderated by threat-to-self factors, like struggling with social problem-solving, rumination, problems with coping and memory biases. A sense of entrapment can further lead to suicidal ideation and suicidal intent. This relationship is moderated by motivational factors, like thwarted belongingness, burdensomeness, hopelessness and thoughts about the future, lack of social support and a sense of not being able to reach one’s goals (O’Connor, 2011a, 2011b). The concepts of thwarted belongingness, burdensomeness and hopelessness are similar to the concepts in the IPTS (Joiner, 2005). Suicidal ideation and suicidal intention are potential outcomes of the second phase.

4.2.3 Volitional phase.

The volitional phase is the third and last phase proposed by the IMV, and this is where the suicidal behaviour eventually takes place (O’Connor, 2011a, 2011b). Volitional factors like capability, impulsivity, planning, access to means and social learning will moderate the relationship between suicidal ideation and suicidal behaviour. Joiner’s (2005) acquired capability concept is one of the volitional moderators in this phase (O’Connor, 2011b). It is important to notice, however, that the moderators both facilitate and obstruct movement from one phase to the next (O’Connor, 2011a, 2011b). One can imagine that not having access to means (i.e., handguns) will obstruct and make suicidal behaviour less likely.
4.2.4 Risk assessment grounded in the IMV.

Applying the IMV to risk assessment suggests that the prediction of risk for self-harm and suicidal behaviour should explicitly address the different factors associated with the motivational phase versus the volitional phase. Clinical practice and prediction of self-harm and suicidal behaviour grounded in the IMV depend on research testing the hypothesis of the theoretical model. The model needs to be further tested and refined (O’Connor 2011b). If supported empirically, this model can potentially – like the IPTS – be of practical value when it comes to predicting suicidal behaviour. The IMV yields testable hypotheses.

4.2.5 Empirical evidence.

O’Connor, Rasmussen and Hawton (2012) found that the volitional phase variables distinguished between adolescents who only thought about self-harm and those who actually engaged in self-harm, whereas the motivational phase variables did not. This indicates that volitional moderators may bridge the gap between suicidal intention and suicidal behaviour.

There is also empirical evidence for a relationship between the feeling of entrapment and suicidal behaviour. O’Connor, Smyth, Ferguson, Ryan and Williams (2013) found that entrapment was a significant predictor of suicidal behaviour. Individually sensitive suicide risk processes like entrapment could usefully be targeted in treatment interventions to reduce the risk of repeated suicidal behaviour and it could be of utility in prediction of future suicidal behaviour. However, there still exists a gap in the knowledge of the association between entrapment and suicidal behaviour and more research is needed (O’Connor & Portzky, in press).

One study tested the IMV model of suicidal behaviour using structural equation modelling (Dhingra, Boduszek & O’Connor, 2016). The fit of the proposed model was good, and explained 79% of variance in defeat, 83% of variance in entrapment, 61% of variance in suicidal ideation, and 27% of variance in suicidal behaviour. Impulsivity was not significantly related to suicidal behaviour in this study. One reason for this may be the conceptualisation of impulsivity (May & Klonsky, 2016a). However, these findings represent a preliminary step towards greater clarification of the mechanisms driving suicidal behaviour and support the utility of basing future research on the IMV of suicidal behaviour. It could turn out to be quite fruitful to do more research in order to gain a better understanding of those factors that
comprise the motivational phase compared to those factors that comprise the volitional phase. This will be extremely helpful when it comes to risk assessment and prediction.

### 4.3 The Three-Step Theory of Suicide

The three-step theory of suicide (3ST; Klonsky & May, 2015) hypothesizes that suicide ideation results from the combination of pain (usually psychological or emotional pain) and hopelessness. Hopelessness is required for the development of suicidal ideation. Among those experiencing both pain and hopelessness, connectedness is a key protective factor against escalating ideation, and hence, a lack of connectedness will probably escalate suicidal ideation. Connectedness most often means connection to people; however, it is possible to use the term more broadly in terms of attachment to a job or a role. Disrupted connectedness is similar to low belongingness and burdensomeness as described in the IPTS (Joiner, 2005), which are also central concepts in the IMV (O’Connor, 2011b). The concept of hopelessness is important both in the IPTS (Joiner, 2005), the IMV (O’Connor, 2011b) and the 3ST (Klonsky & May, 2015). As such, there are similarities across the different theories in the ideation-to-action framework.

Klonsky and May (2015) view the progression from suicidal ideation to suicidal behaviour as facilitated by dispositional, acquired, and practical contributors to the capacity to attempt suicide. The concept of suicide capability in the 3ST (Klonsky & May, 2015) is expanded in two ways compared with the concept of acquired capability in the IPTS (Joiner, 2005). Dispositional contributors can be biology and genetics and practical contributors can be access to firearms and lethal means. Acquired contributors involve self-harm or experience with violence; this is the same construct as Joiner (2005) describes in his theory, which is also part of the IMV (O’Connor, 2011b). Hence suicide capability is a much broader concept than acquired capability.
4.3.1 Pain.

The 3ST proposes that the first step toward suicidal ideation begins with pain (Klonsky & May, 2015). This pain is usually psychological or emotional. Klonsky and May (2015) further explain that human beings are shaped by behavioural conditioning, which means that people perform behaviours that are rewarded and avoid behaviours that are punished. Specifically, they explain that if someone’s day-to-day experience of living is characterized by pain, the individual feels like being punished for living, and this in turn may decrease the desire to live and further initiate thoughts about suicide. Klonsky and May (2015) do not specify the nature of the pain and they believe that different sources of pain can all lead to a reduced desire to live. A few sources of pain are however mentioned, including among others burdensomeness and low belongingness (Joiner, 2005) and defeat and entrapment (O’Connor, 2011; Williams, 2014). Importantly, pain alone is not sufficient to produce suicidal ideation. If someone living...
in pain feels hopeful that the situation can improve, the individual likely will focus on obtaining a future with diminished pain rather than on the possibility of ending his or her life. Because of this, hopelessness is also required for the development of suicidal ideation (Klonsky & May, 2015).

4.3.2 Hopelessness.

When people find themselves in a situation characterised by pain, and the person feels hopeless about the situation, and hopeless that the pain will improve, he or she will potentially consider suicide according to the 3ST (Klonsky & May, 2015). It is hypothesised that it is the combination of pain and hopelessness that will cause suicide ideation to develop. Someone in pain but with hope for a better future will continue to engage with life. Similarly, someone who feels hopeless about the future but without day-to-day pain will probably not consider suicide. Hence, the combination of pain and hopelessness is crucial for suicidal ideation to emerge (Klonsky and May, 2015).

4.3.3 Connectedness.

The second step toward potentially lethal suicidal behaviour involves connectedness. Most often connectedness means connection to other people. However, the term is used more broadly in the 3ST. Connectedness can also refer to one’s attachment to a project, job, role, interest, or any sense of perceived purpose or meaning that keeps one invested in living (Klonsky & May, 2015). Connectedness is important, because even if someone feels pain and experiences hopelessness and starts thinking of hurting themselves, the suicidal ideation will probably remain moderate (i.e., “Sometimes I don’t want to live”) rather than strong (i.e., “I want to kill myself”) if the pain is smaller than the connectedness to life. This is similar to the passive suicidal ideation and the active suicidal ideation in the IPTS (Joiner, 2005; Van Orden et al., 2010), respectively. The 3ST assumes that if both pain and hopelessness are present, and connectedness is absent or less than the pain, the individual will have strong suicidal ideation and an active desire to end his or her life. The primary role of connectedness is to protect against strong suicidal ideation in those at high risk due to pain and hopelessness (Klonsky & May, 2015). Once an individual has developed suicidal thought and ideation, the important question is whether the person will act on these thoughts.
4.3.4 Suicide capacity.

As mentioned earlier, May and Klonsky’s (2015) concept of suicidal capability is expanded in two ways compared to Joiner’s (2005) concept of acquired capability. In addition to acquired capability, which refers to an individual’s habituation to pain, fear, and death through exposure to life experiences such as physical abuse, self-harm, combat training, or any other experience that subjects someone to painful and provocative events, the concept of suicidal capability also consists of dispositional variables and practical variables. Dispositional variables refer to variables that are primarily driven by genetics, such as pain sensitivity and specific phobias, such as for blood. The 3ST presumes that someone with low pain sensitivity will have a higher capacity for suicidal behaviour compared to someone with phobia of blood (Klonsky & May, 2015). Practical variables refer to concrete factors that make self-harm and suicidal behaviour possible. It is hypothesised that someone with knowledge and access to firearms, for example, will be more capable to act on suicidal thoughts than someone without this knowledge or access. The same is probably true for someone with medical competence and access to necessary drugs (Klonsky & May, 2015). In summary, acquired, dispositional and practical factors contribute to the capacity for suicidal behaviour, and an individual with strong suicidal ideation will only make a suicide attempt if and when they have the capacity to do so.

4.3.5 Risk assessment grounded in the 3ST.

The 3ST is a rather new theory, and more research is needed. It is, however, possible to imagine that the theory can have clinical utility. Applying the 3ST to risk assessment suggests that the prediction of risk for self-harm and suicidal behaviour should explicitly address the capacity for suicide, which involves both acquired, dispositional and practical variables (Klonsky & May, 2015). If supported empirically, this model can – like the IPTS and the IMV – potentially be of practical value when it comes to assessment and prediction of suicidal behaviour. There is clearly a need for more research on this model. It is also desirable that researchers other than the ones who first developed this theory test its hypothesis empirically.
4.3.6 Empirical evidence.

May and Klonsky (2015) found evidence that suicide ideation is driven by the combination of pain and hopelessness. Further, they found support for the hypothesis that connectedness plays a particularly important protective role against suicidal ideation in those at greatest risk for ideation (i.e., in those high on both pain and hopelessness). In particular, connectedness, as well as the degree to which participants’ connectedness exceeded their pain, predicted lower suicidal ideation among those who felt both pain and hopelessness, but were relatedly minimally to suicidal ideation for everyone else. These results support the hypothesis of the 3ST of how pain, hopelessness, and disrupted connectedness work in concert to bring about suicidal ideation. May and Klonsky (2015) also predicted that acquired, dispositional and practical contributors to suicide capacity explain the progression from suicide ideation to suicidal behaviour. They also claim to have evidence in support of this hypothesis. It is, however, worth noting that the associations between suicide capacity and the participants’ history of self-harm and suicidal behaviour were relatively small, and thus explain only a small amount of variability in the progression from suicide ideation to suicidal behaviour.

Suicide capability is according to May and Victor (in press) one of few risk factors associated with actual suicidal behaviour among ideators. This was also demonstrated by Klonsky and May (2015). However, Burke and Alloy (2016) claim that it was the concept of acquired capability that Klonsky and May (2015) found support for in their research, when the concept they actually investigated was the much broader defined term, suicidal capability, as described by the 3ST. These concepts are not entirely equal to each other, although the concept of acquired capability is a part of the concept of suicidal capability. Burke et al. (2017) call in to question the utility of the concept of acquired capability for suicide, and demonstrate that this concept did not distinguish between individuals falling along the ideation-to-action spectrum. Apparently, the evidence is mixed, and so are the concepts. This is just a reminder of the importance of the operationalization of concepts, clearly defined constructs, the interpretation of them and possible clinically relevant consequences of this.

The IPTS, the IMV and the 3ST each posit specific and testable hypotheses that may differentiate ideation from action. However, none of these models provide a clear framework for understanding when the transition from thoughts to action will occur nor how this transition is expected to unfold (Bryan & Rudd, 2016; Wolfe-Clark & Bryan, 2017). Suicidal ambivalence can be defined as the relative balance between the wish to live and the wish to
die (Bryan et al., 2016). This is not constant and will change with time. Evidence shows that suicidal ideation varies dramatically over the course of most days (Kleinman et al., 2017). In their study, Bryan et al. (2016) found that the emergence of suicidal behaviour is primarily driven by the absence of the wish to live, and not by the presence of the wish to die. This is important information for the clinician. The temporal nature of suicidal urges is of relevance when it comes to assessment of suicidal behaviour and treatment decisions. More knowledge of how to assess the ebb and flow of the suicidal mind is needed. Suicidal ambivalence may be a useful indicator of risk (Bryan et al., 2016).

A lack of attention to nonlinear change processes among relevant risk variables could conceal the true nature of the transition from suicidal thought to action. This can weaken our ability to understand suicidal behaviour, and our possibility to predict and prevent self-harm and suicide. The fluid vulnerability theory of suicide provides a working model for conceptualizing static versus dynamic aspects of suicide risk over time (Bryan & Rudd, 2016; Rudd, 2006).

4.4 The Fluid Vulnerability Theory of Suicide

The fluid vulnerability theory (FVT; Rudd, 2006) focuses specifically on the risk assessment process and proposes that suicide risk is inherently dynamic, with fluctuations in risk occurring as a function of ever-changing interactions that occur among multiple risk and protective factors. The FVT tries to understand the risk of suicidal behaviour over both the short and the long term. In essence, the FVT proposes that the state of suicidality, the factors that triggered the episode and those that contribute to its severity and duration are fluid in both nature and duration. It is a theory embedded in cognitive theory and more specifically, the suicidal mode (Rudd, 2006) (see below).

Some risk and protective factors, like gender, genetics and trauma, are static and relatively stable. Other risk and protective factors, like mood, life-stressors and social support are more state-based and dynamic (Bryan & Rudd, 2016; Rudd, 2006). According to the FVT static risk factors are more likely to differentiate between suicide ideators and those who act on the suicidal thoughts because individuals with many static risk factors and few static protective factors have a greater vulnerability to experiencing suicidal crises and transitioning from suicide ideation to suicidal behaviour in response to acute risk factors. The FVT further
posits that risk and protective factors are mutually influential and dynamic, and that change in one factor can affect change in another factor. This moment-to-moment interplay among multiple risk and protective factors is captured by the FVT’s concept of the suicidal mode (Bryan & Rudd, 2016; Rudd, 2006). Conceptualizing risk factors with respect to their stability and duration provides a new way to understanding suicidal behaviour and the suicidal process over time (Wolfe-Clark & Bryan, 2017). Knowledge of these factors and the interplay between them may give valuable information concerning when a person will become suicidal as well as when that person is likely to transition from suicidal thought to suicidal behaviour (Bryan & Rudd, 2016).

![Figure 4. Suicide risk over time as hypothesised by the fluid vulnerability theory of suicide (FVT). Reprinted from “Integrating two theoretical models to understand and prevent military and veteran suicide” by A. L. Wolfe-Clark and C. J. Bryan, 2017, Armed Forces & Society, 43(3), p. 488. Copyright 2016 by the Author(s).](image)

### 4.4.1 The suicidal mode.

The suicidal mode has four components, which are the physiological system, the cognitive system, the affective system and the behavioural (motivational) system, and can be explained as a structural framework for understanding how these four systems interact over time (Rudd, 2006; Wolfe-Clark & Bryan, 2017). The physiological system includes autonomic and sensory processes associated with the stress response. Very high physiological arousal can typically only be maintained for limited periods of time, and because of this the physiological system plays a particularly important role in the time-limited nature of acute suicidal episodes (Wolfe-Clark & Bryan, 2017). The cognitive system controls attention, memory and recall, information processing, as well as patterns of cognitive beliefs about the self (i.e., “I’m
worthless”), others (i.e., “Nobody really cares about me”), and the future (i.e., “Things will never change”). This comprises what Rudd (2000) has referred to as the suicidal belief system. The affective system produces and regulates emotional experiences associated with suicidal crises, such as guilt, humiliation, sadness and anger. Finally, the behavioural system includes the individual’s observable actions and responses to internal and external triggers and cues, such as alcohol consumption, self-harm and social withdrawal (Wolfe-Clark & Bryan, 2017).

The suicidal mode can be triggered by both internal (i.e., thoughts, feelings) or external (i.e., the loss of a relationship) factors, and the end result may be a suicidal episode or state (Bryan & Rudd, 2016). This episode or state is characterised by specific or core cognitive themes (i.e., helplessness, perceived burdensomeness), acute dysphoria, related physiological arousal and associated suicidal behaviour (Rudd, 2006). The transition from suicidal thoughts to suicidal behaviours is therefore hypothesized to occur as a result of coordinated change processes among multiple domains of risk. When trying to understand and predict the transition of suicidal behaviour from suicidal thinking the severity of various risk factors may therefore be less important than the patterns of change in these risk factors relative to one another (Bryan & Rudd, 2016).

### 4.4.2 Fundamental assumptions of the FVT.

The foundational assumption of this model is that suicidal episodes are time-limited (Bryan & Rudd, 2016; Rudd, 2006; Wolfe-Clark & Bryan, 2017). A second assumption is that everyone has a baseline risk level for suicidal episodes (i.e., how easily the suicidal mode gets triggered) that is determined by historical and developmental factors, and that this baseline risk varies from individual to individual. The third assumption states that after resolution of an acute suicidal episode an individual returns to his or her baseline risk level. The fourth assumption in the FVT states that those who make multiple attempts have higher baseline risk level. Repeated suicidal episodes have resulted in a suicidal mode that is easily triggered, with activation occurring across any of the four domains in the suicidal mode. The fifth assumption states that risk for self-harm and suicide are elevated by aggravating factors, which essentially are precipitant stressors that cut across the four domains of the suicidal mode. These stressors can be both internal and external (Rudd, 2006). It is important to remember the synchrony of action, that is, once the mode is activated, all four domains or subsystems are involved. The
sixth assumption in FVT holds that the severity of the suicidal episode is dependent on the interaction between baseline risk and the severity of the aggravating factors. The seventh FVT assumption states that risk is elevated by aggravating factors for only limited periods of time, such as a few hours, days, or weeks. The eighth and final assumption of the model states that acute risk resolves to baseline level when aggravating factors are effectively targeted. The suicidal mode has four component parts, and although the suicidal belief system (i.e., cognition) is central, all need to be targeted to resolve a suicidal episode (Rudd, 2006; Wolfe-Clark & Bryan, 2017).

4.4.3 Risk assessment grounded in the FVT.

As the assumptions of the FVT indicate, variable baseline risk means that even when someone recovers from an acute suicidal crisis, they can still be at relatively high risk, with vulnerability that manifests itself across multiple domains (Rudd, 2006). This is something one should bear in mind when trying to predict risk of self-harm and suicidal behaviour. Clinicians need to monitor both stable risk factors and acute risk factors, as well as protective factors (Bryan & Rudd, 2016; Rudd, 2006). When trying to predict the emergence of suicidal behaviour from suicidal thinking, the severity of various risk factors may be less important than the patterns of change in risk factors relative to one another (Bryan & Rudd, 2016). In predicting the risk of suicidal behaviour clinicians should try to quantify the ebb and flow of various risk and protective factors over time. Resolution of an acute suicidal crisis does not however necessarily mean that suicide risk is low, because baseline risk level can be high because of static risk factors (Rudd, 2006).

4.4.4 Empirical evidence.

The dynamic and moment-to-moment interplay among risk factors described by the FVT has not yet been integrated into the design of many research studies (Bryan & Rudd, 2016). In the absence of these methods, one may inadvertently disregard or turn attention away from important mechanisms that drive the transition from suicidal thought to suicidal behaviour. However, one study by Alexander, Reger, Smolenski and Fullerton (2014) found that a history of having a failed relationship in the past, did not differentiate between soldiers who died by suicide and controls. Importantly though, soldiers with a recently failed relationship (i.e., during the past 30 days), were significantly more likely to engage in suicidal behaviour
or to die by suicide than those with a failed relationship earlier in life. Understanding the
temporal proximity of the relationship failure relative to the suicidal behaviour therefore
seems to be more important than knowing whether a relationship failure has ever occurred
(Alexander et al., 2014).

Explicit consideration of change processes is important in the field of suicidology. The
integration of conceptual models such as the FVT with existing models of suicide (Wolfe-
Clark & Bryan, 2017) and the adoption of newer research methods such as dynamic systems
theory (Butner, Gagnon, Geuss, Lessard & Story, 2015), may be especially useful. Wolfe-
Clark and Bryan (2017) argue for combining the IPTS and the FVT. This is an exciting
thought and perhaps will this give more accurate assessments in the future. There is reason to
believe that accounting for temporal dynamics could be a critical step forward in our
understanding of suicidal behaviour (Bryan & Rudd, 2016). As with the other theories in the
ideation-to-action framework, more research and empirical evidence are needed.

The theories presented here are the state of the art and should be subject to empirical
testing. Klonsky and May (2014) argued that an ideation-to-action framework should guide
suicide theory, research, and prevention. Explicit consideration of change processes will be
needed in future research designs, for example dynamic systems theory (Butner et al., 2015).

There is a great need for more research that translates theories and results from
research into effective clinical interventions. This is called translational research (Clark, 2004;
Onken et al., 2014). Theoretical models are valuable because they generate hypotheses that
can be tested empirically. Until recently in the field of suicidology such research that
specifically addresses the gap between suicidal ideation and suicidal behaviour has been
scarce (Franklin et al., 2016). One still does not know the processes that translate suicidal
thoughts into suicidal behaviour. The theorists have not yet succeeded in finding the answer.
Different theories have been developed, however, by closer examination one realises that the
theories postulate much of the same. There is also reason to question whether the theories in
the ideation-to-action framework actually have come up with something new, or if they just
have taken the general risk factors traditionally established through epidemiologically based
research and put them into a new framework. Knowledge of the transition from thought to
action is rather urgent when it comes to the clinical value of risk assessment. There is reason
to believe that the factors that predict suicidal intention are different from the factors that
predict suicidal behaviour (Nock, Kessler & Franklin, 2016). Gaining a better understanding
of the factors and mechanisms that predict who of the suicide ideators will go on to act on their thoughts is arguably one of the greatest priorities for suicide research going forward. Fortunately, in the past decade there has been a growth in interest in this lack of knowledge and an increased focus on theories that addresses connecting these two, but still separate processes (May & Klonsky, 2016b).

In the field of suicidology there is not only uncertainty about the interplay and dynamics among risk factors and the transition from thoughts to action. There is also confusion about relevant concepts and how to define these. This will be considered next.
5 The Concepts of Suicidal Behaviour – What are Clinicians Trying to Predict?

Confusion about relevant terms to describe the behaviours can lead to miscommunication between researchers, unfounded assumptions about how self-harm and suicide emerges and recur, and how best to predict it. This can have unfortunate consequences for research, assessment, prediction, treatment and policy decisions about self-harm and suicide (O’Carroll et al., 1996; Silverman, Berman, Sanddal, O’Carroll & Joiner, 2007a, 2007b).

In the United States two key terms are used to refer to self-injurious behaviours, non-suicidal self-injury (NSSI) and suicidal behaviour disorder (American Psychiatric Association, 2013; Kapur, Cooper, O’Connor & Hawton, 2013; Williams, 2014). Non-suicidal self-poisoning is not included in the American classification. What distinguishes non-suicidal self-injury and suicidal behaviour disorder is mainly the suicidal intent of the act. According to the fifth edition of the Diagnostic and statistical manual of mental disorders (DSM-5) suicidal behaviour disorder is characterized as a suicide attempt where the individual at the time of initiation expected that the set of actions would lead to his or her own death (American Psychiatric Association, 2013, s. 801). Suicidal behaviour disorder is also categorized in terms of violence of the method (i.e., jumping from a bridge, gunshot to the head) and high lethality (i.e., the physical danger of the act) requiring medical hospitalization.

Non-suicidal self-injury is categorized as self-injury to the surface of the body (i.e., superficial cuts to the skin, burning, stabbing, hitting, excessive rubbing) and it is assumed that the intent of the act is to obtain relief from a negative feeling or cognitive state. It is assumed that there is no suicidal intent connected to the behaviour (American Psychiatric Association, 2013, s.803). Importantly, non-suicidal self-injury is classified according to what the individuals themselves report regarding suicidal intent of the act, rather than a clinician judgement.

However, focusing on intention and lethality to define the behaviour is problematic (Cooper et al., 2005; Gjelsvik, Heyerdahl, Holmes, Lunn & Hawton, 2016a, 2016b). The relationship between suicidal intent and lethality and their associations with suicide have yielded contradictory findings. Some studies confound suicidal intent with lethality, and vice versa. There is also reason to believe that most people do not have accurate knowledge
regarding what it takes to end their own lives (i.e., how medically dangerous is self-poisoning with paracetamol). However, lethality and suicidal intent should be considered as largely separate dimensions of self-harm and suicidal behaviour (Gjelsvik et al., 2016a). This is important to recognize during clinical assessment of the risk of future episodes of self-harm and suicidal behaviour, especially regarding historical information.

According to Williams (2014), people give many reasons for why they self-harm. Bancroft, Skrimshire and Simkin (1976) investigated the reasons people give for taking overdoses of drugs. They found that 44 per cent indicated that they had wanted to die, 33 per cent reported that they were seeking help, 42 per cent wanted to escape from a situation, 52 per cent reported that the motive was to obtain relief from a terrible state of mind, and 19 per cent said that they were trying to influence someone. One more recent study investigated why people engage in suicidal behaviour across different cultures (Hjelmeland et al., 2002). Findings indicate that the pattern of intentions involved in suicidal behaviour in different countries tends to be reasonably consistent across the regions, and that the intentions and motives do not vary greatly with gender or age. The reasons and motives reported for why people engage in suicidal behaviour can be classified into four broader factors, namely – care-seeking, influencing others, temporary escape and final exit (Hjemeland et al., 2002).

However, Gjelsvik et al., (2016b) found that there is considerable variability over time in retrospective reports of key aspects of suicidal intent associated with a single episode of self-poisoning and that these covary with levels of depressed mood at the time of assessment. One can think of mood as context. It is well known in the field of psychology that the context in which one learns something new is the best context to remember what one has learned. In other words – our memory is dependent on context. Probably is this also true for reporting thoughts and intent associated with self-harm and suicidal behaviour. When mood is improved the person is not able to report with accuracy earlier motives and intent associated with the suicidal behaviour. However, when the mood is low – as it was by the time of self-harm – the person will be able to more precisely report the intent of the self-harming behaviour. This means that trying to predict the risk of self-harm and suicidal behaviour when the person is better most likely will be of less value than trying to predict the risk when the person is feeling low or depressed (Brown et al., 2005).

Lifetime worst-point intent and lethality of previous self-harm episodes have been found to be better predictors of repeat self-harm episodes than intent and lethality of the most
recent self-harm episode (Sapyta et al., 2012). Self-harm and suicidal behaviour are often
classified by ambivalence and changeability of method (Owens et al., 2015). There are
strong associations between non-suicidal behaviour and suicidal behaviour (Andover, Morris,
Wren & Bruzzese, 2012; Hawton, Bergen et al., 2012; Kapur, Cooper et al., 2013). Self-harm
and suicidal behaviour are heterogeneous with regard to lethality and the suicidal intent
underlying the act (Stefansson, Nordström & Jokinen, 2012). Because of empirically derived
evidence like this, European researchers prefer the term deliberate self-harm rather than
concepts that imply intentions (i.e., non-suicidal self-injury).

Deliberate self-harm is a term that has been used in the United Kingdom (Haw et al.,
2007). This covers both suicidal behaviour such as so called “suicide attempts” and medically
less serious self-harm, such as superficial cutting of the skin (Kapur, Cooper et al., 2013).
Self-harm or deliberate self-harm are preferred and refer to self-injury or self-poisoning
regardless of apparent intention or motivation (Hawton et al., 2003; Kapur, Cooper et al.,
2013). One can think of self-harm on a continuum. Hence, suicide is in this paper defined as
death following deliberate self-harm, regardless of motivation, intention and method.
6 The Relationship between Self-Harm and Death by Suicide

Hospital-treated self-harm is the strongest independent risk factor for subsequent death by suicide (Bergen et al., 2012a, 2012b; Carroll et al., 2014; Chan et al., 2016; Haw et al., 2007; Hawton et al., 2015; Hawton, Bergen et al., 2012; Ribeiro et al., 2016). It is well known that suicide rates are higher in males than females, and that non-fatal acts of deliberate self-harm are more common among females. However, a closer examination of the gender ratio at different ages revealed remarkable variation (Hawton & Harris, 2008). This probably reflects the different pace of development of the two genders in early adolescence, changes in motivation for self-harm at different ages, and the closer resemblance of self-harm to suicide in older age groups. A close examination of the population of people who self-harm and trends in deliberate self-harm can be of great utility when it comes to prediction and prevention of suicidal behaviour. This is because of the strong association between self-harm and later death by suicide, although actual risk is still relatively low (Hawton et al., 2003; Hawton & Harriss, 2008).

Switching methods of self-harm is a common occurrence (Owens et al., 2015). Method of self-harm is fluctuating and unpredictable. Switching can happen quickly, regardless of the initial method of self-harm. This means that clinicians should consider the possibility that the patient will go on and self-harm with another method later on because this can have consequences for risk assessment. Empirical evidence shows that suicide was found to be significantly more likely after self-cutting than after self-poisoning (Bergen et al., 2012a), a finding replicated among children and adolescents (Hawton, Bergen et al., 2012). The finding that death by suicide is more likely after self-cutting compared to self-poisoning is contrary to public and clinical opinion.

Patients who present to hospital following self-harm, especially those who present with self-cutting, comprise a relatively neglected patient group. These patients often perceive negative attitudes of health professionals. This view is confirmed by results of studies of staff attitudes (Hawton et al., 2011). One reason for this can be a lack of training and understanding regarding the problems and suffering of people who self-harm (Saunders, Hawton, Fortune & Farrell, 2012). This is especially worrisome when one takes into account the strong relationship between self-harm and later death by suicide.
It is established that hospital-treated self-harm is a strong independent risk factor for subsequent death by suicide (Hawton et al., 2015; Ribeiro et al., 2016). Lifetime worst-point intent and lethality of previous self-harm episodes have been found to be better predictors of repeat self-harm episodes and risk for suicide than intent and lethality of the most recent self-harm episode (Sapyta et al., 2012). When assessing risk, and especially intent, the clinician needs to be aware of the fact that the mood the patient is in at the time of the assessment will have consequences for the report (Brown et al., 2005; Gjelsvik et al., 2016b). There is reason to believe that one will have the most accurate result when trying to predict risk of self-harm and suicide if the assessment is done when the patient is in a mood that resembles the mood of earlier crises of suicidal behaviour. This raises the interesting question of whether patients can imagine themselves in that mood – without mood inductive – and then report their prior intentions. However, prediction and assessment are not only complicated by uncertainties concerning self-report. There are also psychometrical and methodological challenges with the tests and checklists used when assessing risk of suicidal behaviour.
Prediction of self-harm and risk of suicide is notoriously difficult (Gjelsvik, 2014). This is partly due to challenges of the sensitivity and the specificity of a given test. If the test is perfect both the sensitivity and the specificity would equal 100% (Smith, 2012a). A test that does not work at all would expect sensitivity and specificity of 50%, this is no better than chance. Assessment and prediction of self-harm and suicidal behaviour remain an important area for clinical research and practice. In clinical psychology the search is always on for tools and tests that can help us predict who is at risk, so one can take steps to intervene earlier (Williams, 2014). It is also of interest to exclude those not at risk. If one is able to identify those factors that will lead to suicidal behaviour the hope is that one can prevent this from happening. However, the field of suicidology has until recently focused on epidemiologically established risk factors that have low specificity and they are of little use in the clinical context because they are too general. Research done with the psychological autopsy method indicates that most people who die by suicide have a mental illness (Cavanagh, Carson, Sharpe & Lawrie, 2003). Yet it is well known that most people with mental illness do not end up taking their own lives. For every 100 patients at high risk of suicide only one will actually die by suicide in any one year, and the clinician cannot be sure which one, or when (Williams, 2014).

Accurate and precise determination of suicide risk requires the development of precise assessment techniques and instruments. Perfect tests are, however, rare. Sensitivity, specificity, positive predictive value and negative predictive value are the most common basic measures computed for diagnostic tests (Altman & Bland, 1994a, 1994b). While sensitivity and specificity are properties of the diagnostic test, the positive predictive value and the negative predictive value depend on the prevalence of the disease in the population (Smith 2012b). Although sensitivity and specificity are very useful in defining the accuracy of a test, in a clinical situation they may not provide all the information required; for this the positive predictive value and the negative predictive value are needed (Smith, 2012a). It is a fact that self-harm and especially death by suicide have a low base rate in the population as they are relatively low frequency phenomena, and that this makes prediction difficult (Altman &
The positive predictive value of any risk tool that assesses an event with a low base rate in the population, such as suicidal behaviour, is likely to be low, even when sensitivity and specificity values are high. However, in the following section the challenges of sensitivity and specificity of tests will be explored.

### 7.1 Sensitivity – who will be correctly identified as true positives

One of the methodological problems with assessment and prediction of suicidal behaviour is low sensitivity (Gjelsvik, 2014; Williams, 2014). In defining sensitivity, one is only interested in the proportion of people with suicidal behaviour who test positive. The sensitivity of a test is the proportion of true positives that are correctly identified by the test. In other words, the sensitivity is the percentage of those who truly will go on and harm themselves or die by suicide that was correctly identified by the test (Altman & Bland, 1994a; Smith, 2012a). The sensitivity is also called the true positive rate (Shapiro, 1999). Obviously, one does not want anyone to die by suicide, so this is kind of paradox. Nevertheless, high sensitivity is important in the domain of prediction, and any method of assessment needs to have adequate sensitivity.

A highly sensitive test is useful for excluding persons when the test result is negative (Akobeng, 2006). However, the consequence of low sensitivity is that individuals at high risk of self-harm or death by suicide will be missed (i.e., false negatives). This is problematic because the clinician will not be able to prevent and protect high risk individuals from harming themselves, and the consequences can be fatal. If clinicians are not able to predict and prevent future episodes of self-harm, one can imagine that vulnerable individuals will continue to self-harm without getting any professional help. Their physical and mental health will probably worsen. Self-harm is a significant risk factor for subsequent death by suicide (Bergen et al., 2012a, 2012b; Carroll et al., 2014; Chan et al., 2016; Haw et al., 2007; Hawton et al., 2015; Hawton, Bergen et al., 2012; Ribeiro et al., 2016; Van Orden et al., 2010), in fact it is a risk factor for early death from any cause (Bergen et al., 2012b). It is of course also a consequence that those who do not show any signs of self-harming behaviour still may be in high risk for complete suicide, and yet assessment may classify them as low risk individuals. As is known, more females than males self-harm, self-harm is one of the most robust factors for subsequent death by suicide – yet more males than females die by suicide.
(Hawton & Harriss, 2008). What should one think about this paradox when trying to make assessments and predictions of suicidal behaviour?

### 7.2 Specificity – who will be correctly identified as true negatives

Another methodological problem with prediction is low specificity (Gjelsvik, 2014; Williams, 2014). In defining specificity, one is only interested in the proportion of people without suicidal behaviour who have a negative test result. The specificity of a test can be defined as the proportion of true negatives that are correctly identified by the test. This means that the test correctly identifies those who will not go on to harm themselves or die by suicide (Altman & Bland, 1994a; Smith 2012a). The specificity is also called the true negative rate (Shapiro, 1999). As with sensitivity, any method of assessment needs to have adequate specificity.

A test with high specificity is useful for including persons and initiate treatment and professional care if a person tests positive (Akobeng, 2006). Low specificity, however, means that low risk individuals wrongly will be identified and categorized as high-risk individuals for self-harm and suicide (i.e., false positive). Because of the low base rate of suicidal behaviour the issue of specificity is particularly significant (Williams, 2014). More people will be falsely identified as at risk than correctly identified as at risk even in a highly selected group. The problem is even greater when trying to predict death by suicide (Williams, 2014).

Low specificity is problematic both from an ethical and a clinical perspective. The consequence is that it makes the clinician use scarce resources for individuals who do not need care at such an advanced level (i.e., inpatient admission) and perhaps these resources should have been better used for another individual who needed it more. The economic cost of self-harm and suicidal behaviour is considerable (Crosby et al., 2013; Tsiachristas et al., 2017).

In sum, one can conclude by stating that challenges with sensitivity and specificity have unfortunate consequences for the development of adequate methods and assessment tools (Gjelsvik, 2014; Pokorny, 1983). This will, in turn, have consequences for clinical practice, prediction and for the ultimate goal which is to prevent self-harm and suicidal behaviour. Because of low sensitivity, individuals with high risk of suicidal behaviour will
not get the care and help that they need and may end up being ignored. This can potentially be life-threatening. And because of low specificity individuals who are not in real danger of repeated episodes of self-harm or suicidal behaviour can potentially be granted more time and resources than they actually need. Problems with sensitivity and specificity makes it hard for clinicians to prioritise, make good decisions and use resources efficiently. This has ethical, clinical and juridical consequences.

7.3 Precise prediction

Precise prediction is characterised by high sensitivity (i.e., correctly identifying those who will self-harm or die by suicide) and high specificity (i.e., correctly identifying those who will not self-harm or die by suicide). This is important because poor prediction and assessment yield low clinical utility, which potentially can mean life or death in the field of suicidology. A prospective research study followed up 4800 in-patients (Pokorny, 1983). All attempts to identify specific subjects at risk were unsuccessful. This included the use of factor scores, individual items and a series of discriminant functions. Each trial identified too many false positive cases and missed far too many cases to be workable. Identification of particular persons who would act on suicidal thoughts and urges was not feasible. This is partly because of the low sensitivity and specificity of available identification procedures and the low base rate of this behaviour (Pokorny, 1983). It seems that the situation is about the same today, 35 years later.

However, one major limitation of both sensitivity and specificity is that they are of no practical use when it comes to helping the clinician estimate the probability of suicidal behaviour in individual patients (Akobeng, 2006). The reason for this is that both sensitivity and specificity are defined on the basis of people with or without this particular behaviour. In clinical practice the predictive values are more useful measures of predictive accuracy. The positive predictive value of a test is defined as the proportion of people with a positive test result who actually have suicidal behaviour (Akobeng, 2006; Smith 2012b). The negative predictive value of a test is defined as the proportion of people with a negative test result who do not have suicidal behaviour (Akobeng, 2006; Smith 2012b). The predictive value of a test is determined by the test’s sensitivity and specificity and by the prevalence of the condition for which the test is used. Hence, the predictive values will vary with the prevalence of self-
harm and suicidal behaviour in the population, as well as with the test’s sensitivity and specificity.

Even though the clinician knows that one individual is in particularly high risk of self-harm and suicidal behaviour, another challenge is knowing when this behaviour will occur. This is one of the problems with prediction that the earlier presented fluid vulnerability theory of suicide tries to address (Bryan & Rudd, 2016).

7.4 Timing – when will the person engage in suicidal behaviour?

Assessment of suicidal behaviour cannot merely be done at a single point in time on the basis of risk factors (Rudd, 2006; Williams, 2014). The clinician need to be aware of and take in to account changes over time. This is, however, an under-researched topic.

According to Williams (2014) any disruption to settled routine may trigger a state in which the individual reviews his or her goals and plans. Current circumstances are compared to preferred circumstances. An assessment of the individuals’ own energy and ability level needed to achieve goals are included in the review. If the gap between current reality and future or preferred goals seems unresolvable the individual is in danger of feeling hopeless. Changes in circumstances that can trigger such a life review can be both external (i.e., discharge from psychiatric hospital, relationship crisis) and internal (i.e., a person’s mood state, thoughts about self). Once life review and rumination has started the individual may find it very difficult to switch it off, and these periods are critical for suicidal thoughts and behaviour (Williams, 2014). However, how and when suicidal thoughts are transformed into suicidal behaviour still remains a mystery in the field of suicidology (Gjelsvik, 2014; Nock et al., 2016).
8 Risk Scales, Checklists and Assessment Tools

Because of the psychometric and methodological challenges with assessment and prediction of suicidal behaviour, none of the risk scales, checklists and assessment tools are recommended when assessing risk of suicidal behaviour – at least not in isolation (NICE, 2011).

8.1 Conventional risk assessment scales

Numerous scales, checklists and assessment tools developed to predict self-harm and suicide are available. According to Bolton, Gunnell and Turecki (2015) the most commonly studied risk scales to assess risk of self-harm and suicide are the Beck Hopelessness Scale (BHS; Beck, Weissman, Lester & Trexler, 1974), the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock & Erbaugh, 1961), the Beck Scale for Suicide Ideation (BSS; Beck, Kovacs & Weissman, 1979), the Suicide Intent Scale (SIS; Beck, Schuyler & Herman, 1974), and the SAD PERSONS Scale (Patterson, Dohn, Bird & Patterson, 1983). These are conventional risk assessment scales which means that they were developed based on likely risk factors for suicide and self-harm based on concepts of content validity or face validity (Bolton et al., 2015).

Both the BHS, the BDI and the BSS have low specificity and low positive predictive value (Brown, Beck, Steer & Grisham, 2000). The same is true for the SIS (Harriss & Hawton, 2005; Stefansson et al., 2012) However, one study by Stefansson, Nordström, Runeson, Åsberg and Jokinen (2015) found that combining the SIS with the Karolinska Interpersonal Violence Scale (KIVS; Jokinen et al., 2010) gave a somewhat higher specificity and a higher positive predictive value when it came to predicting completed suicide. This is probably because the SIS and the KIVS measure different components of suicide risk. The SAD PERSONS scale is a widely used tool for suicide assessment. However, research done by Bolton, Spiwak and Sareen (2012) shows that this scale predicts suicidal behaviour no better than chance. Saunders, Brand, Lascelles and Hawton (2013) state that the SAD PERSONS scale is not an adequate screening tool following self-harm because its psychometric properties are not satisfactory. Reliance on this scale regarding treatment
decision can be rather dangerous because it is not able to predict people who will repeat self-harm. One study actually shows that clinicians were able to predict future suicidal behaviour with greater accuracy than the SAD PERSONS scale, and that this probably was related to the training level of the clinicians (Wang et al., 2016).

Together these studies illustrate the tendency for conventional risk assessments scales to have low predictive accuracy.

### 8.2 Newer suicide risk scales

Newer suicide risk scales like the Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) and the Suicide Trigger Scale (STS; Yaseen et al., 2010) have been developed based on conventional approaches (Bolton et al., 2015). One study found that the C-SSRS had a sensitivity of 67% and a specificity of 76% in predicting future suicidal behaviour (Mundt et al., 2013). Yaseen et al. (2014) has shown that the STS was predictive of suicidal behaviour among a high-risk psychiatric-inpatient sample within six months. However, these scales are relatively new and need more testing.

### 8.3 Empirically derived tools

The more robust methodology of empirically deriving a prediction tool using a development dataset and then testing it in a separate validation dataset have been used by several newer studies (Bolton et al., 2015). One of these tools is the Manchester Self-Harm Rule (Cooper et al., 2006). Research on this tool shows that sensitivity is high, however, specificity and positive predictive value are low (Bilén, Ponzer, Ottosson, Castrén & Pettersson, 2013). This can make the Manchester Self-Harm Rule useful in the context of acute situations like in the emergency department. The problem is that the Manchester Self-Harm Rule will give a high number of false positives which limits its practical value because this could potentially waste valuable resources and lead to unnecessary interventions.

The ReACT Self-Harm Rule (Steeg et al., 2012) was developed in the United Kingdom by the same research group that developed the Manchester Self-Harm Rule. The ReACT Self-Harm Rule predicted suicide within six months with high sensitivity, but both specificity and positive predictive value were low.
The Repeated Episodes of Self-Harm Score (RESH; Spittal, Pirkis, Miller, Carter & Studdert, 2014) is a statistically derived tool developed in Australia. Research shows that sensitivity was lower than that seen for the tools developed in the United Kingdom (Spittal et al., 2014). However, at higher scores the RESH showed high specificity (98%) and positive predictive value (82%).

It is, however, beyond the scope of this paper to go more into detail regarding these scales, checklists and assessment tools. The interested reader is referred to the original literature for more information about details. The main point for now is that research on risk scales, checklists and assessment tools show that they are consistent in their low specificity and positive predictive value, and that this limits their clinical utility.

The NICE guidelines (2011) state that one should not use risk assessment tools and scales to predict future suicide or repetition of self-harm in isolation due to the lack of research evidence (Kendall, Taylor, Bhatti, Chan & Kapur, 2011). NICE (2011) recommend that when assessing the risk of repetition of suicidal behaviour the clinician should identify the specific risks for the patient, including methods and frequency of current and past suicidal behaviour, current and past suicidal intent, depressive symptoms or any psychiatric illness and their relationship to self-harm, the personal and social context and any other specific factors preceding self-harm, as well as protective factors and coping strategies.

The warning against relying solely on risk scales and checklists when assessing risk of suicidal behaviour is also supported by later studies of risk scales and assessment tools done by Quinlivan et al. (2016) and Quinlivan et al. (2017). This research shows that most scales predict no better than clinician or patient ratings of risk, and some scales even performed worse. It could potentially be dangerous to use these risk scales and checklists in isolation when trying to predict who will repeat self-harm or who will be at risk of dying by suicide (Carter et al., 2017; Chan et al., 2016; Morriss et al., 2013; Owens & Kelley, 2017; Quinlivan et al., 2017).

Nevertheless, clinicians are inclined to make assessments and to try to predict who will harm themselves, how they will harm themselves and importantly – when they will self-harm. One study found that provision of a psychosocial assessment by mental health staff was associated with a 40% lower risk of repetition following self-harm in two of the three study centres after taking into account baseline demographic and clinical characteristics (Kapur,
This shows that assessment is more than checklists and risk scales, and it underlines the complexity of this important clinical task.

It is, however, also challenging to rely on information based on subjective report, which for different reasons can be misleading. One study found that almost 80% of people who eventually died by suicide denied suicidal thoughts in their last verbal communication (Busch, Fawcett & Jacobs, 2003). This has prompted the search for alternative measures of risk assessment, including computer-based implicit association tests. One study tested whether automatic associations of self with death could provide a behavioural marker for suicidal behaviour (Nock et al., 2010). People were not asked about suicidal thought explicitly. People often do not know their own minds, and much of our mental life is unavailable to introspection (Wilson, 2009). This can be one of the reasons for the conflicting empirical evidence on the effectiveness of no-suicide contracts in reducing a patient’s risk for suicide (Edwards & Sachmann, 2010). In the study by Nock et al. (2010) the results showed that people with a history of suicidal behaviour hold a significantly stronger implicit association between death and self, than do psychiatrically distressed individuals who do not have a history with suicidal behaviour. One can, however, not conclude that this implies causality. Moreover, the implicit association of death with self was associated with a significant increase in the odds of repeating suicidal behaviour in the next 6 months. Explicit assessment of suicidal behaviour has yielded unsatisfactory results. Perhaps prediction of implicit mental processes will yield more accurate results.

There is an urgent need for research that identifies subjectively sensitive and clinically meaningful markers for self-harm and suicide risk.
9 Can Prediction of Self-Harm and Suicide at the Individual Level be Improved?

For decades the research focus in suicidology has been on epidemiologically established risk factors. Epidemiologically oriented questions about self-harm and suicidal behaviour may not be clinically relevant (Gjelsvik, 2014). By changing the research focus and by asking different questions from the ones that traditionally have been asked is it possible that one can improve prediction of self-harm and suicidal behaviour. Perhaps it is time to focus more strongly on the mechanisms underlying the suicidal behaviour and not so much on general risk factors. Hopefully this will aid our efforts in the extremely important task of risk assessment, prediction and prevention of suicidal behaviour.

Cognitive processes (i.e., memory, problem-solving, decision-making, cognitive control) are important mediating variables in understanding the relationship between risk factors and suicidal behaviour (Joiner, 2005; Richard-Devantoy & Courtet, 2016; Williams, 2014; Williams, Barnhofer, Crane & Beck, 2005). These mechanisms may potentially increase our understanding of the transition from suicidal thoughts to suicidal behaviour.

The focus here will mainly be on reasons for living (Bagge, Lamis, Nadorff & Osman, 2014; Linehan, Goodstein, Nielsen & Chiles, 1983) and more specifically, memory and problem-solving (Kaviani, Rahimi-Darabad & Naghavi, 2005; Williams et al., 2005). Reasons for living are negatively associated with suicidal thoughts and behaviours. One potentially useful consequence of this is that it can be clinically relevant to ask the patients about their reasons for living, and to focus on finding reasons for living in therapy. The absence of the wish to live is perhaps of greater significance than the presence of the wish to die when it comes to suicidal behaviour (Bryan et al., 2016).

One study found that reasons for living fully accounted for the relationship between hopelessness and suicidal behaviour (Bagge et al., 2014). The reasons for living mechanism appears to be of particular relevance in explaining the link between hopelessness and suicidal actions versus suicidal ideation. Survival and coping beliefs was however the only reason for living factor that contributed to every reason for living total mediated effect, and survival and coping beliefs was the only reason for living subscale to fully mediate the relation between
hopelessness and suicidal behaviour (Bagge et al., 2014). However, it is important to underscore that these findings are preliminary and need replication.

Earlier research demonstrates that low reliance on strategies that address the direct management of the problem is associated with suicidal ideation (Elliott & Frude, 2001) and suicidal behaviour (Lauer, de Man, Marquez & Ades, 2008). A body of research implies that interventions designed to increase problem-solving and coping skills may lead to a reduction in suicidal ideation (Pollock & Williams, 1998) and suicidal behaviour (Ghahramanlou-Holloway, Bhar, Brown, Olsen & Beck, 2012).

One study found that cognitive therapy was effective in preventing suicide in adults who had recently self-harmed (Brown et al., 2005). However, what is perhaps most interesting in this study is the relapse prevention task introduced for the participants near the end of the therapy. The purpose of this task was to prime the specific thoughts, images and feelings associated with prior suicidal behaviour and to determine if the participants were able to respond to their problems in an adaptive way when in a low mood. Importantly, this was done in therapy sessions. When the participant felt better, the therapists actually induced low mood in the participant, and assessed whether the problem-solving strategies were adequate or not. If problem-solving collapsed during low mood, additional sessions were provided to make sure this skill was improved before terminating therapy. Successful completion of the relapse prevention task was justification for completion of the treatment (Brown et al., 2005).

Clinicians want their patients to get better, and when their mood is better and patients are reporting that they are feeling well, clinicians tend to get satisfied, because that is the goal of treatment and what the clinicians genuinely want for their patients. However, as research indicates, predicting the risk of future episodes of self-harm and suicidal behaviour is not precise when patients feel well (Brown et al., 2005; Gjelsvik et al., 2016b; Williams et al., 2005). One can think of mood as context for memory (Smith & Vela, 2001; Williams, Van der Does, Barnhofer, Crane & Segal, 2008). As explained earlier this basically implies that during retrieval memory is better when being in the same context as learning first took place. Findings from Brown et al. (2005) can be explained both in terms of over-general memory (i.e., one does not remember earlier specific episodes associated with self-harm when in a better mood) and by their problem-solving skills (i.e., problem-solving dependent on mood as context). Perhaps problem-solving skills should be learned when actually being in a mood that resembles the mood of a suicidal crisis.
Williams et al. (2005) compared persons with a history of depression and persons with a history of depression and suicidal ideation and persons with no history of depression. They assessed interpersonal problem-solving skills using the Means-Ends Problem-Solving (MEPS) task before and after a mood-induction procedure. The results show that only people with a history of suicidal ideation produced significantly less effective problem solutions after the induction of lower mood. Also, the deterioration in effectiveness following mood reduction was moderated by lack of specificity in autobiographical memory (Williams et al., 2005).

The experimental research done by both Brown et al. (2005) and Williams et al. (2005) indicate that people can solve problems adaptively when in a good mood, however, when in a low mood this skill may collapse and they will be vulnerable to self-harm and suicidal behaviour. This is especially the case for people with a history of depression and suicidal ideation. Self-harm and suicidal behaviour are not adaptive problem-solving strategies. However, the collapse in problem-solving also seems to be dependent on memory. Over-general memory makes it difficult to remember earlier specific episodes of low mood and suicidal behaviour (i.e., episodic memory). Over-general memory also makes it difficult to retrieve specific problem-solving strategies which can be effective at times of low mood.

No matter how satisfied clinicians are when patients are feeling better, perhaps one should try to induce low mood, allow the sadness and struggling to be in the therapy room once again before the end of therapy, to control whether the improvement in problem-solving is real or concealed by a better mood. When assessing risk of self-harm and suicidal behaviour it is necessary to ask for specific earlier episodes of self-harm and suicidal ideation, as well as specific problem-solving. There is reason to believe that this assessment will be most accurate when the person is in a state which resembles the state where the person is vulnerable and at risk of self-harm (Brown et al. 2005; Gjelsvik et al., 2016b).

Focusing on the mechanisms involved in problem-solving and the importance of coping with and finding solutions for problems as a reason to not kill oneself is a promising area to consider when enhancing prevention efforts aimed at reducing suicidal thoughts and behaviours at the individual level (Brown et al., 2005, Williams, 2014). This is also an important focus for research because it can be of great clinical utility to consider these mechanisms in prediction and assessment of self-harm and suicide. There is reason to believe that one can improve prediction of self-harm and suicide by increasing our knowledge of
clinically modifiable variables, like reasons for living, problem-solving, memory, and so on (Gjelsvik, 2014; Gjelsvik et al., 2016b; Williams, 2014).

Hence, both cognitive behavioural therapy (CBT; Brown et al., 2005; Rudd et al., 2015) and dialectical behaviour therapy (DBT; Linehan et al., 2015) can be effective in treatment of self-harm and prevention of suicide (Hawton et al., 2016). There is, however, also reason to be optimistic that mindfulness-based cognitive therapy (MBCT; Segal, Williams & Teasdale, 2013) can be effective in this regard (Williams, 2014).
10 Clinical Implications and Future Research

Realistic assumptions and updated knowledge about assessment and prediction of self-harm and suicide are essential for everyone dealing with patients at risk of such behaviour. At an individual level there is a great need for an increased focus on mechanisms that are clinically modifiable, like problem-solving skills and reasons for living (Bagge et al., 2014; Brown et al., 2005; Gjelsvik, 2014; Williams, 2014). By temporary inducing a lower mood in the patient in the therapy room, and by testing whether problem-solving skills are still adequate, the clinician can potentially get a more accurate impression of the patients’ actual ability to cope at times when they are struggling. Mechanisms like problem-solving can also explain why CBT, MBCT and DBT have proven useful in the treatment of self-harm and suicidal behaviour (Hawton et al., 2016; Williams, 2014).

Based on current empirical evidence, another implication for clinical practice is not to base risk assessment and prediction of suicidal behaviour solely on checklists and assessment tools (NICE, 2011). These tools do not have adequate psychometric properties, and reliance on schemas like these can potentially be fatal.

It will also be of clinical value to provide health workers with updated knowledge regarding the relationship between self-harm and later death by suicide (Saunders et al., 2012). Patients who self-harm often perceive negative attitudes from health professionals. It is important for clinicians to recognize the potential life-threatening consequence of self-harm, and hence, change the attitude towards patients who struggle with behaviour like this.

When it comes to suicidal behaviour the stakes are high. It is important to acknowledge that research on epidemiologically established risk factors is of limited clinical utility, and that there is a need for research that identifies subjectively sensitive and clinically meaningful markers for self-harm and suicide risk (Gjelsvik, 2014; Gjelsvik et al., 2016b). This should be a key priority in the science of suicidology. Instead of focusing solely on risk factors more attention should be paid to mechanisms that are clinically modifiable. An increased focus on such mechanisms, like problem-solving and reasons for living, can potentially give us a better understanding of what brings a person from suicidal thought to suicidal action. Hopefully, increased knowledge of mechanisms like these may also help
clinicians make more precise assessments of the individual risk of self-harm and death by suicide (Gjelsvik, 2014).

It will also be useful to design studies in which one can have strong experimental control, in addition to other complementary research designs. By inducing experimental control, one can isolate and identify factors and mechanisms that are potentially individually sensitive markers for risk (Gjelsvik et al., 2016b).

The dynamic and moment-to-moment interplay among risk factors has not yet been integrated into the design of many research studies (Bryan & Rudd, 2016). Explicit consideration of change processes will be needed in future research designs, for example dynamic systems theory (Butner et al., 2015).

Finally, there is a great need for more research that translates theories and results from research into effective prevention and intervention strategies (Barber & Miller, 2014; Clark, 2004; Gjelsvik, 2014). This is urgent – both at an individual level as well as at a public level.
11 Concluding Remarks

More accurate prediction of self-harm and suicidal behaviour is extremely important given the many and unfortunate consequences these behaviours have for the individual, the family and the society (Pitman et al., 2014; Tsiachristas et al., 2017). The prediction paradox concerns the fact that it is widely believed that clinicians should be capable of predicting episodes of self-harm and suicide. However, this is actually not evidence based and assessment of self-harm and suicide risk in individuals is not precise (Large, Ryan, Carter & Kapur, 2017; Morris et al., 2013). The belief that clinicians are able to predict risk of suicidal behaviour with accuracy may put an unrealistic pressure on those working with self-harm and suicidal behaviour. One of the worst things that can happen to the clinician is losing a patient due to suicide. Yet, it happens. Is it aspirational to have a vision of zero suicide? However, it is hard and perhaps frightening to recognize the fact that clinicians are not able to predict self-harm and suicidal behaviour with adequate accuracy. The clinical practice of assessment and prediction in the field of suicidology is currently not evidenced based (Large et al., 2017).

Traditional research on epidemiological risk factors has gained important knowledge. However, there is a need to move beyond general risk factors in order to better understand the complexities of the suicidal mind (Gjelsvik, 2014). The ideation-to-action framework is hopefully a valuable new perspective in this respect (Klonsky & May, 2014). One has to acknowledge that the factors and processes that lead to suicidal thoughts most likely are different from the factors and processes that lead to suicidal behaviours (Nock et al., 2016), and both researches and clinicians seriously need to understand this gap. However, so far little is known about what distinguishes ideators from actors. There is also reason to question whether the different theories in the ideation-to-action framework actually succeed in separating the two hypothesized distinct processes of development of thought versus development of action.

It is unfortunate that there is no unifying way of defining and understanding the basic concepts in the field of suicidology. One would probably be better off if the different research communities agreed on the definition and operationalization of the distinct concepts (Silverman et al., 2007a, 2007b).

Recognizing the challenges in the field of suicidology is the first step towards improving the assessment and prediction of self-harm and suicide, and hence, being capable
of preventing suicidal behaviour. Importantly, one also needs to address these issues in research and clinical practice. Suicidology – although developing – currently provides a fragmented picture, and the mechanisms proposed to be involved in the transition from suicidal thought to suicidal behaviour awaits further scrutiny.
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