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**Correlates and prospective predictors of adolescent self-harm in
community and sexually assaulted samples**

Programa de Doctorado en Psicología Clínica y de la Salud

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List of abbreviations

BPD	Borderline Personality Disorder
CPR	Child Protection Register
CRIES	Children's Impact of Events Scale
DAWBA	Developmental And Well-Being Assessment
DSH	Deliberate Self-Harm
DSHI	Deliberate Self-Harm Inventory
DSM	Diagnostic and Statistic Manual of Mental Disorders
EMA	Ecological Momentary Assessment
FASM	Functional Assessment of Self-Mutilation
ISAS	Inventory of Statements About Self-injury
NSSI	Nonsuicidal Self-Injury
OR	Odds Ratio
PTSD	Posttraumatic Stress Disorder
SIB	Self-Injurious Behaviour
SHBQ	Self-Harm Behaviour Questionnaire
SMFQ	Short Moods and Feelings Questionnaire
WHO	World Health Organization
YSI	Youth Strengths Inventory

Presentation

Self-harm is a focus of concern in adolescence given its high prevalence and adverse associated outcomes. In most cases this behaviour will decline over time but there is a significant percentage of cases when it will remain chronic (Barrocas, Giletta, Hankin, Prinstein, & Abela, 2015). Self-harm with or without suicidal intent has been seen as one of the strongest predictors of suicide attempts (Guan, Fox, & Prinstein, 2012) and completed suicide (Hawton, Zahl, & Weatherall, 2003).

Determining correlates and predictors of these maladaptive behaviours in different samples is essential in terms of prevention and treatment. Ascertaining predictors in community samples would help detect risk behaviours that usually go unnoticed (Baetens et al., 2014) and prevent chronic engagement in self-harm. Adolescents who have experienced sexual abuse present higher risk of self-harm and suicide attempts (Unlu & Cakaloz, 2016), and identifying correlates of self-harm might help prevent behaviours that put life at risk.

This work aimed to expand on existing literature on correlates and predictors of self-harm by analysing this topic in different samples and introducing a prospective methodology. There are several terms associated with self-harm, which involve different conceptualisations. The most helpful conceptualisation was considered depending on the sample of study. Nonsuicidal self-injury (NSSI) (Nock & Favazza, 2009) was used for the systematic review in community samples given its high frequency and the fact that it tends to be unnoticed by parents and carers. Deliberate Self-harm (DSH) (Hawton et al., 2003) includes different self-harming behaviours regardless the suicidal intent and was used in the sample of sexually assaulted adolescents. The most distressed adolescents have both episodes of suicidal and nonsuicidal self-injury and find it difficult to determine what their intention was at the time of self-harming (Mars et al., 2014).

This thesis is a compendium of three studies. Study 1 is entitled “Nonsuicidal self-injury in a community adolescents: a systematic review of prospective predictors, mediators and moderators” and was published in 2018 in *Journal of Adolescence*, Volume 65, 25 - 38 (JCR indexed journal). Study 2 is entitled “Correlates and predictors of self-harm in a prospective sample of sexually assaulted adolescents” and is under review in *Clinical Child Psychology and Psychiatry* (JCR indexed journal). Study 3 was presented as a poster in the II International Congress of Clinical and Health Psychology on Children and Adolescents held in Barcelona in 2017 and was selected as a finalist for the international researcher prize. This

work will be submitted for publication as a brief report in the near future. The three studies were carried out at the Centre for Psychiatry (Imperial College London) under the supervision of Dr Tami Kramer during an international research placement (from September 2016 to August 2017).

The thesis is organised in five chapters. Chapter 1 includes the theoretical background in relation to self-harm conceptualisation, functions of self-harm, factors associated with this behaviour and the impact of experiencing sexual assault in adolescence. Chapter 2 describes objectives and hypothesis of the thesis. Chapter 3 outlines the methodology used in the three studies. Chapter 4 includes the three studies aforementioned. Finally, Chapter 5 provides a general discussion of the findings, limitations and strengths of the thesis, clinical implications of the results and directions for future research.

As part of the PhD program, I have undertaken a number of training and research activities. I have presented posters, oral communications and symposia in national and international conferences. I have also attended several international training courses in the field of child and adolescent Clinical Psychology (71 hours). I completed a one-year international research placement at the Centre for Psychiatry (Imperial College London). After the international placement, I took the opportunity of being involved with one of the research projects of the Unit of Epidemiology and Diagnosis in Psychopathology of Development at the Universitat Autònoma de Barcelona. I have participated in writing up the article entitled 'Prospective association of parental and children internalizing symptoms: Mediation of parenting practices and irritability', recently submitted for publication to the Journal of Family Psychology. This work at the Unit provided me with the opportunity to learn from a different field of research in community children and about the statistical method Structural Equation Model. Given that the topic of this piece of research is not related with the topic of the three studies presented here (i.e. self-harm), this work has not been included as part of the doctoral dissertation, but it has been included as a training activity within the PhD program.

Abstract

Self-harm in adolescence is a focus of concern given its increasing frequency and its association with future attempted and complete suicide. The main objective of this thesis is to review correlates and predictors of this behaviour in different samples of adolescents. The aims of this work are: 1) to systematically review the existing literature about prospective predictors, mediators and moderators of Nonsuicidal Self-injury (NSSI) in community adolescents, 2) to examine correlates and predictors of self-harm after experiencing sexual assault in adolescence, 3) to explore the protective role of self-perceived strengths on self-harm occurrence after sexual assault in adolescence.

Three studies were carried out. Study 1 was a systematic review of longitudinal predictors of NSSI in community adolescents. Two members of the team carried out an independent search in four databases: Medline, PsycInfo, Embase and Web of Science. Quality of the studies was assessed by means of the New Castle Ottawa Quality Assessment Scale. Study 2 was a prospective study conducted in a consecutive sample of sexually assaulted adolescents who sought help at the Havens (Multiagency Sexual Assault Centres in London) over a period of two years. One hundred and forty-one young people were recruited at baseline and females who completed self-harm information were included in the study ($n = 98$). There was data collection at T0 (4 weeks on average post-assault) and T1 (22 weeks on average post-assault). Information was gathered by means of a semi-structured interview and validated questionnaires. Bivariate analyses and binary logistic regressions were conducted to ascertain correlates and predictors of self-harm. Study 3 was conducted in the same sample as Study 2, with those females who completed self-harm information at T0 and T1 the *Youth Strengths Inventory* at T1 to assess perceived strengths ($n = 63$). A logistic regression model was tested, controlling for other relevant variables.

In Study 1, 39 studies were found matching inclusion criteria. The following variables were shown to prospectively predict NSSI: female gender, family-related variables, peer victimisation, depression, history of NSSI and self-concept. Studies analysing mediators and moderators, as well as protective factors, were scarce. Study 2 showed a high rate of self-harm both before (38.1%) and after (37.8%) sexual assault. History of family dysfunction [$OR\ 3.60\ (1.30, 10.01)$], depressive symptoms at T0 [$OR\ 5.83\ (2.35, 14.43)$] or T1 [$OR\ 2.79\ (1.20, 6.50)$] and posttraumatic stress symptoms at T1 [$OR\ 3.21\ (1.36, 7.58)$] were associated with self-harm at T1. These effects were attenuated when adjusting for confounders, except

for depressive symptoms at T0 [*OR* 4.21 (1.57, 11.28)]. In Study 3, perceived strengths at T1 were associated with less likelihood of engaging in self-harm after the assault [*OR* .89 (.80, .99)], after controlling for concurrent depressive and PTSD symptoms and history of self-harm.

Results point out to specific risk factors that should be assessed to detect the most at risk individuals both in community and assaulted samples of adolescents. Study 3 indicates the potential protective role of perceived strengths. Correlates of self-harm (e.g. psychopathology, family dysfunction, self-esteem) should be tackled in intervention programs to prevent chronic engagement in the behaviour.

Chapter 1

THEORETICAL BACKGROUND

1.1. Concepts associated with self-harm

The first known clinical depiction of self-harm was performed by Menninger in his book '*Man against himself*' (1938), who defined the behaviour as a way to cope with suicidal ideation and to improve the individual's mental health. In the past 30 years, increasing interest on clinical features and treatment of borderline personality disorder (BPD) led to an interest on self-harm behaviours (Linehan, 1993).

Different terms have been proposed to address self-harm. According to Favazza (1996), more than 33 terms have been used to describe this maladaptive behaviour. Researchers and clinicians have struggled to agree on a term and a definition, thus complicating the understanding of self-harm. Some types of behaviour are often included in every definition of self-harm, i.e. self-cutting, whereas others like risk behaviours, promiscuity or drug use are subject to disagreement (Muehlenkamp, 2005). Each country tends to use a specific term to describe self-injurious behaviour, involving different conceptualisations and meanings. In the US, researchers and clinicians usually refer to the concept Nonsuicidal Self-injury (NSSI) (Nock & Favazza, 2009), whereas the term Deliberate Self-harm (DSH) is preferred in the UK (Hawton, Rodham, Evans, & Weatherall, 2002).

DSH is one of the most controversial terms because its definition varies across countries. In the US, Pattison and Kahan (1983) conducted a classification of different types of self-harm, separating behaviours according to the intention of dying. They used DSH for behaviours without suicidal intent. The same term, however, has been widely used in the UK to address self-harming behaviours regardless of their suicidal intent (Hawton et al., 2002). The latter definition is based upon the idea of the suicidal intent continuum (Grandclerc, De Labrouhe, Spodenkiewicz, Lachal, & Moro, 2016), considering that self-harm behaviours exist along a continuum that includes both NSSI and suicide attempts. This conceptualisation has been derived from empirical results demonstrating that individuals engaging in NSSI also present with suicide attempts (Jacobson, Muehlenkamp, Miller, & Turner, 2008) and that self-harm is the strongest prospective predictor of suicide attempts (Guan et al., 2012) and completed suicide (Hawton et al., 2003). Moreover, assessing the intention of self-harm is complex, especially in adolescents who often report ambivalent intentions (Grandclerc et al., 2016; Mars et al., 2014) and because the lethality of some methods could result in death even if that was not the initial intention (Skegg, 2005).

However, other authors like Muehlenkamp (2005) have argued the importance of clarifying the nature of self-harm by excluding behaviours aimed at ending one's life, proposing the use of the terms NSSI or Self-Injurious Behaviours (SIB), which are interchangeable in meaning. Those supporting this conceptualisation of self-harm have highlighted a number of distinctive features of NSSI as opposed to suicidal behaviour and have stressed that NSSI is often 'antisuicide' and helps the individual cope with difficult emotions or stressful situations without resorting to suicide (Muehlenkamp, 2005).

A number of authors have proposed NSSI or SIB as a separate clinical syndrome or diagnostic entity that should be included in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (Glenn & Klonsky, 2013; Muehlenkamp, 2005). Graff and Mallin (1967), Pao (1969) and Rosenthal et al. (1972) were amongst the first authors to propose a self-harm syndrome, but their attempts failed because of the use of a broad conceptualisation, which included suicidal behaviour (Cipriano, Cella, & Cotrufo, 2017). Even though self-injury is part of the DSM criteria of BPD, it has been highlighted that NSSI is not only an associated characteristic of BPD. Individuals not meeting criteria for BPD might engage in self-injury and not all individuals diagnosed with BPD self-harm (Cipriano et al., 2017). NSSI has been considered as a transdiagnostic behaviour including a consistent pattern of clinical features and distinctive from other psychiatric disorders (Glenn & Klonsky, 2013; Muehlenkamp, 2005). Due to the insufficient, flawed research and the low inter-rater reliability, the NSSI disorder has not been included in DSM-5 and it is currently considered a 'condition requiring further study' (Regier et al., 2013). The NSSI disorder includes the following criteria (as cited by Glenn & Klonsky, 2013, p. 16):

A. In the past year, 5 days of NSSI that was severe enough to cause tissue damage but without suicidal intent.

B. NSSI is associated with two of the following:

1. Negative feelings or thoughts immediately precede engagement in NSSI.

2. A period of preoccupation with NSSI precedes the NSSI.

3. NSSI urges occur frequently even if not acted upon.

4. NSSI is engaged in with a purpose.

C. NSSI causes significant distress or impairment in important areas of functioning.

D. NSSI does not occur exclusively in a state of psychosis, delirium, or intoxication, and cannot be accounted for.

In this thesis, we used different definitions of self-harm depending on the sample of study. In Study 1, a systematic review of predictors of self-injury in community adolescents, the term NSSI was used considering that the main aim was to detect predictors of early engagement in this behaviour, with view of prevention. NSSI usually involves superficial injuries that adolescents themselves can care for, leaving responsible adults unaware of their difficulties (Muehlenkamp, 2005). Only one in three parents are aware of their children self-harming behaviours (Baetens et al., 2014). Self-harm regardless the suicidal intent might be more helpful in clinical samples, given that there are often suicidal and nonsuicidal self-harm behaviours (Nock, Joiner Jr., Gordon, Lloyd-Richardson, & Prinstein, 2006), especially in the most distressed individuals (Klonsky & Olino, 2008). As aforementioned, adolescents tend to struggle when reporting what their intention was at the time of hurting themselves (Mars et al., 2014). The definition of self-harm regardless the intent was used in Study 2 and Study 3, considering they were performed in a sample of adolescents seeking help in a clinical service after experiencing sexual assault.

1.2. Self-harm in adolescents: phenomenology and clinical features

According to previous studies, adolescents are more vulnerable to self-harm than other age groups (Fliege, Lee, Grimm, & Klapp, 2009). This behaviour typically onsets around 12-14 years old (Jacobson & Gould, 2007) and therefore it is essential to address the issue at this developmental stage.

The specific behaviours that adolescents use to hurt themselves vary depending on the definition of self-injury. The concept NSSI includes acts that would unlikely result in death, such as cutting, burning, hitting, skin scratching or picking at wounds (Jacobson & Gould, 2007; Nock & Prinstein, 2005). More generally, self-inflicted self-harm might also include overdosing, jumping from heights, hanging or ingesting non-edible substances or objects (Madge et al., 2011; Skegg, 2005). Research has shown that community adolescents tend to use one method (Muehlenkamp & Gutierrez, 2007), whereas clinical samples engage in multiple methods (Kumar, Pepe, & Steer, 2004). The number of methods is a relevant variable, which has been seen associated with clinical impairment and risk of suicide (Nock et al., 2006).

Adolescents tend to report self-harm as an impulsive behaviour and they usually feel little pain when engaging in self-injury, suggesting an increased pain threshold (Kumar et al., 2004; Nock & Prinstein, 2005). The act of self-harm has also been described as repetitive over time and even ritualistic, with some individuals thinking about self-injury for some time before actually performing it and having the materials for self-harm ready in advance (Favazza, 1992).

The majority of adolescents have reported a mixture of anxiety and anger before self-harming and higher general levels of hostility both towards the others and the self (Ross & Lee Heath, 2003). This finding provides support for the hostility model proposed by Herpertz, Sass and Favazza (1997), suggesting that self-harm might be a way to release non-expressed anger.

Other adolescents have reported feelings of numbness and derealisation before engaging in self-injury (Černis, Chan, & Cooper, 2019). In this case, self-harm might serve the function of generating feelings and ending the dissociative state (Nock & Prinstein, 2004).

Self-harm has been associated with difficulty identifying and expressing feelings, as well as with feelings of emptiness (Muehlenkamp, 2005). The reduced ability to express oneself and the use of self-injury as a self-regulatory mechanism has been linked with the invalidating environment theory (Crowell, Beauchaine, & Linehan, 2009) proposed by Linehan (1993a). This theory postulates that invalidating environments struggle to tolerate and validate children's emotional expressions. Children learn that they need to engage in extreme responses to elicit parental care and have difficulties developing healthy emotion regulation skills.

The feelings preceding self-harm are usually associated with certain events or stressful situations, which could be trivial but trigger essential issues for the adolescent (Hurry, 2000). The themes of rejection or abandonment usually play an important role (Muehlenkamp, 2005). After self-harming, the adolescent obtains relief from negative emotions but soon after feelings of guilt or shame appear (Kumar et al., 2004; Marshall, Tilton-Weaver, & Stattin, 2013). Therefore, self-harm is an effective short-term coping strategy in terms of reducing distress, but in the long-term it increases negative feelings about oneself and therefore exacerbates psychological symptoms (Jacobson & Gould, 2007).

Self-harm has also been conceptualised as an addictive behaviour. Different experiences associated with self-harm have been considered similar as the symptoms present in substance dependence. Nixon et al. (2002) conducted a study aimed at empirically demonstrating that self-harm might function as an addiction. In adolescent inpatients, the authors assessed the presence of addictive behaviour criteria and showed that all the participants presented a frequent and even daily urge to self-harm. The majority of participants (81%) endorsed more than five criteria of addiction. Addictive features of self-harm included losing control over the behaviour, increased tolerance (i.e. needing more intense or frequent self-harm to obtain the same effects) and maintained tension if self-harm is avoided.

It has been argued that self-harm is different from substance abuse in terms of the type of reinforcement that the individual obtains. While drugs lead to positive reinforcement because of the effects of the substance on the brain, the most frequent mechanism maintaining self-harm is negative reinforcement, i.e. relief from negative emotions (Victor, Glenn, & Klonsky, 2012). In keeping with their theory, these authors demonstrated that craving self-harm is only present in the context of negative emotions. They posed that these results provided support for emotion regulation models rather than addiction models.

Several studies attempting classification of different types of self-injurers have been made. Klonsky and Olinio (2008) conducted a latent class analysis in a sample of young adults, showing four groups of self-injurers. The first was the experimental self-harm group, in which members had experimented with self-injury on several occasions; the second was the mild self-harm group, who self-harmed more frequently than the experimental group. The third was the multiple functions/anxious self-harm group, in which different methods of self-injury were used with multiple functions. Finally, the fourth was the automatic functions/suicidal self-injury, which included the more severely impaired young people who self-harmed in private, endorsed intrapersonal functions (see section 1.4) and presented suicidal ideation and behaviours. These four groups of self-injurers have been mostly replicated by other studies conducted in adolescence (Barrocas et al., 2015; Somer et al., 2015), although some of them have found other classes including more methods or higher variety of reasons for self-injury endorsed.

Chronification of self-harm has been linked with suicide attempts: the longer adolescents engage in self-injury, the less sensible they are to pain and death (Nock et al.,

2006). This association has been replicated even after controlling for depressive symptoms and previous suicidality (Guan et al., 2012). Therefore, prevention and early intervention with self-harm are crucial.

1.3. Epidemiology of self-harm in adolescents

Determining the prevalence of self-harm in adolescents is complex, given the highly heterogeneous rates provided by previous studies. According to Swannell et al. (2014), heterogeneity has to do with methodological issues of studies such as the assessment tool used and anonymity. Assessment via questionnaires or checklists of behaviours tends to show higher estimates than single item assessment. Moreover, participants report more self-injurious behaviours through self-administered questionnaires, when anonymity is granted, than in face-to-face interviews.

The mean lifetime prevalence of self-injury in community adolescents has been estimated around 16-18%, with similar rates across studies using the concepts DSH or NSSI (Muehlenkamp, Claes, Havertape, & Plener, 2012; Swannell et al., 2014). Jacobson and Gould (2007) argued that community rates of self-injury might be underestimated given that the most impaired adolescents do not attend school, where population-based samples are usually recruited. Not surprisingly, the rates are much higher in inpatient adolescents, around 40-61% (Nock & Prinstein, 2004).

In terms of the 12-month prevalence, the mean rate from the Child & Adolescent Self-harm in Europe (CASE) study, involving seven countries, was 11.5% (Madge et al., 2008). However, this rate is highly variable depending on the study and the method of assessment, ranging from 8.5% to 28.4% (Muehlenkamp et al., 2012).

Jacobson and Gould (2007) compared the prevalence estimates between studies performed ten years apart in time and suggested a possible increase in self-injury over time. Other reviews have reported prevalence stabilisation, at least during the past 10 years (Muehlenkamp et al., 2012) and when controlling for methodological issues (Swannell et al., 2014).

The age of onset has been established around 12-14 years old (Jacobson & Gould, 2007) and there is a rise in prevalence during middle adolescence (Barrocas et al., 2015). Self-injury tends to decrease substantially over time as adolescents become young adults (Plener, Schumacher, Munz, & Groschwitz, 2015). Swannell et al. (2014) found a lifetime

prevalence of 17.2% in adolescents, 13.4% in young adults and 5.5% in adults, demonstrating a decreasing pattern. However, multiples studies have identified a group of young people who engages in self-injury as a chronic practice and endorses higher risk of suicide and functional impairment (Barrocas et al., 2015; Klonsky & Olin, 2008). When self-harm persists over time, it usually becomes more frequent and severe and puts adolescents at a higher risk of accidental death (Muehlenkamp, 2005).

Despite the generalised idea that self-harm is more frequent in adolescent females, research indicates mixed findings regarding gender differences. Some studies have found a higher prevalence of self-harm in females (Madge et al., 2008) but other studies have shown no differences in terms of rates between female and male participants (Jacobson & Gould, 2007; Plener et al., 2015). Swannel et al. (2014) demonstrated that differences in prevalence rates across gender were largely due to methodological issues. These authors explained the differences in relation to the more prominent attention to self-cutting in research, more typical of women. Males tend to self-harm using self-battery or self-hitting methods.

1.3.1. The iceberg model of self-harm

Researchers in the field of adolescent self-harm have developed an iceberg model related to the prevalence of this behaviour. Geulayov et al. (2018) proposed three levels of this iceberg: fatal self-harm (i.e. suicide) which is relatively uncommon and would be the tip of the iceberg, self-harm presenting to clinical services and self-harm endorsed by young people in the community and not seeking any help. The latter level would be the submerged part of the iceberg and includes high rates of hidden self-harm. These authors collated mortality statistics, hospital-based studies and school-based surveys in the UK and concluded that for every female adolescent suicide, 919 adolescent girls had sought help at hospital emergency services and 6406 were presenting self-harm in the community. In terms of males, for every male adolescent suicide there was 120 adolescents presenting to emergency rooms and 838 were self-harming in the community. These results are cause for concern because they imply that what professionals see in clinical services is only part of the reality of a behaviour involving high risk.

Doyle, Treacy and Sheridan (2015) conducted a population-based study in Ireland, exploring help-seeking in adolescents with self-harm. They found that almost half of the participants with history of self-harm had not sought help before engaging in self-harm. In terms of help seeking after the incident, the majority of adolescents who had ever self-harmed

reported not telling anyone or seeking help at clinical services. Of those who sought help, most adolescents confided on a friend and a minority attended a specialised mental health service.

Together these findings indicate the need of screening for self-harm and carrying out preventative interventions in the community, where most self-harm takes place without carers being aware of it.

1.4. Models and explanatory mechanisms of self-harm

Functional model of self-harm

Nock and Prinstein (2004) have postulated a model of self-harm based on the function of the behaviour, as opposed to its topography. The authors conceptualised self-harm as a coping strategy used to manage intra and interpersonal distress. This model has clear implications for designing interventions with young people who self-harm. Nock and Prinstein proposed that self-harm behaviours could be maintained by either social (i.e. interpersonal) or automatic (i.e. internal, related to the self or the inner state) contingencies. These two variables constitute the two ends of the social/automatic dimension, one of the two dichotomous dimensions included in their model. The other dimension includes positive (obtaining something) or negative (avoiding something) reinforcement. These two dimensions lead to four types of functions:

1. *Automatic-negative*, the young person engages in self-harm as a way to reduce tension or other negative internal states (e.g. to reduce anxiety or to cope with sadness).

2. *Automatic-positive*, the adolescent self-harms as a means of generating new feelings (e.g. to feel something when experiencing numbness). This function could also serve the purpose of self-punishment.

3. *Social-negative*, the individual utilises self-harm as a way to avoid interpersonal demands (e.g. to avoid doing a task or to avoid being punished).

4. *Social-positive*, the adolescent seeks a reaction from others or to communicate something that cannot be expressed with words (e.g. to let others know about unpleasant feelings).

This model has been empirically validated in inpatient adolescents, showing good structural validity and reliability (Nock & Prinstein, 2004). In this study, automatic negative reinforcement, i.e. reducing psychological distress, was the most frequent reason for self-harm.

The functional model demonstrates an association between self-harm and different intra and interpersonal stressors. Thus, in terms of preventing and treating self-harm, relevant variables should be identified and intervened upon. It is especially relevant to identify intra and interpersonal predictors of the worst outcomes and the most severe self-harm group (Klonsky & Olino, 2008).

Self-harm as a dysregulated behaviour

Some authors have proposed self-harm as a dysregulated behaviour having the same underlying mechanisms as other maladaptive practices such as eating disorders or substance misuse (Hasking & Claes, 2019). Although this perspective has only received more attention in recent years, some efforts have been made to ascertain transdiagnostic mechanisms involved in different dysregulated behaviours. Hasking and Claes (2019) conducted a study in which they simultaneously examined the presence of three variables in a sample of college students: impulsivity, emotion regulation and alexithymia. They concluded that negative urgency (a dimension of impulsivity) and difficulties regulating emotions were underlying all of the three behaviours. A recent meta-analysis confirmed self-criticism as a transdiagnostic feature present both in self-harm and disordered eating (Zelkowitz & Cole, 2019).

This approach might help develop transdiagnostic treatments, which focus on common processes and functions of different behaviours. Thus, the ‘symptom shift’, characterised by abandoning one symptom and taking up another one could be avoided (Hasking & Claes, 2019).

NSSI Family Distress Cascade Theory

Waals et al. (2018) argued that previous models had considered interpersonal factors are mere triggers for self-harm and stressed the importance of considering the interaction between self-injury and the environment. They postulated a model including a cascade of negative feelings experienced by the adolescent and by the caregiver, leading to a reciprocal influence between each other’s maladaptive behaviour. The authors conceptualised self-harm as an attempt to obtain relief from negative feelings, which additionally provides a sense of

autonomy. When parents discover the self-harm behaviour, they tend to increase control and vigilance, which is experienced by adolescents as a threat to their autonomy and they usually react increasing the secrecy. Moreover, parents tend to feel confused and overwhelmed in the wake of finding out about self-injury, which make them more difficult to manage their children's emotional needs and their behaviour. This in turn might impact on the adolescent levels of stress and guilt and as a result it might increase self-harm behaviour.

This model has relevant implications for working with families of adolescents who present with self-harm. Family variables associated with self-harm should be considered in a dynamic way and the reciprocal influence between feelings and behaviours in different members of the family should be kept in mind (Waals et al., 2018).

Biological underpinnings of self-harm

Studies analysing biological features of self-harm in individuals without learning disabilities are sparse. The importance of the serotonergic system and its interaction with contextual variables has been highlighted (Crowell et al., 2008). This study showed an increased vulnerability with low levels of peripheral serotonin. An association between serotonin levels and self-harm has also been deduced by the positive effect that selective serotonin reuptake inhibitors have (Markovitz, Calabrese, Charles Schulz, & Meltzer, 1991).

The endogenous opioid system, involved in pain regulation, has also been a focus of interest, given the analgesia reported by individuals during the act of self-harm, as well as the high that is subsequently experienced (Muehlenkamp, 2005). Nock et al. (2006) found that individuals presenting the most severe cases of self-harm reported absence of pain during self-injury episodes. An overlap between neural systems involved in pain and emotion regulation has been demonstrated, thus suggesting that the regulation of one type of experience might impact on the regulation of the other (Bresin & Gordon, 2013). Previous research has shown lower resting levels of beta-endorphin and enkephalins in self-injurers. It has been suggested that, given the abnormal levels of natural opioids, individuals engaging in self-injury might present increased sensitivity to these substances and therefore experience analgesia or euphoria (Bresin & Gordon, 2013). However, it remains unknown whether lower levels of opioids are a precursor or a correlate of self-harm.

1.5. Assessment

1.5.1. Risk assessment

When assessing self-harm, the first step is to carry out a systematic risk assessment. When risk of suicide, accidental death or severe injury is identified, appropriate clinical measures should be put in place.

Westers, Muehlenkamp and Lau (2016) have developed a model to help clinicians conduct risk assessments with their self-harming clients. This tool is especially useful for general practitioners and paediatricians. The use of the acronym 'SOARS' helps remember every important aspect that needs to be considered. 'S' stands for suicidal ideation during the act of self-harm. 'O' stands onset, frequency and methods. As aforementioned, the longer time the adolescent has been self-harming, the higher risk it is involved due to habituation to fear and pain, and the risk is also higher when more methods are endorsed and when frequency is high (Nock et al., 2006). The 'A' refers to the aftercare of wounds or drugs ingestion. Clinicians should ask about the need for medical attention, indicative of the severity of self-harm. 'R' indicates reasons for self-harming and helps clinicians ascertain the function of the behaviour and propose alternative coping strategies based on this function. Finally, 'S' stands for stage of change, referring to the model outlined by Prochaska and DiClemente (1983). Motivation for change is frequently absent in young people who self-harm and it is an essential issue to address in terms of preventing further risk.

Another tool that could help clinicians identifying the risk of future suicide after adolescent self-harm is the Suicide Intent Scale (Beck, Schuyler, & Herman, 1974). This is a brief, 15-item questionnaire, assessing the suicidal intent in the context of an episode of self-harm. The scale includes two different sections: the circumstances section evaluates the objective situation in which self-harm happened and the possibility of getting help; the feelings section evaluates suicidal ideation and sense of capability of going through with suicide at the time of self-harm.

1.5.2. Self-harm scales

The following tools have been developed to assess self-harm in adolescents and adults:

- Functional Assessment of Self-Mutilation (FASM) (Lloyd, Kelley, & Hope, 1997). This scale evaluates functions, methods and frequency of self-harm. The items were

developed after reviewing past literature and conducting focus groups with inpatient adolescents. First, participants complete a section including 11 potential methods of self-injury. Second, there is a 22-item section including different functions of self-harm and individuals are asked to rate the frequency in which they utilise self-harm for each reason. The authors have reported good psychometric properties. The scale could be used to evaluate the functions of the functional model of self-harm (Nock & Prinstein, 2004). This instrument has been adapted to the Spanish population by Calvete et al. (2015).

- Inventory of Statements about Self-Injury (ISAS) (Klonsky & Glenn, 2009). This tool has been developed to assess the frequency and functions of different NSSI behaviours. It includes 13 functions that had been reported in previous literature or were reported by individuals engaging in self-injury. There are also five questions regarding levels of pain experienced, age of onset, company when engaging in NSSI, motivation to stop self-harming and time between the urge and the act. The scale includes two factors (intra and interpersonal functions) and their developers have demonstrated the reliability and validity of the instrument. There is a Spanish adaptation, validated in a Mexican sample (Castro Silva et al., 2016).

- Deliberate Self-Harm Inventory (DSHI) (Gratz, 2001). This 17-item instrument assesses the presence, severity and frequency of different self-harming behaviours, including self-harm that is performed without suicidal intent. As in the other tools aforementioned, the items were developed based on clinical information and self-harm acts described in previous publications. The authors have reported good internal consistency, adequate test-retest reliability and adequate validity.

- Self-harm Behaviour Questionnaire (SHBQ) (Gutierrez, Osman, Barrios, & Kopper, 2001). This self-report measure evaluates different suicide-related behaviours and thoughts, providing extensive information about the suicide spectrum. The SHBQ comprises four sections: NSSI, suicide attempts, suicide threats and suicide ideation. Each section begins with a general question to assess the presence of the behaviour, followed by questions assessing characteristics of the act, intent, lethality and outcome. The authors have reported adequate reliability and validity.

1.5.3. Single item assessments

Assessing self-harm by means of a single item is frequent in previous investigations with adolescents (Baetens et al., 2014; Mars et al., 2014). A systematic review found that it is the most frequent method used (Muehlenkamp et al., 2012). Questions are similar to the one used by Baetens et al. (2014), p. 820: ‘*Have you intentionally injured yourself (e.g. cut, scratch, burn), without the intent to die?*’. Muehlenkamp et al. (2012) showed that single item assessments led to lower estimates of prevalence, when compared to the use of checklists of self-harm behaviours.

1.5.4. Ecological Momentary Assessment (EMA) of self-harm

EMA refers to a group of methods sharing the use of real-time, daily assessments of self-harm and other associated variables (Rodríguez-Blanco, Carballo, & Baca-García, 2018). This approach has been developed to increase reliability of the data gathered, since most studies assess self-harm retrospectively and therefore information is subject to memory bias. Assessments could be ‘event-contingent’, that is, scheduled when the individual engages in self-harm, or ‘time-based’, scheduled at specific times during the day (Reis & Gable, 2000). Methods include paper and pencil registration of behaviours and experiences, or the use of mobile phones and web-based applications. Most studies using EMA methods have analysed stressful situations impacting on self-harm (Rodríguez-Blanco et al., 2018).

1.6. Risk factors and correlates of self-harm

In this section we will review different factors that have been linked with self-harm. Some of these variables are considered risk factors as they occurred before the outcome, i.e. self-harm. Other variables are associated with self-harming behaviours but the direction of the relationship has not been established and therefore they are considered correlates (Fliege et al., 2009).

1.6.1. Psychological symptoms

Previous studies have established a link between self-harm and different psychopathological variables. There has been seen an association between frequency of self-harm and symptom severity (Brunner et al., 2014), as well as between recency of self-injury and greater levels of psychopathology (Zielinski, Hill, & Veilleux, 2018). These findings

provide support for theories considering self-harm as a coping strategy for internal distress (Nock & Prinstein, 2004).

Regarding depressive symptoms, cross-sectional and prospective studies have found associations with self-harming behaviours in adolescents (Barrocas et al., 2015; Brunner et al., 2014). It has been suggested that the association between self-injury and other diagnoses might be accounted for the presence of depressive symptoms across multiple disorders (Jacobson & Gould, 2007). Major Depressive Disorder has been the most frequent diagnosis in clinical samples of adolescents who self-injure (Kumar et al., 2004; Nock et al., 2006). Self-harm is correlated with suicidality, including both suicidal ideation and suicide attempts (Brunner et al., 2014; Guan et al., 2012). Hopelessness has been seen as a relevant factor distinguishing self-harm with and without intention to die (Grøholt, Ekeberg, & Haldorsen, 2000). Anxiety, including general anxiety and panic symptoms, has also been linked with self-harm (Brunner et al., 2014; Zielinski et al., 2018). Zielinski et al. (2018) found that frequency was associated with panic symptoms but not with depression, suggesting that individuals might engage in self-harm more often if they experience increased arousal, in an attempt to regulate themselves.

Dissociation refers to a range of experiences characterised by disturbances in the integration between emotions, cognitive functions, body representation and actions. Some of the most frequently reported symptoms are depersonalization (feeling the self as unreal), derealisation (feeling the environment is not real or not familiar) or emotional numbness (disconnection from affect) (Černis et al., 2019). Despite the fact that dissociation and self-harm appear to be correlated, the link between these variables is not yet well understood, since different mechanisms underlying this association have been proposed. Some researchers have reported states of numbness and dissociation prior to self-harm, in which self-harm would have the function of generating feelings and ending this aversive experience (Nock & Prinstein, 2004). Other authors have proposed that self-harm is utilised as a way to trigger a dissociative state in the context of unbearable emotional suffering (Černis et al., 2019).

Posttraumatic stress disorder (PTSD) is frequent after experiencing traumatic events, especially sexual trauma (Khadr et al., 2018). It comprises reexperimentation of the event, symptoms of dissociation and hyperarousal and it has been associated with NSSI (Weierich

& Nock, 2008). The links between sexual abuse/assault and self-harm will be discussed in further detail in section 1.7.

Adolescents diagnosed with eating disorders, especially those with history of bulimia nervosa or binge eating, present high rates of self-harm (Peebles, Wilson, & Lock, 2011). Moreover, eating psychopathology has been demonstrated as a prospective predictor of self-injury (Fox et al., 2015). Similar underlying processes such as alexithymia or emotion regulation have been proposed to explain the link between these difficulties (Hasking & Claes, 2019).

Nowadays self-harm is considered an independent and transdiagnostic clinical feature, but it has previously been considered as a manifestation of BPD (Muehlenkamp, 2005). Nock et al. (2006) reported that 51% of inpatient adolescents who self-harmed were diagnosed with BPD. A systematic review conducted by Stead et al. (2019) concluded that there is a correlation between BPD and NSSI in adolescents, but due to methodological issues is not possible to establish the direction of the relationship. In order to determine whether adolescents who self-harm will develop BPD, longitudinal studies should be performed.

Regarding substance misuse, Nock et al. (2006) reported that 16.8% of inpatient adolescents presenting with self-injury had an associated alcohol dependence disorder, and 29.5% presented marijuana dependence. In a community sample, O'Connor et al. (2009) found that use of drugs was predictive of self-harm six months later.

Self-harmers have frequently reported increased levels of anger and non-expressed anger (Garcia-Nieto, Carballo, de Neira Hernando, de Leon-Martinez, & Baca-Garcia, 2015), in keeping with studies highlighting the difficulties expressing emotions. Aggression and externalising disorders are also frequent in self-harming adolescents (Nock et al., 2006; Ross & Lee Heath, 2003). The findings regarding impulsivity are inconsistent and depend on the means of assessment. Self-reported measures have yielded significant associations between self-injury and impulsivity, whereas behavioural tests have shown non-significant associations (Gatta, Dal Santo, Rago, Spoto, & Battistella, 2016). Gatta et al. (2016) have explained this discrepancy suggesting that self-harmers only behave impulsively when distressed. In this line, researchers have proposed that impulsivity is not a unidimensional construct and have considered different dimensions. Negative urgency (impulsive behaviour aimed at reducing distress) has been seen associated with self-injury (Hasking & Claes, 2019).

Alexithymia, defined as the inability to recognise, express and communicate feelings, has been highlighted as a relevant factor linked with self-harm (Gatta et al., 2016). As aforementioned, it is considered a transdiagnostic feature playing a role in self-injury, eating disorders and substance use (Hasking & Claes, 2019).

Aside from psychopathology, previous studies have explored links with disturbances in certain psychological processes. Identity formation is one of the most relevant developmental tasks in adolescence and identity confusion appears to be associated with self-harm. Adolescents go through an identity crisis in which they need to develop a coherent sense of self and identity. If they fail in doing so, identity confusion might lead to difficulties in mood regulation and in interpersonal relationships (Gandhi et al., 2019). Some researchers have suggested that self-injury might be a maladaptive strategy to develop a more coherent sense of identity, having feelings of belonging to a group. It has been proposed that self-harm in itself might hinder the process of identity formation and increase identity confusion, but the evidence supports a unidirectional relationship with identity problems leading to self-harm (Gandhi et al., 2019).

Low self-concept and increased self-criticism have consistently shown associations with self-harm (Madge et al., 2011; Zerkowicz & Cole, 2019). This is not surprising, since self-harm involves hurting oneself directly and consciously. Low self-concept has been proposed as a mediator of the relationship between distal interpersonal risk factors (e.g. sexual abuse) and self-injury (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Tatnell, Kelada, Hasking, & Martin, 2014).

1.6.2. Family variables

Cross-sectional and prospective studies have found associations between the presence of self-harm and a number of family variables.

In terms of family functioning, there has been seen an association between self-harm and the following variables: not living with both parents or divorce (O'Connor et al., 2009), lack of perceived support (Andrews, Martin, Hasking, & Page, 2014), poor maternal attachment (Gandhi et al., 2019), excessive behavioural control and low affective involvement (Baetens, Andrews, Claes, & Martin, 2015), witnessing family violence (Asgeirsdottir, Sigfusdottir, Gudjonsson, & Sigurdsson, 2011), severe parental illness

(Muehlenkamp, Hoff, Licht, Azure, & Hasenzahl, 2008) and parental criticism (Baetens et al., 2015; Wedig & Nock, 2007).

Linehan's biosocial model (1993a) constitutes an attempt to explain the relationship between dysfunctional family relationships and self-harming behaviours. The author proposed the concept of the invalidating environment, in which emotions are dismissed or discouraged and individuals do not receive support for regulating them. The absence of validation leads to difficulties naming, expressing and using adaptive means of regulating emotions.

Poor quality family relationships and invalidating environments might be associated with maltreatment, which has been linked with subsequent adolescent self-harm (Di Pierro, Sarno, Perego, Gallucci, & Madeddu, 2012). However, dysfunctional or uncaring relationships, known as relational trauma, have been seen to prospectively predict self-harm with the same strength as maltreatment events (Martin et al., 2016). Secure attachment refers to the experience of a stable bond with a caregiver that is responsive to the child's needs. On the contrary, insecure attachment patterns are associated with the experience of a caregiver that is not responsive or is inconsistently responsive and has been linked with relying on self-harming behaviours for affect regulation (Crowell et al., 2009).

Interactions between adolescents who self-injure and their parents usually change when self-harm is discovered. Parents tend to increase control and criticism, which have a negative impact on adolescents' feelings, and this in turn leads to more self-harm (Duarte, Gouveia-Pereira, Gomes, & Sampaio, 2019; Waals et al., 2018). Parents usually perceive self-harm as having a manipulatory nature, instead of a way of seeking support and releasing tension (Duarte et al., 2019). This interpretation of self-harm reasons is based on stereotypes and usually affects parental understanding and support.

Family psychopathology has been highlighted as a correlate of adolescent self-harm and might be underlying some of the dysfunctional family features aforementioned. History of self-harm within the family is associated with adolescent self-harm (O'Connor et al., 2009) and specifically with suicidal self-harm (Mars et al., 2014). Gromatsky et al. (2017) found that parental psychopathology involving emotion and behavioural dysregulation (i.e. substance misuse, self-criticism, ADHD symptoms) were specifically associated with NSSI in their offspring. In this study, parental internalising disorders were unrelated with NSSI.

This finding suggests that parental difficulties have a negative impact when they lead to less support and more negative relationships.

1.6.3. Peers influence

Peers influence on self-harm can happen in various ways, given the critical role of peers' relationships on adolescent development and wellbeing. In this section we will discuss the effects of bullying victimisation, the social contagion, the use of social networks and the representation of self-harm in the media.

Research has identified a link between bullying, either traditional or cyber-bullying, and self-harm (Heerde & Hemphill, 2018). This relationship appears to be explained by perceived peer rejection, decreased sense of group belongingness and mental health difficulties (Kim, 2005). Adolescents might engage in self-harm with an intrapersonal function, coping with the distress associated with social isolation or rejection (Nock & Prinstein, 2004).

Interestingly, a recent meta-analysis found that both perpetrating or being a victim of traditional bullying nearly double the odds of engaging in self-harm (Heerde & Hemphill, 2018). Victims, however, endorsed higher risk than perpetrators. Heerde et al. (2018) also reported three times the odds of self-harming when victims were cyber-bullied. Several characteristics of this modality of victimisation might account for its higher negative impact: potential anonymity of the perpetrator, potential large number of perpetrators at the same time and persistence of bullying wherever the victim goes (Kowalski, Giumetti, Schroeder, & Lattanner, 2014).

While underlying mechanisms for the association between bullying victimisation and self-harm have been explored, no studies have attempted to explain the link between perpetrating bullying and self-harming behaviours. However, it has been seen that perpetrating bullying is associated with anxiety, depression, substance use and conduct problems (Heerde & Hemphill, 2018).

Regarding social contagion, previous studies have found a prospective association between peers' and individual's self-harm, even after controlling for baseline self-harm and depressive symptoms (Prinstein et al., 2010; You, Lin, Fu, & Leung, 2013). Two potential mechanisms have been proposed to explain this link. The selection effect refers to the fact that adolescents who self-harm tend to befriend peers who also engage in this behaviour. The

socialisation effect refers to the influence that the group has on an adolescent's emotions and behaviour, that is, an individual might take up self-harm after joining a group peers who do so. The aforementioned studies provided support for both effects in community and clinical samples (Prinstein et al., 2010; You et al., 2013).

Social contagion takes place when two or more people in the same group engage in self-harm in a 24-hour period, or when there are clusters (temporal or spatial proximity) of self-harm in the same group of individuals (Jarvi, Jackson, Swenson, & Crawford, 2013). A process of social learning, in which an individual imitates another one through a process of identification, has been well established in both suicidal and nonsuicidal self-harm (Jarvi et al., 2013). Research has shown that peers might model self-harm as a helpful and acceptable coping strategy, and they might self-injure simultaneously (Walsh, 2006). Moreover, having peers with a positive opinion of self-harm prospectively predicts engagement in the behaviour (O'Connor et al., 2009).

Self-harm has also been proposed as a way to strengthen bonds with peers and to develop a social identity. In the functional model of self-harm, this would be regarded as a social positive function (Nock & Prinstein, 2004). Bowes et al. (2015) found a dose-response association between the degree to which adolescents identified themselves to the goth subculture and self-harm and depression three years later. However, the authors highlighted that adolescents self-identifying with the goth subculture had history of more risk factors, suggesting a selection effect: they might have befriended peers who also had difficulties and might have been more attracted to the goth subculture. They concluded that it is unclear whether becoming a goth itself has a negative impact in terms of self-harm. This is in keeping with other studies suggesting that vulnerable adolescents are more susceptible to social contagion (Claes, Houben, Vandereycken, Bijttebier, & Muehlenkamp, 2010; Prinstein, 2007).

Social networking and the use of the Internet is a source of concern regarding potential harmful effects. Lewis et al. (2012) conducted a review of self-injury and the Internet activity in adolescents. They reported different ways in which self-harm can be discussed on the Internet: picture or video sharing, discussion of self-harm with other self-injurers in message forums and sharing experiences related to self-harm in personal blogs or in social networks like Facebook or Instagram.

Previous research has identified that the Internet could be a source of help when adolescents find support online, feel understood and receive treatment advice on a topic that is difficult to discuss in person (Dyson et al., 2016). However, Lewis et al. (2012) alerted in their review that sharing self-harm in a way that includes multiple details and leads to reinforcement of the behaviour is associated with increased self-injury. The authors highlighted a number of ways in which the Internet could have a negative impact on self-harm:

- The emotional suffering associated with self-harm is presented without emphasising the possibilities for recovery.
- Self-injury is presented as an effective strategy to cope with distress and depicted as an addictive behaviour that is very difficult to change.
- Self-harm is validated or glamourised.
- Individuals are provided with tips about how to effectively self-harm, how to take care of wounds and how to hide them from others, conveying the message that help is not needed.
- Exposure to graphic descriptions or images of self-injury, that tends to increase emotional distress and the urge to self-harm.

Another study reviewed YouTube videos on self-harm. The authors found that most videos either provided information about self-harm or were focused on emotional pain with a hopeless tone. All of them presented self-injury images and a notable portion showed somebody engaging in self-harm (Lewis, Heath, St Denis, & Noble, 2011). Another study analysed the comments to these clips and found that viewers frequently validated self-injury and rarely commented on recovery possibilities, thus reinforcing the behaviour (Lewis, Heath, Sornberger, & Arbuthnott, 2012).

Depiction of self-harm in the media has also been problematic. An example is the series *Thirteen reasons why*, which thematised the suicide of an adolescent after experiencing multiple interpersonal and sexual traumas, using explicit images. A recent study showed a worsening in mood in those already experiencing mental health difficulties after watching the series (Santana da Rosa et al., 2019).

In sum, peer influence and the use of the Internet seem to have a notable impact on adolescents' mood and behaviour. Therefore, efforts should be made to identify risk factors within peer interactions and social networking. Investigating moderator factors would allow the identification of variables that make individuals more vulnerable to this influence.

1.6.4. Resilience factors

Few studies have explored resilience factors specifically associated with absence of self-harm. Resilience includes positive variables that can reduce the risk such as family cohesion, family support, perceived personal competence, social competence, adaptive coping skills or self-esteem (Rotolone & Martin, 2012). Resilience factors including self-forgiveness, positive emotion coping and support seeking have been associated with decreased suicide risk in individuals who self-harm (Nagra, Lin, & Upthegrove, 2016). Rotolone and Martin (2012) found that family support, social relationships, self-esteem and life satisfaction presented a stronger association with past compared to current self-injury. Mikolajczak et al. (2009) reported that emotional intelligence was associated with adaptive coping strategies and negatively correlated with self-harm and depression. Emotional intelligence included skills such as adaptability, emotion expression, emotion regulation, maintaining relationships, self-esteem or empathy.

Further study of protective and resilience factors against self-harm is needed in order to foster these variables within prevention programmes.

1.6.5. Relationship between distal and proximal risk factors

Previous studies analysing risk factors have examined both distal and proximal variables (Fliege et al., 2009). A number of authors have hypothesised that both types of factors do not have an independent effect, and have proposed that proximal factors carry the effect of distal factors and lead to self-harming behaviours. In general, research has shown that distal environmental factors impacted on self-harm through the effect of psychological variables. Weierich and Nock (2008) found that child sexual abuse was associated with PTSD symptoms in the present, which were in turn associated with self-injury. Gandhi et al. (2019) demonstrated a mediation effect of identity development on the relationship between poor attachment history and self-injury. Baetens et al. (2015) showed that family functioning impacted on levels of depressive symptoms, which in turn predicted self-injury.

Considering mediator variables is critical to understand the interplay between distal and proximal factors and the psychological mechanisms underlying the urge to self-harm. The analysis of moderator variables is also relevant to ascertain under which circumstances adolescents are more likely to self-harm.

Self-harm has gained attention in the past few years and a large number of studies have explored correlates and risk factors. However, studies have frequently used a cross-sectional methodology, which does not allow drawing conclusions on causation or future risk of self-harm. In view of preventing the onset and chronification of self-harm, conclusions about relevant risk factors should be drawn from prospective studies. There is a paucity of recent systematic reviews synthesising findings regarding correlates and risk factors of self-harm, and no previous reviews have included only prospective studies conducted on adolescents. Moreover, few reviews have examined the effects of mediator and moderator variables.

1.7. Sexual trauma in adolescence and self-harm

Sexual trauma has an enormous impact on victims' mental health, especially when the abuse takes place in childhood and adolescence. A survey in a representative sample in the UK showed that 16.5% of adolescents (aged 11 to 17) had experienced lifetime sexual victimization by an adult or peer and 9.4% had suffered it in the previous year (Radford, Corral, Bradley, & Fisher, 2013).

Sexual assault in adolescence leads to short and long-term mental health difficulties. They include, but are not limited to, PTSD, major depression, anxiety (Khadr et al., 2018; Unlu & Cakaloz, 2016), sexual risk-taking and subsequent sexual revictimization (Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003), self-harm and suicidal behaviour (Oshodi, Macharia, Lachman, & Seedat, 2016; Unlu & Cakaloz, 2016).

Several studies have reported no association of assault variables on PTSD symptoms or psychiatric disorders in the aftermath of sexual trauma (Khadr et al., 2018; Ullman, Filipas, Townsend, & Starzynski, 2007). Ullman et al. (2007) found that negative social reactions after abuse disclosure, previous vulnerabilities and post-assault coping correlated with PTSD severity.

Most studies have been conducted in adults and have assessed trauma retrospectively. The Havens Adolescent Study (Khadr et al., 2018) is a prospective study examining mental health outcomes after experiencing a recent sexual assault in adolescence. Findings showed

that 80% of the sample presented a psychiatric diagnosis 4-5 months after the assault. The most frequent disorders were PTSD, major depression and anxiety. The authors also found that having a diagnosable disorder was associated with more psychosocial vulnerability before experiencing the assault (i.e. family contact with social services, previous sexual abuse).

The age at which the trauma is experienced has been seen as a crucial variable in terms of its impact. Sexual trauma hinders the developmental processes that take place at each developmental stage and the developmental level influences the ability to process trauma (Ogle, Rubin, & Siegler, 2013). In childhood, trauma interferes with attachment, emotion regulation, the development of a coherent sense of self and the neurobiological stress-response system. In adolescence, trauma has a negative impact on identity formation and on the development of a coherent personal narrative (Maercker, Michael, Fehm, Becker, & Margraf, 2004; Ogle et al., 2013). Experiencing sexual trauma in childhood and adolescence leads to more severe and chronic PTSD symptoms and depression (Maercker et al., 2004; Ogle et al., 2013).

Regarding revictimization, it has been seen that those who have experienced sexual abuse are more likely to suffer subsequent abuse or rape (Noll et al., 2003). Noll et al. (2003) showed a mediating effect of dissociative symptoms in the relationship between past trauma and revictimization. The authors explained this relationship by proposing dissociative symptoms as a coping mechanism to escape negative affect, blocking disturbing thoughts or stimuli. If this strategy is sustained over time, the individual is unable to detect danger signals and might be at higher risk of subsequent abuse.

In terms of the association between sexual trauma and self-harm, multiple studies exploring risk factors for self-harm have identified past sexual abuse as a relevant variable making a unique contribution in the onset of self-harming behaviours. This link has been identified in adolescents (Madge et al., 2008; O'Connor, Rasmussen, & Hawton, 2012) and adults (Noll et al., 2003). Noll et al. (2003) showed that women who reported childhood sexual abuse were almost four times more likely to engage in self-harm.

Previous research has attempted to ascertain the paths through which past sexual abuse impacts on present self-harm. It has been demonstrated that past abuse leads to self-harm via the effects of current psychopathology. Weierich and Nock (2008) found that two different PTSD clusters independently mediated the relationship between childhood sexual abuse and

NSSI: re-experiencing symptoms and avoidance and numbing symptoms. The authors argued that in the former NSSI had the function of reducing distress whereas in the latter NSSI had the function of generating feelings and escaping from numbness. In a sample of community adolescents, Asgeirsdottir et al. (2011) highlighted the mediating effect of depression in the relationship between past sexual abuse and self-injurious behaviours. In this line, Klonsky and Moyer (2008) conducted a meta-analysis in which they concluded that the relationship between childhood sexual abuse and NSSI was non-significant after controlling for psychiatric variables. It appears that there might not be a direct link between past abuse and current self-harm, and psychological distress in the aftermath of assault appears to be a crucial risk factor for the onset of self-harming behaviours.

The use of adaptive coping strategies is also a crucial factor to prevent engagement in self-harm after experiencing sexual trauma. Those with history of childhood sexual abuse or other interpersonal traumas present more difficulties with emotion regulation (Cloitre et al., 2009; Ogle et al., 2013) and might be at higher risk after experiencing a recent sexual assault.

As aforementioned, there is a paucity of studies analysing the effects of recent sexual assault in adolescence. To the best of our knowledge, no studies have explored correlates of self-harm in recently assaulted adolescents using a prospective methodology. Determining risk factors and correlates of self-harm after a recent assault is relevant in terms of the immediate aftercare that should be provided to adolescents and in view of preventing chronification of maladaptive coping strategies such as self-harm.

Chapter 2

OBJECTIVES AND HYPOTHESIS

Objectives and hypothesis

This thesis will address the following objectives and will explore the following hypothesis.

Study 1 objectives:

- To systematically review the existing literature about prospective predictors of NSSI in community adolescents.
- To determine robust predictors, mediators and moderators of the behaviour in this population.

Study 1 hypothesis:

- Psychological distress, previous self-injury, past trauma, peers NSSI and low self-concept will prospectively predict different outcomes associated with NSSI in community adolescents.

Study 2 objectives:

- To examine correlates of adolescent self-harm after sexual assault.
- To explore prospective predictors of adolescent self-harm after this traumatic event.

Study 2 hypothesis:

- The rates of self-harm will increase after experiencing sexual assault.
- Pre-existing vulnerabilities before the assault will predict engagement in self-harm after sexual assault.
- Post-assault psychological distress will predict engagement in self-harm after sexual assault.

Study 3 objective:

- To determine whether perceived positive strengths in the aftermath of a sexual assault protect against self-harm in a sample of adolescents.

Study 3 hypotheses:

- Perceived strengths after sexual assault will be associated with reduced risk of engaging in self-harm.

Chapter 3

METHODS

3.1. Participants

Study 1 included articles analysing longitudinal predictors of NSSI in community samples of adolescents (10 – 19 years old, according to the World Health Organization - WHO definition, 2014), which were school-based or representative community samples. Clinical samples were excluded to focus on prevention and early intervention in the community.

Participants in Study 2 and Study 3 were taken from the Havens Adolescent Study, a prospective study of the mental and sexual health outcomes of young people who had experienced a recent sexual assault (Khadr et al., 2018). Participants were recruited from the adolescents seeking help at the Havens (Multiagency Sexual Assault Centres in London) within six weeks of sexual assault. Sexual assault was defined as any attempt to involve an adolescent in a sexual activity that is not desired or that the adolescent does not have the capacity to consent, following the WHO definition of sexual abuse (1999). Recruitment took place over a period of two years. Adolescents aged 13 to 17 at the time of assault and meeting inclusion criteria were invited to take part in the study. Those living outside Greater London were excluded for resource reasons. Young people who did not have a clear recollection of what had happened to them or presented with learning disability were included in the study. Four hundred and ninety-one eligible adolescents attended the Havens over a two-year period and 141 gave consent to participate in the study (recruitment rate of 29%). Those taking part in the study were more likely to be younger, less likely to be of Asian ethnicity and less likely to have reported past domestic violence (Khadr et al., 2018).

The study included two assessment points. The baseline assessment (T0) was arranged on average 4 weeks after the assault (range 1 to 6 weeks). The second assessment (T1) was conducted 21.8 weeks on average post-assault (range 15 to 30 weeks). A hundred and six adolescents were retained from T0 to T1 (retention rate of 75.2%). Bivariate analysis showed no differences between those retained at T1 and those lost to follow-up in terms of sociodemographic, assault and clinical variables assessed at T0.

The sample for Study 2 included those adolescents recruited at baseline who completed self-harm information at the two time points. Due to the small number of males ($n = 6$) and transgender participants ($n = 1$), only females were included in the present study ($n = 98$).

The sample for Study 3 included female adolescents who completed self-harm questions at T0 and T1 and perceived strengths information at T1 ($n = 63$).

3.2. Measures

In Study 2 and Study 3, information regarding assault details, social and clinical variables was gathered by means of a semi-structured interview (study proforma) and by reviewing forensic and clinic notes. Socioeconomic status was assessed with the Family Affluence Scale (Boyce, Torsheim, Currie, & Zambon, 2006). Individual assessments were carried out by a study researcher.

In terms of pre-existing (pre-assault) vulnerabilities assessed at T0, three variables were included in this study:

- *Past sexual assault/abuse*, referred to any unwanted past sexual contact and was assessed by means of several questions: *'Have you ever experienced assault/abuse?'* (if the answer was affirmative, participants were then asked for details to determine whether the event was of a sexual nature); *'Before the assault had you ever had sex without consent?'*; *'Have you ever been forced to sex work?'*. Responses were categorized under $0 = no$, or $1 = yes$ (if answered yes to any of the questions above).

- *Previous rape* included only previous sexual intercourse without consent and was assessed with the question stated above. Response categories were $0 = no$ or $1 = yes$.

- *Previous history of being on the Child Protection Register* was included as a proxy measure of past family adversity/dysfunction. The Child Protection Register (CPR) includes young people who have been subjected to a child protection plan in the UK. This means that children are believed to be victims or to be at risk of physical, emotional, sexual abuse or neglect (NSPCC, 2016). Participants were asked about this information and where possible, responses were matched against clinical records at the Havens. Response categories were $0 = no$ or $1 = yes$.

Information about the assault was collected from forensic and clinical notes at T0 and included questions about the type of sexual assault, the number of assailants, the relationship with them and whether there was violence during the assault.

In this study, self-harm was defined as a behaviour intended to harm oneself regardless of the intention, following the UK conceptualisation (Hawton, Saunders, & O'Connor, 2012).

This definition was used assuming that the adolescents attending the Havens after sexual assault would be presenting high levels of distress and therefore they might present both suicidal and nonsuicidal self-harm, possibly difficult to differentiate. Self-harm was assessed with single item questions, frequently used in previous studies (Baetens et al., 2014; Mars et al., 2014). Single item assessments have been seen to provide lower estimates of self-harm (Muehlenkamp et al., 2012). However, in our study individual assessments carried out by the study researcher who could clarify questions that the adolescent had, might have helped overcome this difficulty. Pre-assault self-harm was assessed retrospectively at T0 with the following question: *'In the 12 months before the assault did you self-harm?'*. Presence of self-harm after the assault was assessed at T1 with this question: *'During this time [since the assault] have you intentionally tried to harm or kill yourself?'*. Response categories were 0 = no or 1 = yes for both questions. Participants were also asked about characteristics of self-harm at T1, including the method and intention.

Psychological symptoms were assessed by means of validated questionnaires at T0 and at T1:

- The Child Revised Impact of Events Scale (CRIES-13) (Perrin, Meiser-Stedman, & Smith, 2005) assessed PTSD symptoms. This instrument includes of 13 items and good face and construct validity has been reported by their developers. A cut-off score of 30 has been established as an indicator of risk of PTSD (Perrin et al., 2005). The questionnaire showed excellent internal consistency in our sample (Cronbach's $\alpha = .88$ at T0 and $\alpha = .84$ at T1).

- The Short Mood and Feelings Questionnaire (SMFQ) was used to assess depressive symptoms (Angold, Costello, Messer, & Pickles, 1995). This brief rating scale including 13 items and has demonstrated good internal reliability. A cut-off score of 8 indicates risk for depression (Angold et al., 1995). The internal consistency of the instrument was excellent in our sample (Cronbach's $\alpha = .90$ at T0 and $\alpha = .92$ at T1).

Perceived strengths were assessed at T1 with the Youth Strengths Inventory (YSI), a tool included in the Development And Well-Being Assessment (DAWBA), a diagnostic interview for children and adolescents (Goodman, Ford, Richards, Gatward, & Meltzer, 2000). The YSI includes 19 items assessing perceived personal qualities or skills and showed good internal consistency in the sample (Cronbach's $\alpha = .83$).

3.3. Procedure

In Study 1, a literature search was conducted using four databases: Medline, PsycInfo, Embase and Web of Science. The following mesh and free terms were searched for in title and abstract: [“adolescen*” OR “teen*” OR “young pe*”] AND [“nonsuicidal selfinjury” OR “non-suicidal self-injury” OR “NSSI” OR “nonsuicidal self-harm” OR “non-suicidal self-harm” OR “self-injur*” OR “self-cut*” OR “self-mutilat*”] AND [“risk factor*” OR “protective factor*” OR “mediat*” OR “predict*” OR “moderat*”] AND [“longitudinal*” OR “prospectiv*” OR “cohort” OR “wave*”]. Databases were searched and screened independently by two reviewers in team. Reference lists were also hand-searched to identify other potential relevant citations. Consensus was established between the two reviewers after independent analysis of the studies. In case of disagreement, a third member of the team assisted to reach a decision.

The review presented the following inclusion criteria: longitudinal studies or systematic reviews of longitudinal studies, community samples of adolescents, studies looking at predictors or mediators or moderators of specifically NSSI and published from 1990 to present in English. Studies were required to conceptualise self-harm behaviours including the elements of the definition of NSSI by Nock and Favazza (2009), even though a different term was used. Different outcomes of NSSI were accepted: presence/absence, onset, continuation, cessation, frequency and severity.

Several of the included studies were performed using the same sample of community adolescents and therefore publications were analysed in terms of samples instead of independent studies to prevent over-representation of findings. Given the disparity between NSSI-related outcomes included in the studies (e.g. onset, continuation, presence of NSSI), evidence for predictors was collated without separating different results for different NSSI outcomes.

Variables investigated in the studies were classified under three themes: sociodemographic, environmental and psychological factors.

Quality assessment was performed using the Newcastle-Ottawa Quality Assessment Scale for Cohort Studies (Wells et al., 2000), which was modified as necessary for the purpose of the study. In the comparability section, previous NSSI was considered the most important factor necessary to control for. In the outcome section, 6 months was selected as an

adequate follow up period. With regards to the retention rate, 70% was established as an acceptable value, considering the difficulties with recruiting and retaining adolescents. The quality scores range from 0 to 9 and results were categorised under low (0-3), medium (4-6) and high quality (7-9).

In Study 2 and Study 3, eligible adolescents seeking help at the Havens after sexual assault within the past 6 weeks were invited to participate. A stepped recruitment process was chosen, allowing sufficient time for the adolescent to make a decision about participation in a time of crisis. Havens attenders were initially provided with a study leaflet and a clinician sought permission from the adolescent to be contacted by the study team. The study researcher contacted those who had given permission to provide further information about the study. Young people were ensured that their decision would not affect their routine clinical care and that their information would be kept confidential unless there was a safeguarding concern. Those consenting to take part in the study provided written consent. The study was approved by the National Research Ethic Service Oxford A Committee on March 14, 2013 (ref 12/SC/0339), and funded by the National Institute of Health Research.

Baseline assessment took place within 6 weeks of assault (T0) and follow up assessment (T1) was arranged 4-5 months after the assault. Interviews were held at a convenient time and place for the participant. Adolescents taking part in the study were reimbursed their travel expenses and were offered vouchers in appreciation of their effort. Individual assessments were performed by a study researcher trained in sensitive interviewing techniques. Participants completed the study proforma and filled out the psychological questionnaires at both time points. The DAWBA, including the YSI, was administered at T1. Safeguarding procedures were followed when necessary and referrals to mental health services were made when indicated.

3.4. Statistical analysis

In Study 2, participants were divided into two groups according to presence/absence of self-harm at T1. Bivariate analyses were conducted to determine differences between groups in terms of sociodemographic, assault and clinical variables and pre-assault vulnerabilities. Chi-square tests were performed with categorical variables and Mann Whitney U tests were used with quantitative variables, given the absence of normality observed in most variables. A series of hierarchical binary logistic regressions were performed to examine pre and post-assault predictors, from those relevant factors identified in the bivariate analyses. Analyses

were adjusted for self-harm in the 12 months before the assault and the number of assailants. Given the limited sample size, independent regression analyses were conducted for each predictor.

To facilitate interpretation of Odds Ratios (ORs), PTSD and depressive symptoms were dichotomised in Study 2. When predictors are continuous variables, ORs refer to the increase in the probability of the outcome for every unit of increase in the predictor (Field, 2009) and this might be more difficult to interpret with questionnaire scores. Two levels of scores in psychological symptoms were obtained by dividing the sample according to the median score. This was decided because the majority of participants scored well above the aforementioned cut-offs often used to indicate clinically significant levels of symptoms.

In Study 3, the outcome was presence/absence of self-harm at T1. Bivariate analyses were conducted to explore differences in terms of sociodemographic and clinical variables. Firstly, univariate logistic regressions were conducted to ascertain significant variables. A multivariate hierarchical logistic regression model was then tested to determine the protective effect of perceived strengths. History of self-harm before the assault, depressive and PTSD symptoms were included in the first step, and perceived strengths were included in the second step. Assumptions of logistic regression were tested before performing the analyses (Field, 2009). Nagelkerke R square was used to determine the effect size of the model.

All the analyses in Study 2 and 3 were performed with SPSS V.22.0.

Chapter 4

RESULTS

STUDY 1

**NONSUICIDAL SELF-INJURY IN COMMUNITY ADOLESCENTS: A
SYSTEMATIC REVIEW OF PROSPECTIVE PREDICTORS, MEDIATORS
AND MODERATORS**



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Review article

Nonsuicidal self-injury in community adolescents: A systematic review of prospective predictors, mediators and moderators



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ABSTRACT

Nonsuicidal self-injury (NSSI) usually starts during adolescence and is associated with an array of psychological and psychiatric symptoms and future suicide attempts. The aim of this study is to determine prospective predictors, mediators and moderators of NSSI in adolescent community samples in order to target prevention and treatment strategies. Two team members searched online databases independently. Thirty-nine studies were included in the review. Several variables were seen to prospectively predict NSSI: female gender, family-related variables, peer victimisation, depression, previous NSSI and self-concept. Few studies analysed mediators and moderators. Low self-concept was highlighted as a relevant moderator in the relationship between intra/interpersonal variables and NSSI. Implications of these findings are discussed. The considerable heterogeneity between studies posed a limitation to determine robust predictors of NSSI. Further prospective studies using standardised measures of predictors and outcomes are needed to ascertain the most at risk individuals and develop prevention strategies.

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STUDY 2

**CORRELATES AND PREDICTORS OF SELF-HARM IN A PROSPECTIVE
SAMPLE OF SEXUALLY ASSAULTED ADOLESCENTS**

TITLE: CORRELATES AND PREDICTORS OF SELF-HARM IN A PROSPECTIVE SAMPLE OF SEXUALLY ASSAULTED ADOLESCENTS

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Abstract

Background. Sexual assault of adolescents is associated with negative mental health outcomes, including self-harm. Little is known about correlates and predictors of self-harm after sexual assault. We hypothesized that pre-assault vulnerabilities and post-assault psychological distress would be associated with self-harm after experiencing a recent sexual assault.

Methods. The sample was recruited from adolescents aged 13-17 years accessing sexual assault centers and it included 98 females. Longitudinal data were collected at T0 (3.9 weeks on average post-assault) and T1 (21.8 weeks on average post-assault). Bivariate analysis and hierarchical binary logistic regressions were performed.

Results. The rate of self-harm was 38.1% before the assault and 37.8% after the assault (T1). History of family dysfunction [*OR* 3.60 (1.30, 10.01)], depressive symptoms at T0 [*OR* 5.83 (2.35, 14.43)] or T1 [*OR* 2.79 (1.20, 6.50)] and posttraumatic stress symptoms at T1 [*OR* 3.21 (1.36, 7.58)] predicted self-harm at T1. These effects were attenuated when adjusting for confounders, except for depressive symptoms at T0 [*OR* 4.21 (1.57, 11.28)].

Discussion. Clinical implications for prevention of onset or continuation of self-harm following adolescent sexual assault are discussed. Future studies should replicate these findings in a larger sample and consider different trajectories of self-harm.

Correlates and predictors of self-harm in a prospective sample of sexually assaulted adolescents

Sexual assault of adolescents is a major public health problem, given its high prevalence and negative consequences. A survey in a representative sample in the UK showed that 16.5% of adolescents (aged 11 to 17) had experienced lifetime sexual victimization by an adult or peer and 9.4% had suffered it in the previous year (Radford et al., 2013). Previous research has shown that most cases go unreported (Kilpatrick, Saunders, & Smith, 2003).

Sexual assault in adolescence has been associated with an array of negative mental health outcomes, including self-harm, depression, posttraumatic stress disorder and substance misuse as well as multiple comorbidity (Asgeirsdottir et al., 2011; Kilpatrick, Ruggiero, et al., 2003). Self-harm and suicidality have been linked with past sexual assault or abuse (Asgeirsdottir et al., 2011; Behnken, Le, Temple, & Berenson, 2010; Sigfusdottir, Asgeirsdottir, Gudjonsson, & Sigurdsson, 2008; Weierich & Nock, 2008).

More generally, there is concern about rising levels of self-harm in adolescence, with a lifetime prevalence estimated around 16 – 18% depending on the conceptualization of the behavior (Muehlenkamp et al., 2012). Research has demonstrated that adolescents are more vulnerable to this behavior than other age groups (Fliege, Lee, Grimm, & Klapp, 2009). Self-harm with or without suicidal intent has been seen as one of the strongest prospective predictors of suicide attempts (Guan, Fox, & Prinstein, 2012) and completed suicide (Hawton, Zahl, & Weatherall, 2003). Some authors have noted the difficulty of assessing the intention of self-harm: it is often ambivalent, the lethality of some of the methods can lead to death even if it was not the intention of the behavior (Skegg, 2005) and a high percentage of adolescents who self-harm without suicidal intent present with suicide attempts as well (Jacobson, Muehlenkamp, Miller, & Turner, 2008). For these reasons, the present study will focus on self-harm behaviors regardless of suicidal intent (Hawton, Rodham, Evans, & Weatherall, 2002).

Research with community and clinical samples has consistently shown an association between adolescent self-harm and psychological symptoms (Barrocas et al., 2015; Evans, Hawton, & Rodham, 2005; Fliege et al., 2009; Jacobson & Gould, 2007; Webb, 2002), with depressed mood being the strongest predictor across studies (Barrocas et al., 2015; Hawton et al., 2002; Jacobson & Gould, 2007).

Self-harm has been conceptualized as a coping strategy used with intra and interpersonal functions (Chapman, Gratz, & Brown, 2006; Nock & Prinstein, 2005). It has been suggested that reducing psychological distress tends to be the most frequent reason for self-harm (Chapman et al., 2006; Jacobson & Gould, 2007). In those with a history of childhood abuse, self-harm might function to generate feelings in depressed and dissociative states (Nock & Prinstein, 2005). Studies focused on the relationship between sexual trauma and self-harm have demonstrated a mediating effect of depressed mood (Asgeirsdottir et al., 2011; Sigfusdottir et al., 2008), posttraumatic stress (PTS) symptoms (Weierich & Nock, 2008b) and binge drinking (Behnken et al., 2010). Together these findings provide support for the models conceptualizing self-harm as a coping strategy in general and specifically after sexual trauma.

In light of findings that self-harm might be a mechanism for coping with distress the following question remains: why do some adolescents lack healthy strategies and engage in self-harm after sexual assault? Adverse early experiences have been postulated as a contributory factor. A range of negative childhood events, such as trauma, neglect or family dysfunction, have been associated with self-harm in adolescence (Kaess et al., 2012; Webb, 2002) and with lower capacity to regulate emotions and to solve problems adaptively (Johnson, Sheahan, & Chard, 2003; van der Kolk, 2005). Within a sample of university students who had experienced sexual assault, Gibson and Leitenberg (2001) found that those who had suffered childhood sexual abuse were more likely to engage in avoidant coping.

As well as contributing to poorer coping, traumatic events in childhood have been shown to increase psychological distress, which is in turn associated with self-harm. Early trauma leads to higher levels of symptoms both in childhood and adulthood, compared to levels in those with adult trauma only (Cloitre et al., 2009). Prior sexual victimization and indicators of parental dysfunction before age 18 have been shown to increase the likelihood of developing posttraumatic stress disorder (PTSD) after sexual assault (Breslau, Chilcoat, Kessler, & Davis, 1999; Nishith, Mechanic, & Resick, 2000). Thus, those experiencing early trauma and adverse experiences might be predisposed to self-harm both through increased likelihood of psychological distress alongside poorer coping. Understanding the occurrence of self-harm after sexual assault requires an analysis of both previous/early vulnerabilities and post-assault distress.

Systematic study of the factors related to adolescent self-harm in the aftermath of sexual trauma has been scarce and existing studies include a number of limitations. Firstly, adolescent studies have assessed experience of trauma retrospectively and without specifying timing of the abuse (Asgeirsdottir et al., 2011; Behnken et al., 2010; O'Connor et al., 2009). No studies have addressed the relationship between a recent sexual assault in adolescence, self-harm and other risk factors. Secondly, few studies have addressed this topic in adolescents seeking help from specialist clinical services. Research has demonstrated higher prevalence of pre-assault mental health problems (Brown, Du Mont, Macdonald, & Bainbridge, 2013) and history of trauma (Dunmore, Clark, & Ehlers, 2001) in assaulted adults compared with the general population. Therefore, it is important to specifically assess characteristics and needs of this group. Finally, other biases in previous community studies include exclusion of the most impaired adolescents who were not attending school (Behnken et al., 2010) and assessment through written self-report, shown to underestimate the prevalence of sexual abuse (Weierich & Nock, 2008).

To our knowledge, this is the first study looking prospectively into correlates and predictors of self-harm in a sample of help seeking adolescents who have experienced recent sexual assault. Firstly, we hypothesized an increase in the prevalence of self-harm after the assault. Secondly, we expected to find an association between pre-existing vulnerabilities (past sexual trauma and family dysfunction) and self-harm, as well as between increased psychological distress after assault (depressive and PTS symptoms) and self-harm.

Method

Participants

The sample was selected from a prospective study of the mental and sexual health outcomes of young people who had experienced a recent sexual assault (Khadr et al., 2018). The participants were recruited from adolescents who attended the Havens (Sexual Assault Referral Centers serving Greater London, UK) within six weeks of sexual assault. All police or self-referrals of young people aged 13 to 17 at the time of assault and based in Greater London were eligible for inclusion and were invited to participate in the study. Four hundred and ninety-one eligible adolescents attended the Havens over a two-year period and 141 gave consent to participate in the project (recruitment rate of 29%). Compared to non-participants, participants were more likely to be younger, less likely to be of Asian ethnicity and less likely

to have reported past domestic violence (Khadr et al., 2018). There were no other significant differences in terms of sociodemographic and vulnerability factors.

The study included post-assault data collection at T0 (four weeks on average after the assault, range 1 to 6 weeks) and T1 (21.8 weeks on average post-assault, range 15 to 30 weeks). A hundred and six adolescents were retained from T0 to T1 (retention rate of 75.2%). Bivariate analysis showed no differences between those retained at T1 and those lost to follow-up in terms of sociodemographic, assault and clinical variables assessed at T0. Due to the small number of males ($n = 6$) and transgender participants ($n = 1$), only females who completed self-harm information at both time points were included in the present study ($n = 98$).

Procedure

The study was approved by the National Research Ethic Service Oxford A Committee on March 14, 2013 (ref 12/SC/0339), and funded by the National Institute of Health Research. Study procedure has been described in detail elsewhere (Khadr et al., 2018).

Measures

Participants completed a standardized study questionnaire (study proforma) evaluating social and clinical variables as well as validated questionnaires to determine the presence of psychological distress. Socioeconomic status was assessed with the Family Affluence Scale (Boyce et al., 2006). Individual assessments were undertaken by a study researcher.

Pre-existing (pre-assault) vulnerabilities were assessed at T0. Three variables were included in this study:

Past sexual assault/abuse, referred to any unwanted past sexual contact and was assessed by means of several questions: ‘Have you ever experienced assault/abuse?’ (if the answer was affirmative, participants were then asked for details to determine whether the event was of a sexual nature); ‘Before the assault had you ever had sex without consent?’; ‘Have you ever been forced to sex work?’. Responses were categorized under 0 = no, or 1 = yes (if answered yes to any of the questions above).

Previous rape included only previous sexual intercourse without consent and was assessed with the question stated above. Response categories were 0 = no or 1 = yes.

Previous history of being on the Child Protection Register was included as a proxy measure of past family adversity/dysfunction. The Child Protection Register (CPR) includes young people who have been subjected to a child protection plan in the UK. This means that children are believed to be victims or to be at risk of physical, emotional, sexual abuse or neglect (NSPCC, 2016). Participants were asked about this information and where possible, responses were matched against clinical records at the Havens. Response categories were 0 = no or 1 = yes.

Information about the assault was collected from forensic and clinical notes at T0 and included questions about the type of sexual assault, the number of assailants, the relationship with them and whether there was violence during the assault.

Engagement in self-harm was determined with single item questions. Pre-assault self-harm was assessed retrospectively at T0 with the following question: *'In the 12 months before the assault did you self-harm?'* Responses were matched against clinical records, including self-harm information if clear that it happened within this timeframe. Presence of self-harm after the assault was assessed at T1 with this question: *'During this time [since the assault] have you intentionally tried to harm or kill yourself?'* Response categories were 0 = no or 1 = yes for both questions. Participants were also asked about characteristics of self-harm at T1, including the method and intention.

Psychological symptoms were assessed by means of validated questionnaires at T0 and at T1. The Child Revised Impact of Events Scale (CRIES-13) (Perrin et al., 2005) was administered to assess PTS symptoms. This scale consists of 13 items and their developers have reported good face and construct validity. A cut-off score of 30 has been established as an indicator of risk of PTSD (Perrin et al., 2005). The questionnaire showed excellent internal consistency in our sample (Cronbach's $\alpha = .88$ at T0 and $\alpha = .84$ at T1). Depressive symptoms were assessed with the Short Mood and Feelings Questionnaire (SMFQ), a brief rating scale including 13 items that has demonstrated good internal reliability (Angold et al., 1995). A cut-off score of 8 was used to indicate risk for depression (Angold et al., 1995). The internal consistency of the instrument was excellent in our sample (Cronbach's $\alpha = .90$ at T0 and $\alpha = .92$ at T1).

Data analysis

Basic descriptive analyses were run first. Second, to compare those with and without self-harm at T1 (i.e. after sexual assault), the sample was divided into two groups. Bivariate

analyses were conducted to determine differences in terms of sociodemographic, assault and clinical variables, pre-assault vulnerabilities and pre-assault self-harm. Chi-square tests were performed for categorical variables and Mann Whitney U tests were used for quantitative variables given the absence of normality observed in most cases.

Hierarchical binary logistic regression was then conducted to explore significant pre- and post-assault predictors, from those relevant factors identified in the bivariate analyses. Analyses were adjusted for self-harm in the 12 months before the assault and the number of assailants. Given the limited sample size, independent regression analyses were conducted for each predictor.

PTS and depressive symptoms were included in the regression model as categorical variables, establishing two levels for scores below or above the median. This was decided because the majority of participants scored well above the aforementioned cut-offs often used to indicate clinically significant levels of symptoms.

All the analyses were performed with SPSS V.22.0. Missing data ranged from 0% to 23.4% across all variables, with a mean of 5.9% of missing data. Regarding predictor variables, missing data was 17% in history of CPR, 10% in previous rape, 1% in previous sexual abuse, 0% in pre-assault self-harm and ranged from 0% to 2% in the psychological distress measures. We used pairwise deletion for missing data.

Results

Ninety-eight females completed self-harm information at T0 and T1 and were included in the study. Self-harm variables are presented in Table 1 and participant and sexual assault characteristics are presented in Table 2. Participants' median age was 15.60 years and vaginal rape was the most frequently reported type of sexual assault.

The rate of self-harm in the 12 months before the assault (T0) was 39.8% and it remained similar after the assault when assessed at T1 (37.8%). However, there were different self-harm trajectories between T0 and T1 including: new onset, maintenance, remission or no self-harm (Table 1).

In terms of PTS symptoms, 86.7% of the sample scored above cut-off in the CRIES at T0 ($Md = 47$; $IQR = 18$) and 83.7% did at T1 ($Md = 42.50$; $IQR = 19.50$). Regarding depressive symptoms, 86.7% presented with scores above cut-off at T0 ($Md = 15$; $IQR = 10.50$) and 69.4% did at T1 ($Md = 12$; $IQR = 10.25$).

Bivariate analysis

Comparisons between the self-harm and non-self-harm groups at T1 are presented in Table 2. There were no significant differences in sociodemographic or assault variables, with the exception of number of assailants [$X^2(1,97) = 7.56, p = .015$]. The two groups were similar in terms of median age ($U = 1,25, p = .389$).

Table 3 includes the analyses of differences between the two groups in terms of previous vulnerabilities. Only history of being on the CPR was significantly associated with self-harm after the assault at T1 [$X^2(1,82) = 6.36, p = .012$].

Self-harm at T1 was associated with significantly increased depressive symptoms ($U = 1,65, p < .001$) but not with PTS symptoms at T0 ($U = 1,31, p = .176$). Both depressive ($U = 1,48.50, p = .010$) and PTS symptoms at T1 ($U = 1,52, p = .004$) were associated with self-harm at T1.

Predictors of self-harm at T1

The results for non-adjusted and adjusted models are presented in Table 4. In the adjusted model, self-harm before the assault and number of assailants were included in the first step of the regression. Both control variables significantly increased the risk of self-harm at T1 (previous self-harm, $OR = 5.89, 95\% CI 2.27 - 15.22, p < .001$; number of assailants, $OR = 4.11, 95\% CI 1.44 - 11.73, p < .05$).

In the non-adjusted model, history of being on the CPR was strongly associated with self-harm, increasing the odds of self-harming after being assaulted more than three-fold. In the adjusted model, the association was attenuated (Table 4).

Regarding psychological distress, depressive symptoms at T0 and at T1 and PTS symptoms at T1 increased the likelihood of engaging in self-harm at T1 in the non-adjusted models (Table 4). In the adjusted models only depressive symptoms at T0 remained strongly associated with self-harm at T1. The association with depressive and PTS symptoms at T1 was attenuated when controlling for potential confounding factors and the observed difference did not reach statistical significance (Table 4).

Discussion

This is the first study to explore correlates and predictors of self-harm in a sample of sexually assaulted adolescents, using a longitudinal design. Findings demonstrated high rates

of self-harm both pre and post-assault. Self-harm before the assault was the strongest predictor of self-harm after the assault (T1). Depressive symptoms within six weeks of assault (T0) were a strong prospective predictor of self-harm 4-5 months following assault (T1) but PTS symptoms were not. Concurrent psychological distress (depressive and PTS symptoms) and history of family dysfunction were also associated with self-harm at T1, although the strength of the effect was attenuated in the adjusted model. Past history of sexual trauma was not predictive of self-harm in our study.

The rates of adolescent self-harm in our study were significantly higher than those previously reported in community samples of young people (Brunner et al., 2014; Swannell et al., 2014). Rates of self-harm were similar in the sample overall before and after the assault, thus disconfirming our hypotheses that self-harm would increase after the assault. Different self-harm trajectories were found (onset, maintenance and remission). Moreover, percentages of pre- (T0) and post-assault self-harm (T1) were not directly comparable as each question referred to a different timeframe (previous 12 months before assault vs. time from assault to T1 assessment). Rates of pre-assault self-harm (T0) together with history of vulnerabilities in the sample (32% had history of sexual abuse, 18% had experienced a rape in the past and 26.8% had been subject to a child protection plan previously), suggest that this is a distinctive and vulnerable group of adolescents.

Depressive symptoms within six weeks of assault (T0) was the strongest predictor in the study, increasing the odds of self-harming more than 4 times even after controlling for previous self-harm and sexual assault variables. This finding is consistent with previous studies showing a significant association of depressive symptoms and self-harm (Barrocas et al., 2015; Lundh, Wangby-Lundh, Paaske, Ingesson, & Bjarehed, 2011; Madge et al., 2011), including those performed in samples who had suffered traumatic family experiences (Asgeirsdottir et al., 2011). Depressive symptoms 4-5 months post-assault (T1) were also associated with concurrent self-harm, but the relationship became weaker in the adjusted model.

Levels of PTS symptoms were very high in the sample, especially at T0 when 86.7% of participants scored above cut-off in the CRIES. This is consistent with studies showing around 90% subjects reporting increased PTS symptoms after experiencing a recent sexual assault (Darves-Bornoz, 1997; Ulirsch et al., 2014). According to DSM-5 (American Psychiatric Association, 2013), PTS symptoms within four weeks of a traumatic event do not

qualify for a PTSD diagnosis. This fact, together with a possible ceiling effect, might explain why PTS symptoms at T0 were unrelated to self-harm at T1 in our sample. Other studies have found a relationship between the two variables (Jacobson et al., 2008; Weierich & Nock, 2008) but they were not evaluating recent trauma. PTS symptoms at T1, namely approximately 4-5 months after assault, were associated with self-harm at T1. Similarly to depressive symptoms at T1, the strength of the relationship was attenuated in the adjusted model. PTS symptoms might not involve a risk in the short term after trauma, but might be associated with self-harm in the longer term.

History of family dysfunction increased the odds of self-harming 3.6 times. Our findings are in line with a number of studies that have established an association between family adversity/dysfunction and self-harm in young people (Asgeirsdottir et al., 2011; Fisher et al., 2012; Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011). The attenuation of this association in the adjusted model might be related to the loss of statistical power when introducing more variables in the analysis. Wide confidence intervals suggest the need of a larger sample to find statistically significant associations. The fact that direct access to the CPR was not available for the study led to a considerable amount of missing data and might have caused an underestimation of the prevalence of being subject to a child protection plan.

We found that past sexual trauma was unrelated to self-harm at T1 while other studies have demonstrated a relationship in adolescents (O'Connor et al., 2009) and adults (Gladstone et al., 2004). Our results, however, are in line with a meta-analysis reporting no association between childhood sexual abuse and self-harm after controlling for other psychiatric and environmental factors (Klonsky & Moyer, 2008). Past sexual trauma might contribute to self-harm when other risk factors are involved, e.g. family dysfunction.

The study findings need to be considered in light of a number a strengths and limitations. Strengths include the use of a longitudinal design. Despite the high prevalence of adolescent sexual assault high quality evidence on outcomes is scarce. We believe this may be largest sample of sexually assaulted adolescents followed up prospectively to date, with high levels of participant retention to T1 (75%). Participants were individually interviewed by the research assistant increasing the reliability of the information provided, as opposed to written self-report that has been used with school-based samples (Barrocas et al., 2015; Madge et al., 2011). In terms of the limitations, the small sample size reduced the statistical power and the possibility to find significant associations. The recruitment rate was low

(29%), which might reduce the generalization of the findings. However, this rate is in line with previous longitudinal studies involving adult sexual assault victims, in most of which participation rates were less than 45% (Campbell, Sprague, Cottrill, & Sullivan, 2011). We had expected a 30% recruitment rate in our study, anticipating that adolescents might be less willing to participate. A control group would have been necessary to determine the specific effect of sexual assault on adolescents' mental health. Some variables were assessed with one-item questions, limiting the possibility to analyze specific dimensions of the factor (e.g. severity of previous traumatic experiences, characteristics of family dysfunction).

This work has a number of practical implications for professionals working with adolescent populations. When receiving a referral involving sexual assault, clinicians should consider history of sexual victimization, as indicated by high rates of past sexual trauma in our sample. Adolescents who present with self-harm prior to sexual assault and those who are depressed in the aftermath of assault are the most at risk individuals for post-assault self-harm and need to be closely monitored thereafter. Those with increased levels of PTS symptoms in the aftermath, on the other hand, require monitoring for persistence and need for specific intervention, as PTS levels remain high after 4-5 months. Sustained psychological distress after the assault should alert clinicians to the risk of self-harm. Early intervention for psychological symptoms could contribute to prevention or decrease of self-harm. In those with past family dysfunction/adversity social care support or family intervention might be indicated. Finally, the characteristics of the assault should be assessed when clinically possible, since findings point out to worse outcomes when there was more than one assailant.

Future studies should analyze factors associated with different trajectories of post-assault self-harm. The differential relevance of past trauma, psychological distress and social support in relation to pre-existing self-harm as opposed to new onset self-harm should be clarified. Moreover, it would be important to determine resilience factors in the group that has never self-harmed and in those who ceased to do so after the assault. Our findings should be replicated in a larger sample and using a control group. Studies with a longer follow up time could explore whether past sexual trauma and past family dysfunction have a long-term impact on the psychological response.

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Table 1. Self-harm variables (N = 98).

Variable	<i>n</i>	%
Presence of self-harm in the 12 months before the assault		
Yes	39	39.8
Presence of self-harm after the assault (T1)		
Yes	37	37.8
Course of self-harm from before to after the assault		
Never self-harmed	46	46.9
Maintenance	24	24.5
Remission	15	15.3
Onset	13	13.3
Characteristics of self-harm at T1		
Method ¹		
Cutting	29	78.3
Overdose	11	29.7
Other	13	32.7
Intention ¹		
To ease an emotional pain	19	51.3
To die	14	37.8
To hurt or punish self	6	16.2
Other (e.g. to block feelings, distraction)	21	56.7

¹*Note: numbers do not add up since categories are not mutually exclusive.*

Table 2. Participant and sexual assault characteristics and differences between T1 self-harm and non-self-harm groups.

Variable	All participants (N = 98)		Non-self-harm group (n = 61)		Self-harm group (n = 37)		Statistic	p
	n/N ¹	%	n	%	n	%		
Ethnicity								
White	49/98	50.0	25	41.0	24	64.9	$X^2(2,98)$ = 5.48	.065
Black	31/98	31.6	22	36.1	9	24.3		
Other	18/98	18.4	14	23.0	4	10.8		
Socioeconomic status (<i>Family Affluence Scale</i>)								
High	24/75	32.0	12	24.5	12	46.2	$X^2(2,75)$ = 3.75	.153
Medium	38/75	50.7	28	57.1	10	38.5		
Low	13/75	17.3	9	18.4	4	15.4		
Living with at least one biological parent at T0								
Yes	74/98	75.5	50	82.0	24	64.9	$X^2(1,98)$ = 3.64	.056
Vaginal rape								
Yes	69/88	78.4	43	76.8	26	81.3	$X^2(1,88)$ = 0.24	.624
Anal rape								
Yes	14/80	17.5	10	19.2	4	14.3	$X^2(1,80)$ = 0.31	.579
Oral rape								
Yes	38/85	45.8	22	40.0	16	53.3	$X^2(1,85)$ = 1.40	.237
Digital penetration								
Yes	27/76	35.5	16	33.3	11	39.3	$X^2(1,76)$ = 0.27	.601
Physical violence								
Yes	46/82	56.1	30	58.8	16	51.6	$X^2(1,82)$ = 0.41	.523
Number of assailants								
One assailant	72/97	74.2	51	83.6	21	58.3	$X^2(1,97)$ = 7.56	.006
More than one assailant	25/97	25.8	10	16.4	15	41.7		
Relationship with assailant								
Acquaintance	44/94	46.8	29	49.2	15	42.9	$X^2(1,94)$ = 1.98	.372
Relative/partner	15/94	16.0	11	18.6	4	11.4		
Stranger	35/94	37.2	19	32.2	16	45.7		

¹Note: Denominators are all those from the sample with available information on each variable.

Table 3. Differences in pre-existing vulnerabilities between T1 self-harm and non-self-harm groups.

Variable	Sample overall (N = 98)		Non-self-harm group (n = 61)		Self-harm group (n = 37)		Statistic	p value
	n/N ¹	%	n	%	N	%		
Past sexual assault/abuse								
Yes	31/97	32.0	17	28.3	14	37.8	$X^2(1,97)$ = 0.95	.330
Past rape								
Yes	16/89	18.0	9	17.3	7	18.9	$X^2(1,89)$ = 0.04	.845
History of CPR								
Yes	22/82	26.8	10	16.4	12	44.4	$X^2(1,82)$ = 6.36	.012

¹Note: Denominators are all those from the sample with available information on each variable.

Table 4. Independent regressions predicting self-harm at T1 from pre-existing vulnerabilities and post-assault psychological distress.

Variable	Non-adjusted analyses					Adjusted for pre-assault self-harm and number of assailants				
	<i>B</i>	S.E.	Wald	<i>p</i>	OR (95% CI)	<i>B</i>	S.E.	Wald	<i>p</i>	OR (95% CI)
Previous history of CPR	1.28	0.52	6.03	.014	3.60 (1.30,10.01)	0.91	0.58	2.46	.117	2.48 (.80, 7.68)
Depressive symptoms (SMFQ) at T0	1.76	0.46	14.51	<.001	5.83 (2.35,14.43)	1.44	0.50	8.13	.004	4.21 (1.57,11.28)
Depressive symptoms (SMFQ) at T1	1.03	0.43	5.71	.017	2.79 (1.20, 6.50)	0.83	0.49	2.92	.088	2.29 (.885, 5.93)
PTS symptoms (CRIES-13) at T1	1.17	0.44	7.09	.008	3.21 (1.36, 7.58)	0.91	0.49	3.48	.062	2.50 (.96, 6.50)

STUDY 3

PERCEIVED STRENGTHS AS A PROTECTIVE FACTOR AGAINST SELF-HARM IN A SAMPLE OF SEXUALLY ASSAULTED ADOLESCENTS

TITLE: PERCEIVED STRENGTHS AS A PROTECTIVE FACTOR AGAINST SELF-HARM IN A SAMPLE OF SEXUALLY ASSAULTED ADOLESCENTS

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Abstract

Adolescent sexual assault has been associated with an array of negative mental health outcomes, including self-harm. Little is known about protective factors against psychological distress in the aftermath of sexual trauma and there are no previous studies looking at factors protecting against self-harm after this traumatic event. The aim of this study is to determine whether perceived strengths are associated with reduced self-harm in a sample of adolescents who have experienced a recent sexual assault. The sample was recruited from adolescents accessing the Havens, sexual assault centres serving a major UK city (recruitment rate 29%). This study included data collection at T0 (average 3.9 weeks post-assault) and T1 (average 21.8 weeks post-assault). A semi-structured interview collected assault details, social, clinical and self-harm variables at both time points. The Development and Well-being Assessment was administered at T1, including the Youth Strengths Inventory (YSI). Binary logistic regression was conducted to determine the impact of perceived strengths on self-harm at T1. Data are presented for the 63 female participants [Mean age (SD) at assault 15.39 (1.25)] who completed self-harm information at T0 and T1 and the YSI at T1. The rate of self-harm was 38.1% prior to the assault and 41.3% at T1. Binary logistic regression analyses showed that high perceived strengths at T1 were associated with decreased risk of self-harm at T1 ($OR = .89$, 95% CI .80 - .99 $p = .027$), after controlling for history of self-harm and concurrent psychopathology T1. This work demonstrated an inverse association between perceived strengths in adolescents and self-harm after sexual assault. Focused intervention on the development of positive self-appraisal might reduce self-harm. Further prospective research should explore this relationship in more detail while controlling for other protective factors/vulnerabilities.

Background

Adolescent sexual assault has been associated with an array of negative mental health outcomes, including depression, posttraumatic stress disorder (PTSD) symptoms, anxiety, substance misuse and self-harm (Asgeirsdottir et al., 2011; Ford, Elhai, Connor, & Frueh, 2010; Khadr et al., 2018).

Previous studies have mainly focused on mental health difficulties after being sexually victimised, but there is a paucity of evidence regarding protective factors against psychopathology in adolescents. DeCou et al. (2019) showed the mediating effect of coping self-efficacy in the relationship between negative social reactions after sexual assault and PTSD symptoms in university students. Their findings suggest that coping self-efficacy could buffer the effects of lack of social support after the traumatic event. Howell and Miller-Graff (2014) found that higher levels of resilience in young adults with history of interpersonal trauma was associated with spirituality, emotional intelligence and perceived support from friends.

More generally, self-esteem and perceived strengths have been highlighted as a protective factor against psychopathology and impairment. Vidal-Ribas et al. (2015) reported a prospective protective effect of perceived positive attributes on adolescent psychopathology, after controlling for baseline psychological distress and family factors. Moreover, Hoffman et al. (2016) demonstrated a protective effect of perceived positive attributes on school outcomes in the context of low intelligence and high levels of psychopathology.

One of the most worrying outcomes after sexual assault in adolescence is self-harm, given the life risk it involves (Guan et al., 2012). Self-harm has been conceptualised as a coping strategy to manage psychological and interpersonal distress, the former being the most frequently reported reason for self-harm (Nock & Prinstein, 2004). Self-esteem has also been shown to protect against self-injury in community samples (O'Connor et al., 2009; Tatnell et al., 2014). To the best of our knowledge, there are no previous studies looking at factors protecting against self-harm in the aftermath of sexual trauma.

The aim of this study is to determine whether perceived positive strengths in the aftermath of a sexual assault protect against self-harm in a sample of adolescents. We

hypothesised that higher levels of perceived positive attributes would be associated with reduced self-harm after sexual assault.

Method

Participants

The sample was recruited from those adolescents attending the Havens, Sexual Assault Referral Centres serving Greater London, after experiencing a recent sexual assault. This study was part of a larger project investigating the mental and sexual health outcomes after sexual assault in adolescence (Khadr et al., 2018). Inclusion criteria included age between 13-17 years old and seeking help at the Havens within the six weeks after assault. A hundred and forty-one adolescents gave consent to participate in the study (recruitment rate of 29%). Mean age was 15.39 years of age ($SD = 1.25$). Compared to non-participants, participants were more likely to be younger, less likely to be of Asian ethnicity and less likely to have reported past domestic violence (Khadr et al., 2018). There were no other significant differences in terms of sociodemographic and vulnerability factors.

The study included post-assault data collection at T0 (four weeks on average after the assault, range 1 to 6 weeks) and T1 (21.8 weeks on average post-assault, range 15 to 30 weeks). A hundred and six adolescents were retained from T0 to T1 (retention rate of 75.2%). Bivariate analysis showed no differences between those retained at T1 and those lost to follow-up in terms of sociodemographic, assault and clinical variables assessed at T0. Due to the small number of males ($n = 6$) and transgender participants ($n = 1$), only females who completed self-harm and perceived strengths information at both time points were included in the present study ($n = 63$).

Procedure

The study was approved by the National Research Ethic Service Oxford A Committee on March 14, 2013 (ref 12/SC/0339), and funded by the National Institute of Health Research. Study procedure has been described in detail elsewhere (Khadr et al., 2018).

Measures

Sociodemographic variables were evaluated by means of a semi-structured interview (study proforma) conducted by the research assistant.

Regarding sexual assault characteristics, information was collected from forensic and clinical notes at T0 and included questions about the type of sexual assault.

Self-harm before the assault was assessed retrospectively at T0, using the following question '*In the 12 months before the assault did you self-harm?*'. Self-harm after the assault was assessed at T1 with the following question: '*During this time [since the assault] have you intentionally tried to harm or kill yourself?*'. Response categories were 0 = no or 1 = yes for both questions.

Perceived strengths were evaluated by means of the Youth Strengths Inventory (YSI), which is included in the Developmental And Well Being Assessment (DAWBA) (Goodman et al., 2000), a structured diagnostic interview administered at T1. The YSI consists of 19 items and comprises two parts: the first enquires about perceived personal qualities such as affectionate, caring or generous; the second part includes questions about skills or activities the adolescent is good at. Response categories included 0 (*not at all*), 1 (*a little*) and 2 (*a lot*). The YSI showed good internal consistency in the sample (Cronbach's $\alpha = .83$).

Depressive symptoms were assessed with the Short Mood and Feelings Questionnaire (SMFQ), a brief rating scale including 13 items that has demonstrated good internal reliability (Angold et al., 1995). A cut-off score of 8 was used to indicate risk for depression (Angold et al., 1995). The internal consistency of the instrument was excellent in our sample (Cronbach's $\alpha = .90$ at T0 and $\alpha = .92$ at T1). For the purpose of the study, the score on the SMFQ at T1 was used.

The Child Revised Impact of Events Scale (CRIES-13) (Perrin et al., 2005) was administered to assess PTSD symptoms. This scale consists of 13 items and their developers have reported good face and construct validity. A cut-off score of 30 has been established as an indicator of risk of PTSD (Perrin et al., 2005). The questionnaire showed excellent internal consistency in our sample (Cronbach's $\alpha = .88$ at T0 and $\alpha = .84$ at T1). The score on the CRIES-13 at T1 was used for the analysis.

Statistical analysis

The sample was divided in two groups according to the presence or absence of self-harm at T1. Bivariate analyses were run to ascertain differences between groups in the variables of study. Given the absence of normality observed in most variables in the study, Chi-square tests and Mann Whitney U tests were conducted to explore differences between the two groups.

A multivariate logistic regression model was used to determine whether perceived strengths was associated with decreased likelihood of self-harm after sexual assault. First, univariate logistic regression analyses were conducted to select significant variables for the multivariate model. Self-harm at T1 was introduced as the outcome variable and perceived strengths, psychopathology (i.e. depressive and PTSD symptoms) and self-harm before the assault were included as the explanatory variables. Multivariate hierarchical logistic regression was then conducted including significant variables identified in univariate analyses. Confounding variables (history of self-harm and number of assailants) were included in the first step and perceived strengths were included in the second step. Assumptions of logistic regression were tested before performing the analyses (Field, 2009). Linearity was tested by introducing in the model the interaction between the continuous predictors (depressive symptoms, PTSD symptoms and perceived strengths) and their log transformations. If the interaction term was not significant we assumed that the assumption was met. Absence of multicollinearity was tested with the tolerance value and the VIF value, obtained when conducting linear regression. The assumption was considered met when the tolerance value was over .1 and the VIF value was below 10. Moreover, we checked for predictors with large proportions on the same eigenvalues, indicating an association between the variances of their regression. Finally, independence of errors was tested with the Durbin-Watson test, considering values between 1 and 3 as acceptable. Nagelkerke R square was used to determine the effect size of the model. All the analyses were performed with SPSS V.22.0.

Results

Table 1 shows descriptive information about sociodemographic, sexual assault and clinical variables.

Differences between self-harm and nonself-harm groups at T1 were not statistically significant for ethnicity ($\chi^2(2) = 2.04, p = .361$), socioeconomic status ($\chi^2(2)$)

= 2.91, $p = .233$) or history of vaginal rape ($\chi^2(1) = .09$, $p = .764$). There were differences between groups in terms of the living situation ($\chi^2(1) = 3.95$, $p = .047$), with those self-harming being less likely to live with at least one biological parent. History of self-harm was significantly more frequent in the self-harm group ($\chi^2(1) = 15.59$, $p < .001$). The scores on the SMFQ ($U = 1,478.50$, $p = .010$) and the CRIES-13 ($U = 1,522$, $p = .004$) at T1 were significantly higher in the self-harm group when compared to the nonself-harm group, whereas nonself-harmers scored higher on the YSI at T1 ($U = 275$, $p = .004$).

Univariate and multivariate regression analyses are presented in Table 2. In univariate analyses the following variables were significantly associated with self-harm at T1: self-harm before the assault, depressive and PTSD symptoms at T1, perceived strengths at T1.

Before conducting multivariate regression analysis, assumptions for logistic regression were checked. Linearity was violated since the interaction term of PTSD symptoms with its log transformation was significant. Therefore, PTSD symptoms were transformed into a categorical variable by dividing the sample into two categories: below the median (0) and above the median (1). There was no multicollinearity since tolerance values were over .1 and VIF values were below 10. Moreover, there were not two or more variables with large proportions on the same eigenvalue. Finally, the Durbin-Watson value was 1.99, suggesting independence of errors.

Results from the multivariate regression analysis are presented in Table 2. After controlling for history of self-harm before the sexual assault, depressive and PTSD symptoms at T1, perceived strengths was associated with reduced likelihood of engaging in self-harm at T1 ($OR = .89$, 95% CI .80 - .99; $p = .027$). Regarding the control variables, only history of self-harm was significantly and positively associated with self-harm at T1 ($OR = 3.91$, 95% CI 1.10 – 13.86; $p = .035$). The Nagelkerke R-squared statistic for the model was .43.

Discussion

The present study examined the protective role of perceived strengths against self-harm in a sample of adolescents who had experienced a recent sexual assault and were seeking help at specialised Sexual Assault Referral Centres. Most participants had

experienced rape and were presenting with high rates of depressive and PTSD symptoms. Moreover, a high percentage of them were already self-harming before the sexual assault.

Those self-harming at T1 experienced significant higher levels of depressive and PTSD symptoms when compared to the nonself-harm group. This is consistent with models explaining self-harm as a coping strategy to deal with psychological distress (Nock & Prinstein, 2004).

Perceived strengths were significantly associated with reduced likelihood of self-harm after the assault, in both adjusted and non-adjusted regression models. This variable was associated with decreased risk of self-harm even if adolescents were previously self-harming and independently of increased levels depressive and PTSD symptoms. These findings suggest that perceived strengths might buffer the negative psychological outcomes associated with the traumatic event and it might be a protective factor against self-harm in the aftermath of sexual assault. Results build on previous evidence from community samples demonstrating a protective effect of self-esteem against self-harm (O'Connor et al., 2009; Tatnell et al., 2014), extending this association to those who have experienced a recent sexual assault.

The findings need to be considered in light of a number of strengths and limitations. Regarding the strengths, we believe this might be the first study to analyse the protective role of perceived positive attributes on self-harm after sexual assault. Moreover, the study recruited and retained a vulnerable sample of adolescents at a very stressful time in their lives. Limitations include the absence of a pre-assault measure of perceived strengths, not allowing conclusions about the effect of the sexual assault on this variable, and the use of a concurrent design, limiting the possibilities to establish the direction of the relationship between perceived strengths and self-harm. Moreover, only females were included in the analyses and therefore the findings might not apply to adolescent males.

The findings have a number of implications for clinicians working with adolescents. Those presenting with higher levels of depressive and PTSD symptoms after sexual assault might be at higher risk for self-harm. Interventions including coping strategies for psychological distress might reduce symptoms and therefore risk for self-harm. Regarding perceived strengths, focused interventions on self-concept and the

development of skills and prosocial activities might prevent self-harm even if adolescents are presenting with high levels of psychological distress.

Future studies should determine variables underpinning the development of positive self-concept before and after sexual assault and examine the relationship between perceived strengths and self-harm prospectively in order to establish a causal link.

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Table 1. Descriptive variables ($n = 63$)

Variable	
Ethnicity, n (%)	
White	31(49.2)
Black	23(36.5)
Other	9 (14.3)
Socioeconomic status, n (%)	
High	15 (13.7)
Medium	29 (56.9)
Low	7 (13.7)
Living with at least one biological parent, n (%)	
Yes	51 (81.0)
Type of sexual assault ¹ , n (%)	
Vaginal rape	46 (80.7)
Anal rape	7 (13.5)
Oral rape	21 (38.2)
Digital penetration	16 (32.0)
Penetration with object	1 (1.9)
Self-harm in the 12 months before sexual assault, n (%)	
Yes	24 (38.1)
Self-harm after the assault (T1), n (%)	
Yes	26 (41.3)
Depressive symptoms, T1 (SMFQ), median (IQR)	10 (11)
Posttraumatic stress symptoms, T1 (CRIES-13), median (IQR)	43 (21)
Perceived strengths, T1 (YSI), median (IQR)	24 (10)

¹Note: numbers do not add up since categories are not mutually exclusive.

Table 2. Univariate and multivariate logistic regression analyses for predicting self-harm after sexual assault.

Variable	Univariate logistic regression				Multivariate logistic regression			
	β	Odds ratio	95% CI	<i>p</i> -value	β	Odds ratio	95% CI	<i>p</i> -value
Living situation	1.29	3.67	.97 - 13.87	.056				
Self-harm before the assault	1.73	5.66	2.32 - 13.81	< .001	1.36	3.91	1.10 - 13.86	.035
Depressive symptoms (SMFQ)	.08	1.08	1.02 - 1.15	.012	.04	1.04	.94 - 1.15	.413
PTSD symptoms (CRIES-13)	1.17	3.21	1.36 - 7.58	.008	1.17	3.22	.84 - 12.38	.089
Perceived strengths (YSI)	-.13	.88	.80 - .96	.005	-.12	.89	.80 - .99	.027

Note. CI: confidence interval.

Chapter 5

DISCUSSION

5.1. Overall discussion

This thesis focused on correlates and risk and protective factors for self-harming behaviours in different samples of adolescents, with view of prevention. Study 1 consisted of a systematic of prospective studies analysing NSSI correlates in community samples and found a consistent association with female gender, family-related variables, peer victimisation, depression, history of NSSI and self-concept. Study 2 explored pre- and post-assault factors associated with self-harm after experiencing sexual assault in adolescence. There were high rates of self-harm both before and after the assault. Family dysfunction, depressive symptoms at T0 and T1 and posttraumatic stress at T1 were associated with self-harm at T1, although the strength of the associations was attenuated when introducing confounders in the model. Study 3 analysed the protective role of perceived strengths on self-harm after experiencing sexual assault. Perceived strengths at T1 were associated with less likelihood of engaging in self-harm, after controlling for concurrent depressive and PTSD symptoms and history of self-harm.

Despite the sizable differences between community and assaulted samples and the different conceptualisation used (NSSI vs. DSH), there are a number of emerging factors that appear to underpin this maladaptive coping strategy across samples.

Self-harm is a topic of interest for researchers and high quality studies (i.e. prospective, large sample sizes allowing control of multiple variables) are being conducted with adolescents, especially in large community or school-based samples. Moreover, there are investigations all over the world, suggesting this is an issue raising concern internationally.

Worrisome rates of self-harm have been reported by most studies conducted in community samples. Lifetime prevalence of self-injury was as high as 48.7% in older adolescents (Garisch & Wilson, 2015). The variability in rates of self-harm in the systematic review was large, suggesting the need to improve consensus around definition and assessment of the behaviour. Regarding the sample that had experienced sexual assault, rates of self-harm in the 12 months before the traumatic event were also very high. In general, these results point to a frequent use of self-harm in adolescents, whether they belong to a vulnerable population or not.

Sociodemographic factors do not seem to have a prominent role in self-harm, considering lack of associations between variables like socioeconomic status and self-harm in community studies and in the sexually assaulted sample. Female gender appeared to be associated with self-harm, although there were some community studies failing to establish this link. In the sexual assault study, it was not possible to examine the gender variable, since the few male participants were excluded from the analyses to assure homogeneity.

Family functioning and other family-related variables have been shown to have a relevant role in adolescent self-harm. In community studies, multiple prospective investigations have found associations between a myriad of family factors and self-harm. In the sexual assault sample, the relationship was not significant in the adjusted model, possibly in relation to the loss of statistical power. The evidence is mainly focused on family risk factors and studies looking at family resilience are sparse.

Interpersonal victimisation play a relevant role in self-harm but there were few prospective studies in community samples. Regarding evidence from the sexual assault study, the specific impact of sexual assault on self-harm remained unclear, since there was not a control group. Moreover, due to the unpredictability of the traumatic event, participants could not be followed up prospectively before the assault. Previous studies and also the sexual assault study point out to the role of psychopathology and intrapersonal variables like self-esteem leading to self-harm after experiencing interpersonal trauma.

Previous self-harm was possibly the strongest predictor of new self-harm in both community samples and in the assaulted sample. Adolescents engaging in self-harm might be positively and negatively reinforced and continue to use this strategy because it is effective to cope with distress in several ways (Nock & Prinstein, 2004).

Psychological distress has shown a consistent association with self-harm, both generally and in the context of sexual victimisation. Depression is one of the most relevant variables in community samples and also in the immediate aftermath of sexual assault. Studies 1 and 3 have demonstrated the critical role of self-esteem, both as a risk and as a protective factor.

The systematic review did not include studies addressing PTSD symptoms. In the sexual assault study, PTSD symptoms in the immediate aftermath of sexual assault were not associated with self-harm after the assault. However, sustained PTSD symptoms over time were associated with the behaviour. PTSD symptoms might be a normative reaction to a traumatic event and might not necessarily involve increased risk for the adolescent, but symptoms need to be monitored and intervened upon if they do not decrease.

There is a paucity of evidence regarding protective or resilience factors in community and victimised samples. Study 3 showed the protective role of perceived strengths after experiencing sexual assault. Despite the limitations of this study, which will be addressed in the strengths and limitations section, this variable seems promising in terms of planning preventive interventions. Even if adolescents are experiencing depressive and PTSD symptoms, perceived positive attributes can improve their coping strategies and prevent self-harm.

Contradictory findings in the systematic review suggest that self-harm is multidetermined and is associated with complex interactions of inter and intrapersonal factors. Moderators and mediators could help the understanding of these interactions, but have received little attention in prospective studies.

The systematic review highlighted a number of factors relevant in prospective studies. However, it should be borne in mind that the absence of other variables in our conclusions does not mean that they are not associated with self-harm, but need to be studied with a prospective methodology to increase the quality of the findings.

Regarding the sexual assault study, descriptive information points to a vulnerable sample of adolescents, with high rates of pre-assault self-harm and history of prior sexual victimisation. Efforts from different agencies regarding prevention of revictimisation need to improve, since the sample included a sizable percentage of participants who were revictimised rather than victimised.

In line with previous studies, sexual assault variables were mostly unrelated with self-harm, with the exception of the number of assailants. The mechanisms underpinning this association are unclear, since no previous studies have explored this

association. It could be hypothesised that being abused by more than one assailant might increase feelings of disgust and pose a higher threat to bodily integrity.

5.2. Strengths and limitations

The findings need to be considered in light of a number of strengths and limitations. In terms of Study 1, the following limitations have been identified:

- Meta-analysis was not possible given the high heterogeneity of the studies included, which used different measures for assessing self-injury and also the correlates or risk factors.
- There are relevant variables that have been previously linked with self-harm (e.g. PTSD symptoms, social media) that were not included in any of the selected studies, and therefore no conclusions could be drawn about their predictive ability.
- Since the review included mainly school-based samples, those presenting higher levels of distress and impairment might have been absent at the time of the assessment (Jacobson & Gould, 2007).

Study 1 included the following strengths:

- The focus on community samples is relevant in terms of prevention since most adolescents who self-harm do not present for help.
- The inclusion of prospective studies improves the validity of the conclusions of the review, clarifying the direction of the relationship (risk factor leading to subsequent self-injury).
- The overall quality of the studies included was acceptable, improving the robustness of our conclusions.

Studies 2 and 3 presented the following limitations:

- Despite that fact that this might be largest sample of sexually assaulted adolescents that have been followed up prospectively to date, the sample size was relatively small. This reduced the statistical power necessary to detect significant associations. The limited sample size did not allow for mediation

analyses. This might have clarified whether there is a link between pre-assault vulnerabilities and post-assault psychological distress in terms of the prediction of self-harm.

- The recruitment rate was relatively low (29%), possibly reducing the generalisation of the findings. However, this recruitment rate was in line with what was expected, considering that longitudinal studies of adult sexual assault victims have achieved a recruitment rate lower than 45% (Campbell et al., 2011). The study team anticipated that adolescents might be less likely to participate.
- The study did not include a comparable control group, which would have allowed for conclusions about the specific effects of sexual assault in adolescents' mental health.
- Pre-assault vulnerabilities and self-harm were assessed by means of one-item questions, limiting the possibilities to determine the specific nature of past sexual abuse or family dysfunction, or the severity of self-harm. This type of evaluation was included to shorten the time of assessment for participants, who were adolescents experiencing high levels of emotional distress after being assaulted. Previous studies addressing self-harm have included one-item assessments (Baetens et al., 2014; Mars et al., 2014).
- Study 3 involved a cross-sectional analysis of the relationship between perceived strengths and self-harm at T1, not allowing for conclusions about the direction of the relationship.

On the other hand, these are some of the strengths that should be highlighted in Studies 2 and 3:

- The study included a prospective design, improving the conclusions about the direction of relationships. This is especially relevant to identify early predictors of the onset and continuation of self-harm after experiencing sexual assault. The characteristics of the traumatic experience were assessed soon after it happened, limiting potential memory bias.
- To our knowledge, Study 2 is the first study to systematically analyse

predictors and correlates of self-harm in adolescence after a recent sexual assault. Study 3 is the first to explore the role of perceived strengths as a protective factor against self-harm after being exposed to sexual trauma.

- A sample of vulnerable and distressed adolescents was recruited and followed up, achieving a high retention rate 4-5 months after the assault (75%). The low attrition in the study was due to the efforts of the research assistant (Venetia Clarke), who maintained a warm and respectful climate during the assessments and who was available to schedule multiple appointments in case the participant needed to cancel.
- Participants were individually assessed and the study researcher clarified any doubts, increasing the reliability of the data.

5.3. Clinical implications

The studies included in this thesis have a number of implications for clinicians working with adolescents.

Some variables have demonstrated an association with self-harm across different samples and clinicians should therefore pay special attention to them in terms of self-harm prevention. Depressive symptoms, family dysfunction, previous self-harm and perceived strengths (or self-esteem) have shown a consistent association with self-harm. Clinicians could regularly assess these variables even if the presenting complaint is not self-harm. Adolescents might be more willing to disclose these difficulties rather than disclosing self-harm. When these difficulties are present, clinicians should ask about present and past self-harm and continue to monitor the risk over time. Interventions aimed at reducing depressive symptoms, improving family dynamics and fostering a healthy and positive self-concept should be implemented in specialised adolescent mental health services. Regarding prevention, school-based interventions could be put in place, conducting primary prevention strategies and identifying the most vulnerable individuals that should be referred to mental health clinics.

The results from the systematic review of prospective predictors of self-injury could help the development of an assessment tool that includes the most relevant factors that have demonstrated a causal link with self-injury. This is especially relevant considering the low rates of adolescents seeking help after self-harm (the iceberg

model) and the fact that most parents and carers are unaware of self-injury in their children. This assessment tool could be used in schools to screen for the most at risk individuals that need specialised help.

The findings provide support for models conceptualising self-harm as a coping strategy for psychological distress (Nock & Prinstein, 2004). Therefore, alternative coping strategies, such as strategies from Dialectical Behaviour Therapy for emotion regulation (Linehan, 1993b), should be taught to adolescents who self-harm.

The association between perceived strengths and self-harm after sexual assault highlights the importance of promoting skills and positive attributes in the clinical context. Solution-focused interventions such as the strengths-based therapy by Matthew Selekman (2010), might foster resilience in the context of psychological distress and interpersonal trauma.

Clinicians working with adolescents should bear in mind a number of issues when receiving a referral involving sexual assault. Firstly, history of previous victimisation should be enquired, as well as family functioning and current levels of family support. Considering the high rates of revictimisation present in the sample, clinicians need to be reassured that there are no current abuse-related risks for the adolescent. When the adolescent reports lower levels of family support, liaison with social services and/or family therapy might be indicated. Those presenting with high levels of depressive symptoms and history of self-harm appear to be the most at risk individuals and should be offered frequent appointments. Assessing PTSD symptoms is essential after sexual trauma and levels of PTSD should be monitored over time. If levels of PTSD symptoms do not decrease with time, specific trauma-focused interventions, such as trauma-focused cognitive behavioural therapy should be offered.

5.4. Future research

Considering the findings from the systematic review of predictors, future studies could develop and validate a brief assessment tool aimed at screening adolescents at risk for self-harm in the community. Prospective studies could determine whether this screening tool could accurately predict self-injury.

Future studies should replicate the findings of Study 2 and 3 using a larger sample of assaulted adolescents and including relevant variables identified in the literature such

as peer influence. Family function and history of sexual victimisation should be addressed in more detail to determine which are the most relevant dimensions in terms of self-harm.

Given the importance of pre-assault and post-assault factors demonstrated in this study, future investigations should explore the links between distal and proximal risk factors, using mediation and moderation analyses.

Interventions specifically addressing a recent sexual assault in adolescence should be developed. They should include help for all the variables that have been identified as relevant (reduction of acute psychological symptoms, alternative strategies to cope with distress, fostering family support). An acute intervention might differ from those put in place when the sexual abuse happened in the remote past.

Previous research has identified multiple classes of self-harmers in community (Barrocas et al., 2015) and clinical samples (Klonsky & Olino, 2008), which present different associated factors. Future studies should analyse whether there are different classes of self-harm in adolescents who have been sexually assaulted. According to our results, a sizable percentage of adolescents were already self-harming and continued to do so after the assault. It should be ascertain whether this constitutes a specific class with certain correlates associated and specific needs.

Finally, future research should focus on protective factors both in community samples and in adolescents who have experienced sexual assault.

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