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Rebecca E. Ballinger
Loma Linda University

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LOMA LINDA UNIVERSITY
School of Behavioral Health
in conjunction with the
Department of Psychology

Treatment Options for Adolescent Non-Suicidal Self-Injurious Behavior:
A Systematic Review

by

Rebecca E. Ballinger, M.A.

Project submitted in partial satisfaction of
the requirements for the degree of
Doctor of Psychology

June 2013

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Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree Doctor of Philosophy.

_____, Chairperson
Kimberly R. Freeman, Associate Professor of Psychology

Adam Arechiga, Associate Professor of Psychology

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ABBREVIATIONS

AAU	Assessment as Usual
ADAPT	Adolescent Depression Antidepressants and Psychotherapy Trial
BDI	Beck Depression Inventory
BHS	Beck Hopelessness Scale
BPD	Borderline Personality Disorder
CABS	Child and Adolescents Bipolar Services
CASE	Child and Adolescent Self-Harm in Europe
CAT	Cognitive Analytic Therapy
CBT	Cognitive Behavior Therapy
CONSORT	Consolidating Standards of Reporting Trials
DBT	Dialectical Behavior Therapy
EFT	Emotion-Focused Therapy
FASM	Functional Assessment of Self-Mutilation
GCC	Good Clinical Care
H-TAU	Historical Treatment as Usual
K-SADS-PL	Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime Version
MDD	Major Depressive Disorder
PDD	Pervasive Developmental Disorder
RCT	Randomized Clinical Trial
SHBQ	Self-Harm Behavior Questionnaire
TAU	Treatment as Usual

TORDIA Treatment of SSRI –Resistent Depression

ABSTRACT OF THE DISSERTATION

Treatment Options for Adolescent Non-Suicidal Self-Injurious Behavior:
A Systematic Review
by

Rebecca Ballinger

Doctor of Psychology, Graduate Program in Psychology
Loma Linda University, June 2013

Dr. Kimberly R. Freeman, Chairperson

Dr. Adam Arechiga, Chairperson

A systematic review was conducted using four different databases and seven different search terms to address the following points: (1) what types of clinical treatment programs are currently being used to address self-harming behaviors in adolescents, (2) how do each of these programs define self-harm, (3) what theory guides these intervention programs, (4) and how effective are these programs at reducing self-harming behaviors in adolescents? Nine final studies were identified and the quality of the reporting of these studies was assessed using an extension of the CONSORT 2010 (Consort Group, 2010) checklist for pragmatic studies. The results of this study found a diverse range of treatment options available, differing definitions of self-harm as well as theories guiding the treatment interventions across all 9 studies, and varying degrees of effectiveness. Finally, of the three studies that reported success, two of these studies utilized DBT (and one other pilot study using DBT found a notable reduction in self-harm, but not significance); therefore, this review highlights the fact that DBT is a promising therapeutic approach for treating adolescent self-harm and is worthy of more rigorous research designs that can more fully evaluate its efficacy.

CHAPTER 1

INTRODUCTION

Adolescent self-harm is a relatively new public health concern that is gaining more and more attention in the mental health research literature. Self-harm is defined as the deliberate harming of one's body without the intention of suicide (Favazza, 1998). Self-harm is understood to be to be a maladaptive coping strategy intended to relieve negative emotions such as anger, anxiety, frustration, or guilt. Common acts of self-harm include cutting, burning, and punching, usually resulting in minor injury. Less common, more serious forms of self-injury, can include self-poisoning, risky sex, and drug overdose.

Adolescent self-harm is a serious public health concern because it affects the individual child, the family in which the adolescent functions, and society as a whole. The presence of self-harm in adolescence is associated with recurrent psychosocial problems such as poor affect regulation abilities, deficits in problem-solving skills, and deficits in the use of social supports compared with non-injuring peers (Andover & Gibb, 2010; Nock & Favazza, 2009; Nock, Joiner, Lloyd-Richardson & Prinstein, 2006). The treatment of self-harm places considerable demands on mental health services, in that these adolescents are showing up in emergency rooms, inpatient mental health hospitals, general mental health intensive outpatient tracks, as well as in traditional outpatient therapy (Andover & Gibb, 2010; DiClemente et al. 1991; Gratz, Conrad & Roemer, 2002; Hawton, Rodham, & Evans, 2006; Klonsky, Oltmanns & Turkheimer, 2003; Laye-Gindhu & Schonert-Reichl, 2005; Meulenkamp et al., 2012; Nock & Prinstein, 2004). Most alarmingly, though, self-harm is associated with future suicide attempts (Hawton et

al., 1999; Laye-Gindhu & Schonert-Reichl, 2005), both in adolescence and in adulthood. As such, self-harm in adolescents is a serious problem that needs to be addressed more effectively through treatment programs specifically targeting the self-harming behaviors by the mental health community.

Research indicates that self-injury tends to first occur during adolescence and that a significant portion of adolescents are likely to engage in self-injury during their lifetime. Community samples suggest that 13-45% of adolescents have engaged in self-injury at some point in their lifetime (Plener, Libal, Keller, Fegert & Muehlenkamp, 2009) with even higher rates of 40-60% estimated among clinical samples (Darche, 1990; DiClemente et al. 1991). The wide variation in the estimated rate of self-injury is partly due to the fact that measures of self-harm have not been included in any of the large-scale mental health epidemiologic surveys, thereby making it difficult to narrow down actual rates of self-harm. In addition, Meulenkamp et al. (2012) points out that because of the many similar, but different, definitions of self-injury used in the research literature, the different assessment methods utilized to assess for self-harm in community samples, the frequency of self-injury required to meet criteria, and the characteristics of the sample and recruitment methods used in these studies also contribute to the confusion over prevalence rates.

Given that adolescent self-injury is a serious and growing concern for the mental health community, it is, therefore, imperative that these adolescents have access to treatment programs that aim to address the unique characteristics of self-injury. Traditional outpatient treatment programs might not adequately solve the common presenting problems that are unique to adolescents who self harm (i.e. emotion regulation

difficulties, problems with internalizing negative emotions, interpersonal effectiveness problems) and evaluative research studies need to be conducted in order to assess which treatment programs are helping adolescent self-harmers and which ones are not as effective. Further, research articles that report pre and post data (whether they are randomized clinical trials, quasiexperimental designs, or comparison studies) are of most use to clinicians seeking the assessment of effective treatment programs for these adolescents. However, a consistent problem within the literature on adolescent self-harm is that these types of research studies are few and far between.

Given the above, the purpose of this study is to present a systematic review of the literature examining interventions that focus treatment exclusively, or in part, on adolescents who display self-harm behaviors. A review of 4 different databases and 7 different search terms was carried out and the articles identified by the database search were further narrowed down by title review, abstract review, and then a full body review. Finally, 9 studies were identified to fit all of the criteria needed to answer the questions involved in this current systematic review. These 9 final studies were then submitted to the CONSORT extension for pragmatic trials to assess for reporting quality. This process was carried out in order to answer the following questions:

1. What types of clinical treatment programs are currently being used to address self-harming behaviors in adolescents?
2. How do each of these programs define self-harm?
3. What theory guides these intervention programs?
4. How effective are these programs at reducing self-harming behaviors in adolescents?

CHAPTER 2

LITERATURE REVIEW

The following literature review will discuss important background information regarding self-harm and current research information in the field. Following this information, an examination of the current literature in the areas of prevalence rates and types of self-harm will be presented. Finally, a discussion on the definitions for self-harm used in the literature, theories used to guide treatment programs for adolescents who self-harm, and an overview of treatment programs discussed in the current body of scientific literature will be presented.

Self-Harm

As pointed out above, self-harm is defined as the deliberate harming of one's body without the intention of suicide (Favazza, 1998). Essentially, self-harm is a purposeful decision to harm one's body through behaviors such as cutting, burning, or punching oneself as a way to deal with the uncomfortable negative emotions being experienced by the individual. Self-harm is considered to be a maladaptive way of dealing with stressful environments and situations, and oftentimes adolescents resort to self-harm as a coping mechanism because they do not have the skills necessary to understand how to cope in these situations in a healthier way (Miller, Glinski, Woodberry, Mitchell & Indik, 2002). While self-injury may bring a momentary sense of calm and a release of tension, it's usually followed by guilt and shame (Andover, Pepper, & Gibb, 2010) and the return of painful emotions (Meulenkamp et al., 2012). Self-injury may be linked to a variety of mental disorders, such as depression, eating disorders and

borderline personality disorder (Hawton, Kingsbury, Steinhardt, James, Fagg, 1999; Laye-Gindhu & Schonert-Reichl, 2005; Nock, 2009).

Prevalence Rates

Because self-harm is oftentimes hidden (i.e. injuries might not be obvious to the casual observer), it is difficult to understand the prevalence rates in the general community. Further, the many definitions and descriptions of self-harm within the research community contribute to the difficulty in agreement in prevalence rates (Laye-Gindhu & Schonert-Reichl, 2005; Meulenkaamo et al., 2012). For example, one study found that 13.9% of 440 high school students engaged in self-harming behaviors (Ross & Heath, 2002) while another study found 15% of 424 high school students endorsed having a history of self-harming behaviors (Laye-Gindhu & Schonert-Reichl, 2005). A Swedish test-retest study investigating 7th and 8th grade students found that 40% of students reported having engaged in at least one self-harming behavior during the past 6 months. Two months later, 36% of students endorsed having engaged in a self-harming behavior (Bjärehed & Lundh, 2008). Perhaps one of the largest studies to survey 30,477 adolescents aged 14-17 in Europe, the Child and Adolescent Self-Harm in Europe (CASE) study, found 11.1% of adolescents endorsed having had at least one experience with a self-harming behavior. Another study looked at 424 American high school students and found that while 42% reported some type of self-harm ideation experience, 15% responded that they had actually engaged in at least one form of self-harm behavior in their lifetime (Laye-Gindhu & Schonert-Reichl, 2005).

Within the clinical community, incidence rates of self-harm are reportedly even higher. There is some evidence to suggest that rates of self-harm in adolescent psychiatric inpatients range from 30% to 40% (Jacobson, Meulenkamp, Miller, & Turner, 2008). This indicates that self-harm among many different psychiatric diagnoses is a significant problem in both inpatient and outpatient communities and needs to be addressed.

Overall, even though researchers disagree on prevalence rates, they do agree that self-harm rates for adolescents in many countries are on the rise (Klonsky, Oltmanns, & Turkheimer, 2003; Ross & Heath, 2002; Scoliers et al., 2009). This could be due to more adolescents around the world experiencing higher levels of stress (Madge, et al., 2008) or that self-harm in adolescents is gaining interest in the research community and more research is being done in this area than ever before (Gratz, Conrad, & Roemer, 2002). In addition, medical professionals, parents, and teachers have become more aware of the signs and symptoms of self-harm and are better able to identify adolescents who need help (Rodham & Hawton, 2009).

Types of Self-Harm

The most recognizable form of self-harm is probably the cutting of one's skin, either on the arm, leg, back, or abdomen. Adolescents who are intent on cutting themselves have been known to use razor blades, pieces of glass, finger nails, and the sharp cutting object from a pencil sharpener. Other forms of self-harm behaviors included in recent research studies consists of biting oneself, eating disordered behaviors, reckless behaviors such as jumping off the roofs of buildings, bone breaking from falls or jumps, burning oneself, severely scratching the skin to cause an open wound, and wound picking

(Hawton, Rodham, & Evans, 2006; Laye-Gindhu & Schonert-Reichl, 2005; Madge et al., 2008; Nock et al., 2006).

Other studies have investigated less well-known behaviors such as ingesting a substance in excess of the prescribed dose or ingesting a recreational or illicit drug (Hawton, Rodham, Evans & Harriss, 2009), ingesting a non-ingestible substance or object (Hawton, Rodham, & Evans, 2006), and/or hanging, strangulation, and electrocution (Madge et al., 2008). In addition, reckless behaviors such as promiscuous sexual behavior is also considered a form of self-harm when the intent of putting oneself in this dangerous situation is to experience pain (Laye-Gindhu & Schonert-Reichl, 2005; Madge et al., 2008; Nock, Prinstein & Sterba, 2010).

Definitions of Self-Harm

When an adolescent engages in NSSI, it is generally not carried out for the purpose of dying; rather, the individual is attempting to experience temporary relief of his or her negative emotions by concentrating on the physical pain and not on the emotional pain (Bjärehed & Lundh, 2008; Meulenkamp et al., 2012; Nock, Prinstein & Sterba, 2010). In contrast, if the harmful act (i.e. cutting one's wrist) has the intent to bring about death, then this act ceases to be considered self-harm and is now considered a suicidal act. Therefore, it is important for researchers to specify exactly how they operationalize the term self-harm as this has important implications in interpreting study results (Rodham & Hawton, 2009).

Because the area of self-harm is only recently gaining interest in the research community, clear-cut definitions for the factors that comprise self-harm do not seem to

exist (Laye-Gindhu & Schonert-Reichi, 2005; Rodham & Hawton, 2009). There are as many different definitions for self-harm as there are research articles on the subject. For instance, Laye-Gindhu and Schonert-Reichi (2005) define self-harm as a, “deliberate and voluntary physical self-injury that is not life-threatening and is without any conscious suicidal intent.” Nock, et al., (2006) builds on this definition to also include in their research that self-injury must involve the destruction of bodily tissue. Some researchers don’t even provide a definition of self-harm; instead they list certain specific behaviors that they believe comprise self-harm. In their research, Hawton, Rodham, and Evans (2006), Hawton, Rodham, Evans, and Harris (2009), and Madge et al., (2008) listed specific criteria of behaviors that had to be met instead of a broad definition of self-harm. In spite of a general lack of consensus in defining self-harm in the research community, there is general agreement among researchers that adolescents who self-harm do so without the intent to commit suicide (Laye-Gindhu & Schonert-Reichi, 2005; Nock, et al., 2006; Rodham & Hawton, 2009).

Theories of Self-Harm

It is understood in current research that adolescents overwhelmingly turn to self-harm as a coping strategy in order to distract themselves from their internal, negative feelings. It is a way to take focus away from uncomfortable emotional pain and, instead, focus on physical pain. Oftentimes, self-harm is used to reduce stress, anxiety, feelings of depression, anger, self-punishment, loneliness, and as a way to distract themselves from their everyday problems (Meulenkamp et al., 2012; Nock, Prinstein, & Sterba, 2010). This strategy of coping with emotional distress is very short-sided. While the adolescent

self-harmer might experience a short-term reprieve from their pain, their internalization of stress, anxiety, or whatever negative feeling they are trying to cope with eventually comes back, including feelings of guilt and shame for also engaging in the self-harm act (Sim, Adrian, Zeman, Cassano, & Friedrich, 2009). Therefore, self-harm becomes an ineffective coping mechanism because it does not solve the original negative feelings and it can also initiate new, compounding feelings of guilt and shame.

Current research on adolescent self-harm has also uncovered apparent psychological deficits that many adolescents who self-harm appear to have in common. Mikolajczak, Petrides, and Hurry (2009) hypothesize that adolescents who turn to self-harm as a coping mechanism do so because they possess inadequate adaptive coping strategies. This study looked at 490 British high school students (27% reported having used self-harm as a coping strategy) and found that self-harm was positively related to the use of maladaptive coping strategies. Further, they found the opposite to also be true – that adolescents who did not self-harm were positively related to using adaptive coping strategies. Therefore, this study appears to suggest that an adolescent's available resources, such as their coping ability, is directly related to whether or not they will self-harm.

In addition to a having a greater maladaptive-to-adaptive coping style (Mikolajczak, Petrides, & Hurry, 2009), another study suggests that adolescents who self-harm make the decision to hurt themselves during an overwhelming emotional state (Ross & Heath, 2003) and with little consideration of the consequences (Madge, et al., 2008). In one study, over 70% of adolescents who endorsed having self-harmed at least once, reported making the decision to self-harm while experiencing overwhelming

emotions such as self-hatred, anger, and sadness (Sim, Adrian, Zeman, Cassano, & Friedrich, 2009). Another study looked at when the adolescent decided to self-harm. This study found that 48% of the adolescents who reported having self-harmed in the past year made the decision within an hour of the self-harming episode, while 22% made the decision after an hour but before a week, and 29% made the decision a week prior to the incident (Madge, et al., 2008). It appears that if adolescents are making such a dramatic decision to harm themselves hastily and under severe emotional distress, perhaps an intervention can be instituted to teach them to use a more adaptive way of coping.

Finally, a very dangerous aspect to self-harm is the fact that while the self-harm behavior initially started out as a way to cope with uncomfortable internalized feelings, it is theorized that it can become a very addictive coping skill that eventually becomes the adolescent's go-to coping strategy for more and more of the adolescent's problems (Nixon, Cloutier, & Aggarwal, 2002). Several researchers have suggested that such behaviors can eventually become habituated over time, and the increased tolerance for pain can result in more daring forms of self-harming behaviors (Selby, Bender, Gordon, Nock, & Joiner, 2012) including future suicide attempts (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006).

Given the above, psychological treatment programs geared specifically toward adolescents who self-harm are important for long-term wellbeing of this population. These treatment programs can help adolescents who self-harm develop healthy coping mechanisms to replace the maladaptive self-harming behaviors. Further, programs that address the emotional dysregulation difficulties, communication problems with family members, and interpersonal troubles will more effectively target the underlying issues

shown to be associated with the decision for adolescents to self-harm (Andover, Pepper, & Gibb, 2010).

Given the above, effective treatment programs for self-harming adolescents are crucial for addressing the dangerous behaviors associated with self-harm in order to reduce possible future suicide attempts in the adolescent's future. Recent studies have shown that the number of methods for self-harm and the number of years engaged in self-harm are related to the number of lifetime suicide attempts (Andover & Gibb, 2010; Nock et al., 2006). Therefore, addressing self-harm behaviors in adolescents, before the adolescent has time to escalate their self-harming behavior to more dangerous behaviors, is crucial in reducing future suicidal behavior.

Finally, as with any type of mental health treatment program, the ultimate goal for any treatment program aiming to reduce adolescent self-harming behaviors is to help adolescents live healthier and more adaptive lives. It has been shown that adolescents who self-harm also often suffer from poor self-esteem (James, Taylor, Winmill, Alfoadari, 2008), lack communication skills (Slee, Spinhoven, Garnefski, & Arensman, 2008), and possess ineffective emotional regulation abilities (Nock et al., 2009). Therefore, adolescents who begin treatment with the goal of reducing their self-harming behaviors will hopefully also gain many other secondary, and complementary, behavioral skills.

Treatments

With self-harming such a prevalent problem for adolescents, it is imperative that help be available for them. Adolescents that attempt to help themselves to stop self-

harming behaviors are often unsuccessful (Rissanen, Kylmä & Laukkanen, 2009). One study reported that almost half of the self-harming adolescents that they surveyed did not receive any kind of help for their behavior and continued using self-harm as a coping mechanism (Ystgaard, Arensman, Hawton, Madge, van Heeringen & Hewitt, 2009). For the adolescents that did receive help, 32.8% received help from their social networks (e.g. friends and family members) and 18.8% sought help from the medical community. Another recent study investigated if adolescents sought help before they actually engaged in a self-harming behavior. They found that only 46.7% of the adolescents that endorsed a self-harming episode in the last year actually tried to seek some kind of help before engaging in a self-harm incident, with females more likely than males to want help (Evans, Hawton, & Rodham, 2005).

A review of current research has revealed a wide-range of approaches to treating self-harm behaviors in adolescents, but many of these programs have not been rigorously tested for effectiveness (i.e. they were not compared to a treatment as usual group). Some studies have theorized that Emotion-Focused Therapy (EFT) could be useful in treating individuals who self-harm because of its focus on maladaptive emotional regulation, but it has yet to be empirically studied (Kimball, 2009; Slee, Spinhoven, Garnefski, & Arensman, 2008). Another paper described a weekly group therapy program based upon Kelly's Personal Construct Theory (Moran, Pathak, & Sharma, 2009), but did not provide any data as to whether or not this program was successful. One study investigated psychotherapy plus a psychopharmacology component. Specifically, Asarnow et al.'s (2011) secondary analysis of the TORDIA study examined whether any of the intervention groups (medication only or medication plus CBT therapy) decreased self-

harm behaviors in adolescents who had a history of self-harm only, suicide attempt only, both, or no history of suicide attempt or self-harm. Overall, this study found that adolescents receiving CBT plus a SSRI medication switch led to a decrease in depressive symptoms; however, when taking into account self-harm history at baseline, there were no significant effects found when assessing for a reduction in self-harm behaviors at the end of the study.

Some treatment programs in the research literature have reported some success in treating adolescent and young-adult self-harm. Robinson et al., (2012) looked at whether or not sending an intervention explained on a postcard once a month to participants aged 15-24 with a history of self-harm would lead to a decrease in self-harm behaviors in the participants receiving the postcards versus those in a TAU group. This postcard study, while looking at both adolescents and young adults, found a decrease in self-harm episodes from baseline to follow-up for those the group allocated to the intervention group. Ougrin et al. (2011) also found significant effects when instituting a brief therapeutic intervention during the initial psychosocial interview. This study found that those adolescents who received the therapeutic assessment (TA) as opposed to assessment as usual (AAU) were more likely to attend the follow-up therapy session, as well as these adolescents also attended a greater number of future therapy sessions than their counterparts in the AAU group. Therefore, it appears that monthly reminders of coping skills and a brief educational overview of why therapy is so important in treating self-harm behaviors in adolescents can lead to a decrease in self-harm behaviors in adolescents.

Research studies investigating Dialectical Behavior Therapy (DBT) have reported some success in treating self-harming behaviors as well (James, Taylor, Winmill, Alfoadari, 2008; Linehan et al., 2006). One study showed a reduction in self-harming behaviors in adult females (Linehan et al., 2006) while another demonstrated a decrease in self-harming behaviors in adolescent girls (James, Taylor, Winmill, Alfoadari, 2008; Linehan et al., 2006). Because DBT therapy was initially designed for adults, there are many more studies available for review with the adult population. Research into the effectiveness for DBT therapy with adolescents is in the early stages, and more research is needed to fully evaluate whether or not this type of therapy is useful for the adolescent population.

A review of the literature also found one study reporting a successful treatment program for adolescent self-harmers, but a replication study carried out several years later could not verify the results of the original study. Specifically, Wood, Trainor, Rothwell, Moore, & Harrington's (2001) clinical trial of developmental group therapy versus routine care found that the developmental group therapy format was more effective at decreasing the number of self-harm episodes by the seven-month interview than the routine care group. In contrast, Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington's (2009) replication study of the Wood et al., (2001) study found no benefit of group psychotherapy over routine care.

Current Research Limitations

Although previous research studies may report on clinical treatment interventions for adolescent self-harm (whether self-harm is the primary or secondary research goal),

there does not exist a systematic review outlining and organizing all the studies purporting to treat adolescent self-harm. A review of the literature in this area is important for several reasons. First, it is important for clinicians to be able to quickly reference what treatment programs are currently available. Secondly, a report outlining the effectiveness of current treatment programs is essential for clinicians to judge whether or not the treatment program is worth implementing. Finally, a reporting of the quality of these studies using a highly-regarded assessment instrument is essential for the reader of the study to judge the validity of its reporting.

As such, the goal of this study is to thoroughly review current research literature in order to find all relevant research articles reporting on treatment programs purporting to help adolescents who self-harm. By doing so, we can become more informed about the how the research community is defining the broad term of 'self-harm', what theories guide these treatment programs, what kinds of treatment programs have been researched, and the outcomes of these research studies.

CHAPTER 3

METHOD

Database Search Parameters

A computer database search of PsycINFO, Cochrane Library, PubMed, and Google Scholar was conducted, using the following search terms: “non-suicidal self-injury AND adolescent AND treatment,” “NSSI AND adolescent AND treatment,” “self-injury AND adolescent AND treatment,” “deliberate self-harm AND adolescent AND treatment,” “DSH AND adolescent AND treatment,” “cutting AND adolescent AND treatment,” and “self-mutilation AND adolescent AND treatment.” All searches were limited to full text papers published in academic journals. Selections were excluded if they were book chapters or dissertations.

Studies were included if they presented quantitative data on the effectiveness of a clinical treatment program that involved adolescent participants who self-injured. The aim was to include as many randomized clinical trials as possible (since this is the most rigorous type of testing of an intervention), but quasi-studies, pilot studies and pre-post test design studies without a control group were also included in this review because they could also contain valuable information on treatment effectiveness. Many studies were excluded because of the following reasons: the study was a case study or a pharmaceutical trial; participants were adults only; participants included adolescents and adults, but the results of the study did not differentiate between adolescents and adults; or the treatment program included self-injury as a symptom, but the program was really designed to treat a different problem (such as head-banging in Autism).

Identification and Selection of Studies

As seen in Figure 1, the initial database search yielded a total of 31,129 hits, which included the following results in each database: PsycINFO (346 results), Cochrane Library (Cochrane Collaboration, 2009; 20 results), PubMed (7,102 results), and Google Scholar (23,661 results). The 23,661 results in Google Scholar included some repetition of published articles. For example, many of the 346 results from the PsycINFO database search were also included in the 23,661 hits of the Google Scholar database search. Therefore, because of the large number of overall hits, it is difficult to identify an exact number of original studies identified in the database search.

In order to narrow down the search to include only those studies that would adequately answer the research questions identified by this systematic literature review, the next step included a review of all titles identified in the original database search. Many papers were excluded in this step due to their obvious ineligibility. For example, many titles included the fact that the papers were case studies, pharmaceutical trials, examining an unrelated psychological diagnosis such as autism, or were describing a treatment program that did not include a clinical trial of that program. As such, this step excluded 30,651 studies, but left 478 eligible studies for the next step. The 478 studies were then subject to an abstract review to further examine their eligibility in answering the identified research questions and this step excluded 389 studies and left 89 studies. The bodies of these 89 studies were then further reviewed and 80 studies were again excluded, which left a total of 9 final studies for the quality assessment process. The final 9 studies were then included as part of the quality review process and examined in order to answer the research questions.

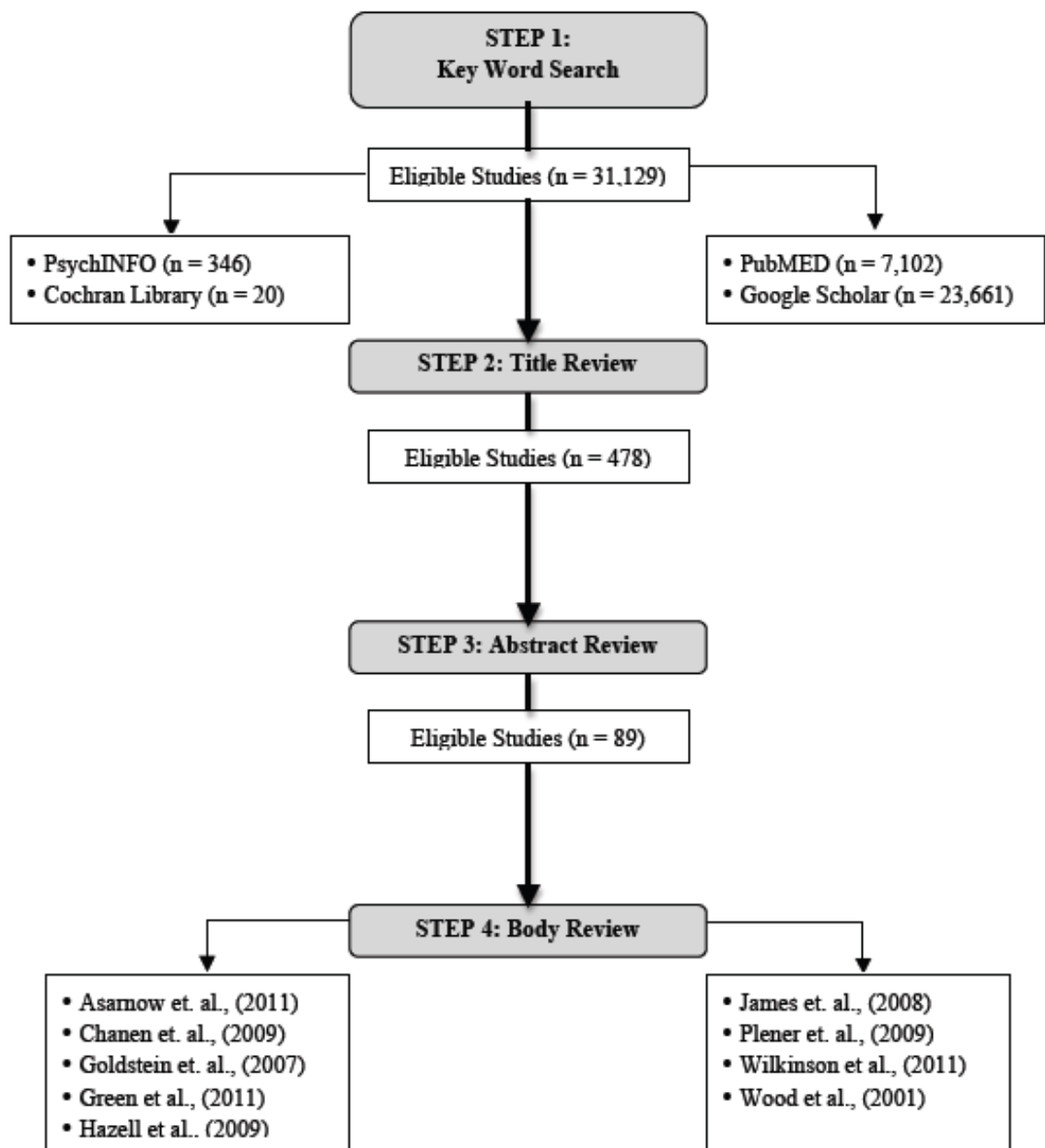


Figure 1. CONSORT 2010 flow diagram

Quality Assessment

In order to assess for overall quality of the studies that met the final criteria, the 22-item extension of the CONSORT (Consolidating Standards of Reporting Trials) statement specifically designed for pragmatic trials (Zwarenstein, et., al., 2008) was utilized. The CONSORT statement is primarily utilized to assess randomized controlled trials, but it has been extended to cover many other designs, such as non-inferiority and equivalence trials, and reporting of harm-related data (Boutron, Altman, Schulz, & Ravaud, 2008; Higgins et al., 2011). The checklist, published in 1996 and revised in 2001, 2008, and 2010, comprises a set of guidelines that may be used to identify the strengths and weaknesses of clinical trials for both pharmacologic and non-pharmacologic treatments (Des Jarlais, Lyles, & Crepaz, 2004).

For the purposes of this review, the CONSORT extension for pragmatic trials (scientific studies that are designed to measure the effectiveness of a specific treatment intervention) was deemed most appropriate for a thorough review of the 9 final studies. As seen in Figure 2, in order to consistently track quality across all 9 studies, a three-point grading system was used for each CONSORT criterion, similar to the systematic review conducted by King, Delfabbro, Griffiths, and Gradisar (2011).

Consort Items*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	% Met	Intervention Successful?		
Author, Year																										
Asamow et. al. (2011)	●	●	●	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	55%	No	
Chanen et., al. (2009)	●	●	●	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	59%	No
Goldstein et., al. (2007)*	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	43%	No
Green et., al. (2011)	●	●	●	○	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	95%	No
Hazell et al. (2009)	●	●	●	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	80%	No
James et., al. (2008)*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	46%	Yes
Plener et., al. (2009)*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	27%	Yes
Wilkinson et., al. (2011)*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	41%	No
Wood et al. (2001)	●	●	●	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	75%	Yes

As defined by the Extended CONSORT Checklist of pragmatic trials, Zwarenstein et., al. (2008)
○ No Information reported on the CONSORT item; ○ Some information reported on the CONSORT item; ● All/Most information reported on the CONSORT item
* Indicates study with only pre-post data only for one intervention and no comparator

Figure 2. Summary of CONSORT checklist results by study

The primary reviewer (RB) and secondary reviewer (VZ) noted whether or not the item was not present at all (0), whether the feature was partially present such as some aspects of the CONSORT item were missing or unclear; (6), or if the CONSORT item was present and clear (4). In instances where the CONSORT item was not present due to inherent limitations of the study design (e.g., lack of randomization on a pilot study), the item was noted to not be present at all (0). By applying the CONSORT criteria to all relevant sections of each study, an overall summary of the study's quality as a clinical trial was produced.

CHAPTER 4

RESULTS

Description of Studies

The results of the analysis of the nine final studies can be found in Table 1. All nine of the final studies were randomized clinical trials, comparison studies, or pilot studies of treatment interventions that addressed adolescent self-harm in an outpatient program. Two studies (Asarnow et al., 2011 and Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011) examined the effects of a medication switch (SSRI or venlafaxine), with or without Cognitive-Behavioral Therapy (CBT) while the remaining seven studies examined psychotherapy treatments only. Six of the studies included a group therapy component (Asarnow et al., 2011; Chanen et al., 2009; Goldstein, Axelson, Birmaher, & Brent, 2007; Green et al., 2011; Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001) and one utilized a music therapy plus Dialectical Behavior Therapy (DBT) intervention (Plener, Sukale, Ludolph, & Stegemann, 2009). Two studies purported to use a developmental group psychotherapy aspect (Green et al., 2011 and Wood, Trainor, Rothwell, Moore, & Harrington, 2001) in that both interventions were designed to meet the specific needs of adolescents who were in the process of maturing both psychically and psychologically. Finally, one study (Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011) used the data from a large study on adolescent depression (the Adolescent Depression Antidepressants and Psychotherapy Trial; ADAPT) that also included pre and post data on self-injury. This study was useful to include in this review because it provided important data

gathered from a large pool of participants on an intervention assessing the effectiveness of using medication with and without a CBT therapy group.

The three pilot studies included in this review (Goldstein, Axelson, Birmaher, & Brent, 2007; James, Taylor, Winmill, & Alfoadari, 2008; and Plener, Sukale, Ludolph, & Stegemann, 2009) provided valuable information in evaluating the types of treatment programs currently being considered for research. Pilot studies in general aim to test the logistical soundness of a proposed study in order to evaluate the quality and efficiency of the future, large-scale experiment. While pilot studies are typically small in comparison to the proposed future experiment (and therefore can only provide limited information on the effectiveness of the interventions used), it was decided to use these pilot studies in this review because the outcomes garnered from these studies (while preliminary) are still valuable to researchers and clinicians when evaluating treatment programs for adolescents who self-harm.

Another notable aspect of the studies evaluated in this review is the wide range in the numbers of participants used, as well as the length of time each treatment intervention was administered across all nine trials. As Table 1 shows, the pilot studies used the smallest number of participants, with Goldstein et. al., (2007), James et. al., (2008), and Plener et. al., (2009) using ten, sixteen, and five participants respectively. The other nine studies employed far more participants: Wood et. al., 2001 (n=63); Hazell et. al., 2009 (n=72); Chanen et. al., 2009 (n=110); Wilkinson et. al., 2011 (n=164); Asarnow et. al., 2011 (n=327); and Green et. al., 2011 (n=366). In terms of treatment length, Hazell et. al., (2009) had the shortest treatment length at six weeks, followed by Plener et. al., (2009) at 3 months, Asarnow et. al., (2011), Wilkinson et. al., (2011) and Wood et. al.,

(2001) at six months, and Goldstein et. al., (2007), Green et. al., (2011) and James et. al., (2008) with a year-long treatment model. Chanen et. al., (2009) also included a six month treatment length, but they had the longest follow-up evaluation at 2 years after the start of the treatment program.

Table 1
Selected characteristics of treatment studies for adolescent self-harm

Author	Definition of NSSI	Type of Clinical Program	Theory	N	Characteristics	How NSSI was Measured	Conclusion
Asarnow et. al. (2011)	Self-injurious behavior resulting in physical damage with no explicit or implicit intent to die	1. Change to another SSRI 2. Change to venlafaxine 3. Change to another SSRI plus CBT 4. Change to venlafaxine plus CBT	None	32 7	Range: 12-18 Yrs Mean: 15.9 Yrs 69.7% Female 30.3% Male	Structured interview	While they found an overall reduction in self-harm behaviors for the entire group, the results were not significant
Chanen et. al. (2009)	None	1. Treatment as usual 2. Cognitive analytic therapy 3. Manualized good clinical care	Cognitive Analytic Theory	11 0	Range: 15-18 Yrs Mean: 16.3 Yrs 82% Female 18% Male	Parasuicidal behavior was assessed on semi-structured interview	They found no statistical difference between groups with regard to rates of self-harm at baseline, six months, one year, and two-year assessment periods basically stayed the same
Goldstein et. al. (2007)	None	DBT only pilot study	Cognitive Behavioral Theory	10	Range: 14-18 Yrs Mean: 15.8 Yrs 80% Female 20% Male	Nonsuicidal self-injurious behavior were assessed using five K-SADS-DRS items	Pre/post comparison of the K-SADS-DRS item assessing for self-harm behavior (item 30) showed a decrease in self-harm behaviors, but the decrease was not significant

Green et., al. (2011)	The non-accidental overdose of toxic substances or non-accidental self-inflicted injuries such as scratching, cutting, burning, burning, or strangulation	1. Manual-based developmental group psychotherapy based on Wood et. al., (2001) study 2. Routine care	Developmental theory; Cognitive behavioral theory	36 6	Range: 12-16 Yrs Mean: 15.3 Yrs 89% Female 11% Male	Interview based on a previously-validated self-harm interview schedule	They did not find a significant decrease in self-harm in either group at the six-month or at the one-year mark
Hazell et al. (2009)	Any intentional self-inflicted injury (including poisoning, except if the poisoning was a result of excessive use of recreational drugs) irrespective of the apparent purpose of the behavior	1. Manual-based developmental group psychotherapy based on Wood et. al., (2001) study 2. Routine Care	Cognitive behavioral theory	72	Range: 12-16 Yrs Mean: 14.57 Yrs 91% Female 9% Male	Interview-based assessment of suicidal behavior	More adolescents allocated to the intervention group engaged in self-harm by the 6 month mark than those adolescents in the routine care group, which was significant. Similar results were noted at the 12-month follow-up mark, although these results were nonsignificant
James et., al. (2008)	An act with a non-fatal outcome in which an individual deliberately did one or more of the following: self cutting; jumping from a height which they intended to cause harm; ingesting a	Dialectical Behavior Therapy only	Cognitive behavior theory	16	Range: 15-18 Yrs Mean: 16.4 Yrs 100% Female 0% Male	The number of episodes of DSH per week was determined by clinical interview	They found a reduction in self-harm behaviors assessed by clinician interview with the participants at baseline and one year

<p>substance in excess of the prescribed or generally recognized therapeutic dose; ingesting a recreational or illicit drug that was an act that the person recognized as self-harm; ingesting a non-ingestible substance or object</p>	<p>Deliberate, direct destruction of body tissue, without conscious suicidal intent, that is socially unacceptable and repetitive and leads to minor or moderate harm</p>	<p>Music therapy plus DBT program only (no comparison group)</p>	<p>Music theory Cognitive behavior theory</p>	<p>5</p> <p>Range: 14-16 Yrs Mean: 14.8 Yrs</p> <p>100% Female 0% Male</p>	<p>Functional Assessment of Self-Mutilation (FASM) Self-Harm Behavior Questionnaire (SHBQ)</p>	<p>Of the five participants who took part in this pilot study, four out of five showed a decrease in self-harm behaviors</p>
<p>Wilkinson et., al. (2011)</p> <p>Self-injury was defined as at least one nonsuicidal self-injury act as a response to the "nonsuicidal self-damaging acts" item on the (K-SADS-PL)</p>	<p>1. Fluoxetine with CBT 2. Fluoxetine with standard support</p>	<p>Cognitive behavior theory</p>	<p>16</p> <p>4</p> <p>Range: 11-17 Yrs Mean: 14.2 Yrs</p> <p>58% Female 42% Male</p>	<p>The Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL)</p>	<p>The rate of self-harm stayed the same during the treatment period (A between-groups comparison was not carried out to compare which group had better outcomes in regard to a</p>	

decrease in self-harm)

Wood et al. (2001)	Any intentional self-inflicted injury, irrespective of the apparent purpose of the act	<ol style="list-style-type: none"> 1. Manualized developmental group psychotherapy 2. Routine care alone 	A mix of developmental, CBT, DBT, problem-solving, and psychodynamic theories	63	Range: 12-16 Yrs Mean: 14.2 Yrs 78% Female 22% Male	Interview-based assessment of repetition of self-harm, depressive symptoms, and suicidal behavior Schedule for Affective Disorders and Schizophrenia for School-Age Children (KSADS) Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA)	Adolescents who attended the developmental group therapy condition developed for this study tended to have fewer episodes of self-harm than adolescents who received the routine care condition
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Patient Characteristics

The characteristic of age was slightly different across the nine final studies. As summarized in Table 1, Wilkinson et al., (2011) and Asarnow et. al., (2011) had the widest range in terms of age, using participants aged 11-17 years and 12-18 years, respectively. Green et. al., (2011), Hazell et al., (2009), and Wood et al., (2001) all used adolescents aged 12-16 years, while Goldstein et al., (2007) used participants aged 14-18 years, thereby giving these researchers an age range of 4 years. Chanen et al., (2009) and James et al., (2008) used participants aged 15-18 years old, and Plener et al., (2010) had the smallest age range of 2 years by only using adolescents aged 14-16 years. As one would expect, most participants involved in the studies were female (Asarnow et. al., 2011 = 69.7% female; Chanen et al., 2009 = 82% female; Goldstein et al., 2007 = 80% female; Green et. al., 2011 = 89% female; Hazell et al., 2009 = 91% female; Wilkinson et al., 2011 = 58% female; and Wood et al., (2001) = 78% female). In fact, James et al., (2008) and Plener et al., (2010) used all females and no males at all in their studies.

Participants in the nine final studies represented four different countries (United States, England, Germany, and Australia) and two differing recruiting methods (recruited directly from the community versus referred by professionals from community mental health clinics). The Asarnow et. al., (2011) study recruited participants from the general community in the United States and the Goldstein et al., (2007) study recruited them from the Child and Adolescents Bipolar Services (CABS) specialty clinic at the Western Psychiatric Institute, University of Pennsylvania. The Green et al., (2011), James et al., (2008), and Wood et al., (2001) studies recruited adolescents from child and adolescent mental health clinics in different districts of England. Participants from the Wilkinson et

al., (2011) study were selected based on specified inclusion criteria (i.e. history of self-harm) from the data of a large-scale depression study (ADAPT) carried out by the British National Service Clinics. Hazell et al., (2009) recruited their participants from three different mental health clinics in Australia and participants in the Plener et al., (2009) study were from a community in Germany. Only the Chanen et al., (2009) study did not report how they recruited participants for their study.

Most of the studies required that the adolescents have a previous diagnosis of Major Depressive Disorder (MDD; Asarnow et. al., 2011; Wilkinson et al., 2011), Borderline Personality Disorder (BPD; Chanen et al., 2009), or Biopolar I or II Disorder (Goldstein et al., 2007). Several studies assessed for previous history of self-harm only without a diagnosis of a mood or personality disorder (Green et al., 2011; Hazell et al., 2009; James et al., 2008; Plener et al., 2009; Wood et al., 2001). Many of the studies excluded possible participants if they had a previous diagnosis of Pervasive Developmental Disorder (PDD), psychosis, mental retardation, autism spectrum disorder, eating disorder, or substance abuse.

Measures Used

Table 1 summarizes the different measures used to assess for self-harm episodes. Six studies used a structured or semi-structured interview to ascertain the number of self-harm episodes at baseline and follow-up (Asarnow et al., 2011; Chanen et al., 2009; Green et., al., 2011; Hazell et al., 2009; James et., al., 2008; Wood et al., 2001). Three studies used part or all of the Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime Version (K-SADS-PL; Goldstein et., al.,

2007; Wilkinson et al., 2011; and Wood et al., 2001). In addition to the structured interview and the K-SADS-PL, the Wood et al., (2001) study also employed the Health of the Nation Outcome Scales for Children and Adolescents to further assess self-harm behaviors in adolescents. The Plener et al., (2009) study was the only article in the final nine studies to use the Functional Assessment of Self-Mutilation (FASM) and Self-Harm Behavior Questionnaire (SHBQ). Thus, it is clear that the research community disagrees on how best to measure self-harm behaviors in adolescents.

Definition and Theory

Six out of nine of the final studies included a definition of self-harm. Only Chanen et al., (2009) and Goldstein et al., (2007) did not address a foundational definition of self-harm; instead, they alluded to the fact in their introduction that self-injurious behaviors were those that were self-inflicted, irrespective of whether or not they were intended as a suicidal act. While Wilkinson, Kelvin, Roberts, Dubika, & Goodyer (2011) did not include a definition of self-harm in their study, they used a positive response from “nonsuicidal self-damaging acts” item on the K-SADS-PL to define self-harm for their study. As such, the primary aim of these three studies was to investigate the outcome of an intervention on rates of suicide attempt and suicidal ideation, as well as on deliberate self-harm.

James, Taylor, Winmill, & Alfoadari (2008) actually listed specific behaviors in their definition of self-harm. They stated that an act of self-harm was a deliberate, non-fatal behavior where the individual participated in one or more of the following: self cutting; jumping from a height which they intended to cause harm; ingesting a substance

in excess of the prescribed or generally recognized therapeutic dose; ingesting a recreational or illicit drug that was an act that the person recognized as self harm; or deliberately ingesting a non-ingestible substance or object. This definition of self-harm leaves very little room for any other purposeful and potentially harmful behavior (such as burning one's self or restricting food intake as a way to experience pain). Therefore, this definition does not take into account many other forms of self-harm that might not be as popular as those mentioned in the definition.

The definition used by Plener, Sukale, Ludolph, and Stegemann (2009) is similar to other definitions of self-harm by including the fact that it is deliberate and causes harm to the individual; however, these researchers include acts that have a suicidal intent if the self-injurious act of the individual was not explicitly conscious to the individual at the moment of the self-harm act. In addition, they also include in their definition that the self-injurious act is one that is deemed to be socially unacceptable and is repetitive. No other definitions included in this review include the caveats of social acceptability or repetitiveness in their definitions.

Green et. al., (2011), Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009), and Wood, Trainor, Rothwell, Moore, & Harrington (2001) appeared to be in agreement with their definition of self-harm. All three studies outlined a definition of self-harm as a self-inflicted injury that did not take into account the intended purpose of the act. This act of self-injury could have occurred with the intent to die or not. For example, an act such as a broken arm from a fall off of a roof (which was meant as a suicide attempt) would be classified as deliberate self-harm in the instance that the suicidal act was not successful.

The above definitions of self-harm are not the definition that most current studies investigating deliberate self-harm utilize. Only the Asarnow et al., (2011) study fits with the more current definition of deliberate self-harm. They state that deliberate self-harm is a, “self-injurious behavior resulting in physical damage with no implicit or explicit intent to die.” This definition is more in line with researchers such as Laye-Gindhu and Schonert-Reichi (2005) and Nock et al., (2006) who assert that, “deliberate and voluntary physical self-injury that is not life-threatening and is without any conscious suicidal intent.” This definition includes that caveat that the physical injury did not occur as a result of a suicide attempt.

Interventions Used

Many of the studies in this review involved group psychotherapy programs. Goldstein, Axelson, Birmaher, & Brent (2007) and James, Taylor, Winmill, & Alfoadari (2008) used Dialectical Behavior Therapy (DBT) for their intervention group. DBT (Linehan, 1993) is an evidence-based psychotherapy program originally developed for adults with borderline personality disorder that targets both behavioral and emotional dysregulation. It makes sense to use DBT with adolescents who self-injure because research has shown that these adolescents often experience extreme emotions, high sensitivity to emotional stimuli, and acute impulsivity which often leads them to give in to the urge to cut without really thinking through the consequences of their actions.

Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009), Green et al., (2011) and Wood, Trainor, Rothwell, Moore, & Harrington (2001) both reported using the same developmental group psychotherapy interventions. Wood, Trainor, Rothwell,

Moore, & Harrington (2001) initially developed this manualized program that was developed using aspects of problem-solving and cognitive behavioral therapies. This intervention aimed to target school problems, difficult peer relationships, family problems, anger management, depression and self-harm, and hopelessness regarding the future. The Green et al., (2011) and Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009) studies aimed to replicate Wood's study as well as to include a cost effectiveness component to implementing this group psychotherapy program. The main difference between these three studies was that the initial study only lasted 6 months (Wood, Trainor, Rothwell, Moore, & Harrington, 2001), while the other two studies lasted longer. Green et al's., (2011) study involved providing the psychotherapy group plus routine care and the participants were allowed to leave the group whenever they felt ready (assessments were given at 6 months and 12 months after beginning the group). Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington's (2009) study consisted of an initial engagement phase lasting 6 sessions and the optional attendance in a long-term maintenance group, with attendance lasting up to one year.

There were two studies included in this review (Asarnow et al., 2011 and Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011) that examined the role of medication (venlafaxine or fluoxetine) with or without a Cognitive Behavior Therapy (CBT) group. Asarnow et al. (2011) included four different treatment conditions: (1) change to another SSRI, (2) change to venlafaxine, (3) change to another SSRI plus attendance in a CBT group, (4) and change to venlafaxine plus attendance in a CBT group. Wilkinson, Kelvin, Roberts, Dubika, & Goodyer's (2011) study was much simpler. They examined the use of fluoxetine with attendance in a CBT group or the use

of fluoxetine with attendance in a standard support group. The results of these studies provide important information to clinicians on the integration of psychotropic medication with psychotherapy treatment programs.

The Chanen et al., (2009) study compared Cognitive Analytic Therapy (CAT) with both manualized Good Clinical Care (GCC) as well as to routine care. CAT is a time-limited, integrative psychotherapy program specifically designed for the treatment of Borderline Personality Disorder in adults (Ryle & Kerr, 2002). The Chanen et al., study (2009) adapted CAT to include adolescents who self-harm by using the same techniques that were originally developed for adults on the adolescents in the study. The GCC intervention is a therapy program developed specifically for the Chanen et. al., (2009) study. GCC was designed to address specific public health factors of routine psychotherapy treatment commonly believed to affect the outcome of treatment (i.e. availability, accessibility and duration of therapy, institutional prestige and general factors associated with receiving therapy). Therefore, this study had many different areas of interest, but they provided pre and post data on self-harm that was of interest to this review.

Finally, the last study included in this review implemented a very creative approach to addressing adolescent self-harm. Plener, Sukale, Ludolph, and Stegemann (2009) combined a music therapy program with DBT. At first glance it might appear that music therapy does not have much to do with treating self-harm, but the authors of this study hypothesize that music therapy may fulfill a similar purpose as self-harm for the adolescents. For example, they state that music therapy may aid in affect regulation, mindfulness, and positive interpersonal expression through creating music and lyrics.

Including the DBT skills in this group was thought to further help the adolescents learn other important coping mechanisms, to help with communication problems, distress tolerance, and emotion regulation.

Outcomes and Conclusions of Studies

The final outcome of each of the nine final studies were very diverse in terms of whether or not the intended intervention strategy actually led to a decrease in adolescent self-harm. While each of the nine final studies aimed to tackle a decrease in adolescent self-harm using different intervention tactics (e.g. through group psychotherapy, therapy plus psychopharmacology, or music therapy combined with CBT), either the intervention was noted to not have led to a decrease in adolescent self-harm, or it appeared that this behavior decreased, but with a caveat.

One study reporting a successful treatment intervention for adolescents who self-harm was the pilot study carried out by James, Taylor, Winmill, & Alfoadari (2008). These authors undertook a preliminary pilot study (with no comparison group) examining the pre/post data involving sixteen female adolescents who undertook six months of DBT therapy. They found a reduction in self-harm behaviors assessed by clinician interview with the participants at baseline and one year ($F = 23.95, df = 2, p < .001$). Furthermore, the study also found a decrease from baseline to conclusion of the study in Beck Depression Inventory (BDI) depression scores ($F = 12.79, df = 2, p < .001$), Beck Hopelessness Scale (BHS) hopelessness score ($F = 15.97, df = 2, p < .001$), and an increase in general functioning (based on the GAF score; $F = 22.95, df = 2, p < .001$). The

results of this study suggest that a DBT based intervention program may be successful in treating adolescent self-harm as well as reducing depression and hopelessness.

The creative music therapy program carried out by Plener, Sukale, Ludolph, and Stegemann (2009) also appeared to show a reduction in self-harm behaviors from baseline to the conclusion of the study. This study was another pilot study (no comparison group) that investigated a unique program that integrated music therapy with DBT groups. Of the five participants who took part in this pilot study, four out of five showed a decrease in self-harm behaviors. One participant did not self-injure at all throughout the 12-week program, while the other three participants went from self-harming from 1-7 days per week to not self-harming at all during all seven days of the last week of the treatment program. Only one participant self-harmed throughout the entire program and did not show any decrease in severity of self-harm behaviors. Therefore, the results of this study appear to show some success in reducing self-harm behaviors in adolescents with a combination music therapy/DBT treatment program.

Asarnow et al.'s (2011) analysis of the TORDIA study found mixed results. While they found an overall reduction in self-harming behaviors when looking at the participants as a whole, they did not find significant results when examining the pre/post data. This study grouped the participants into the following groups: participants with no history of self-harm, history of self-harm behaviors only, history of suicide attempt only, and history of self-harm and suicide attempt. Results of this analysis found that at week 24 (after 24 weeks of the adolescents receiving one of the 4 treatment conditions) 3% of adolescents with no self-harm history engaged in at least 1 self-harm episode ($n = 6/172$) versus 14% of adolescents with a self-harm history ($n = 11/78$), 3% of adolescents with

history of suicide attempt only ($n = 1/31$), and 24% of adolescents with a history of both self-harm and a suicide attempt ($n = 11/46$). The median time for the initial self-harm event after starting the treatment condition for the adolescents as a whole was 3 weeks.

When examining any positive effects of the treatment conditions (medication switch (SSRI or venlafaxine) only, or medication switch with the addition of cognitive-behavioral therapy group sessions), the analyses revealed that youths receiving combined CBT plus a medication switch were more likely to have a positive treatment response than youths receiving the medication switch alone (Brent et al., 2008), however, this positive effect was not significant. Therefore, by further analyzing the participants of the study based on their previous history of self-harm behaviors, it is apparent that the TORDIA treatment did not have a significant positive effect on adolescents with a history of self-harm, as 18% of adolescents were still engaging in self-harm behaviors at the conclusion of the TORDIA treatment.

It is important to note that three of the final nine final studies were related in that two studies (Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009 and Green et al., 2011) were both attempts to replicate an original study (Wood, Trainor, Rothwell, Moore, & Harrington, 2001). Wood et al.'s (2001) study found that adolescents who were randomly allocated to a group therapy intervention (utilizing the developmental group psychotherapy that they specifically designed for this study) tended to have fewer episodes of self-harm (mean = 0.6, 95% CI 0.3 to 0.9) than adolescents who received the routine care allocation (mean = 1.8, (95% CI 0.6 to 3.0) at the 7-month interview. Further, this study found the mean time for first repetition of self-harm was longer for the adolescents who attended the group psychotherapy intervention (11.9 weeks, SD 6.3

weeks) than those adolescents who received routine care (7 weeks, SD 6.3 weeks), with a mean difference of 4.9 weeks (95% CI 0.0 to 9.8), which was statistically significant ($t_{30} = 2.1, p < .05$). In addition, this study also investigated the risk of being a “repeater” (an adolescent with two or more episodes of deliberate self-harm at the time of the 7-month follow-up interview). Using the Cox regression model, they found that those adolescents who received the group psychotherapy intervention were less likely to “repeat” their self-harm behavior ($n = 2/32$ or 6%) than those adolescents who received routine care ($n = 10/31$ or 32%), with an odds ratio of 6.3 (95% CI 1.4 to 28.7).

Hazell et al.’s (2009) attempt at replicating Wood et al.’s (2001) study was not successful. Hazell’s study was carried out in the same manner as Wood’s study (examining the effectiveness of developmental group psychotherapy versus routine care) except that Hazell interviewed the adolescent participants at 6 months and 12 months (versus Wood’s 7-month follow-up interview) after the six-session treatment condition was administered. Overall, Hazell reported not being able to reliably estimate the mean number of the self-harm episodes of the adolescents in the study at the 6 month and 12 month follow-up, but was able to report that a greater proportion of the adolescents in the intervention group ($n = 30/34$ or 88%) engaged in some form of self-harm at the 6 month follow-up than those adolescents in the routine care group ($n = 23/34$ or 68%), which was significant ($X^2 = 4.19, p = .04$). This trend was also noted at the 12-month interview (although it was nonsignificant at $X^2 = 3.24, p = .07$) with 88% of the adolescents ($n = 30/34$) in the intervention group engaging in self-harm behaviors versus 71% of adolescents ($n = 24/34$) receiving routine care.

The most recent attempt at a replication of the Wood, Trainor, Rothwell, Moore, & Harrington (2001) study was also unsuccessful at showing significant findings that a group developmental intervention versus routine care showed a decrease in self-harm behaviors. Green et. al., (2011) compared a manualized developmental group therapy program that included an acute phase of 6 weekly sessions followed by booster sessions of weekly groups for as long as needed to routine care. They found that the cohort (n=364; n=164 in Routine Care group and n=164 in Developmental Group) as a whole showed improvement from baseline to follow-up. Specifically, at baseline, 94/364 patients self-harmed while there was a decrease in self-harm behavior at the six-month follow-up at 56/364 reported engaging in this behavior and only 28/364 reported NSSI at the one-year mark. However, the proportional odds ratio of group therapy versus routine care between the two groups found no significant differences at the six-month mark (0.99, CI 0.68 to 1.44, P=0.95) or at the one-year mark (0.88, CI 0.59 to 1.30, P=0.52). Therefore, this study could not confirm that a developmental group psychotherapy treatment group was superior to treatment as usual.

The four remaining studies did not find a significant reduction in self-harm behaviors in adolescents who self-harm. Chanen et al. (2009) compared two manualized treatment programs (Cognitive Analytic Therapy (CAT) versus Good Clinical Care (GCC)) using 110 participants over a treatment period of twenty-four months. They found no statistical difference between groups ($X^2(6, n=108) = 5.59, p = 0.47$) and rates of self-harm at baseline, six months, one year, and two-year assessment periods basically stayed the same. Another study with a psychopharmaceutical component compared a treatment group that included pairing the medication Fluoxetine with a CBT group and

Fluoxetine with a standard support group. This study's primary investigative outcome was adolescent depression and suicidality, but did include a report on self-harm. This secondary analysis showed that 58 of the 164 adolescents involved in this study (36%) had at least one act of self-harm in the month before baseline and 60 participants reported at least one act of self-harm (37%) during the 28-week treatment period. A between-groups comparison was not carried out to compare which group had better outcomes in regard to a decrease in self-harm; however, it appears that, when looking at the cohort as a whole, adding Fluoxetine with either CBT or standard care is not effective in reducing self-harm behaviors.

A pilot study carried out by Goldstein, Axelson, Birmaher, & Brent (2007) found a decrease in self-report self-harm behaviors, but this decrease was not significant. This study evaluated the pre/post data of ten participants (no comparison group) receiving DBT therapy over the course of one year. Pre/post comparison of the K-SADS-DRS item assessing for self-harm behavior (item 30) was not statistically significant (paired $t = 2.1$, $p = .06$, $d = 0.8$), but it is noteworthy that no self-injurious acts were reported during clinician interview during the treatment period. While this study did not produce significant effects, it shows promise in reducing self-harming behaviors in adolescents; therefore, future research utilizing an RCT should be conducted to fully evaluate its effectiveness.

Methodological Quality

The quality of the studies varied a great deal and is summarized in Figure 2. Five out of the nine studies were randomized controlled trials that included a comparison

group (Asarnow et al., 2011; Chanen et al., 2009; Green et al., 2011; Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001). The other four studies included 3 pilot studies with very small numbers of participants (Goldstein, Axelson, Birmaher, & Brent, 2007; James, Taylor, Winmill, & Alfoadari, 2008; and Plener, Sukale, Ludolph, & Stegemann, 2009) and 1 comparison study that examined baseline data with completion data from a very large study that measured self-injury as well as depression and suicide (Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011). The more details reported in the study (such as explanation of randomization allocation, blinding procedures, and participant flow), the higher the overall score in terms of quality. Therefore, because five of the studies were RCTs, these studies were able to inherently appear to be of higher quality because they included more of the details required by the CONSORT 2010 checklist than the non-RCT studies.

As seen in Figure 2, the most left out items of the CONSORT checklist were the items explaining the determination for sample size, randomization procedures, ancillary analyses, and adverse events (harms). Even though Chanen et al., (2009) was an RCT trial, the authors of this study did not report their method of randomization including sequence generation, allocation concealment, and who was principally in charge of allocating and assigning participants to the groups. In addition, while many studies left out reporting the dates for recruitment (Asarnow et al., 2011; Goldstein, Axelson, Birmaher, & Brent, 2007; Plener, Sukale, Ludolph, & Stegemann, 2009; Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001), 2 studies received partial credit for reporting dates for recruitment but

not when follow-up occurred (Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009 and James, Taylor, Winmill, & Alfoadari, 2008). However, both Chanen et al., (2009) and Green et al., (2011) reported dates for the recruitment period and the follow-up procedure.

The most reported items from the CONSORT checklist included the following: explanation of the scientific rationale behind the study; eligibility criteria of participants; reporting of specific objectives and hypotheses; clearly defined primary and secondary outcomes; clear interpretation of the results; generalizability of the trial; and overall interpretation of the results in relation to the context of the current evidence. These are key aspects of any reporting of a clinical trial. Without a clear explanation of the hypothesis and/or objectives, it is difficult for the reader to understand the purpose of the clinical trial. Similarly, it is also very important to clearly lay out for the reader the results of the study in a way that relates the conclusions to current clinical problems.

Finally, of the three studies where the interventions appeared to be successful in reducing self-harming behaviors in adolescents, only one was a randomized clinical trial (Wood, Trainor, Rothwell, Moore, & Harrington, 2001), which is the most rigorous testing method to compare the effectiveness of a clinical treatment method (Zwarenstein, et., al., 2008). The other two studies (James, Taylor, Winmill, & Alfoadari, 2008 and Plener, Sukale, Ludolph, & Stegemann, 2009) were pilot studies with less than 20 participants in the trial. As expected, these two pilot studies also reported less than 50% of the required information recommended by the CONSORT checklist. This is evidence that future studies need to be conducted with more participants in order to replicate the findings of the two pilot studies.

Discussion

Summary of the Findings

This section provides a summary of the findings related to the research question guiding this systematic review. The aim of this study was to conduct a complete literature review using four different databases and seven different search terms to address the following points: (1) what types of clinical treatment programs are currently being used to address self-harming behaviors in adolescents, (2) how do each of these programs define self-harm, (3) what theory guides these intervention programs, (4) and how effective are these programs at reducing self-harming behaviors in adolescents? Nine final studies were identified and the quality of the reporting of these studies was assessed using an extension of the CONSORT 2010 (Consort Group, 2010) checklist for pragmatic studies. The information gleaned from these nine final studies was diverse in answering the research questions; therefore, many important limitations regarding current research on this topic, repercussions for clinical application in treating self-harm behavior in adolescents, and suggestions for future research were identified.

The studies included in this review represented a diverse example of research options available for assessing the effectiveness of therapeutic treatment programs. Three studies were pilot studies (Goldstein, Axelson, Birmaher, & Brent, 2007; James, Taylor, Winmill, & Alfoadari, 2008; and Plener, Sukale, Ludolph, and Stegemann (2009) with each study containing less than ten participants. This review also included one original study on a developmental group psychotherapy program (Wood, Trainor, Rothwell, Moore, & Harrington, 2001) and two replication studies attempting to replicate the results

of the original study (Green et al., 2011 and Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009). In addition, two studies (Asarnow et al., 2011 and Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011) used the data from the Treatment of Selective Serotonin Reuptake Inhibitors-Resistant Depression in Adolescents study (TORDIA Study) and the Adolescent Depression Antidepressants and Psychotherapy Trial study (ADAPT study) respectively, which were large research studies originally designed to examine adolescent depression but also contained valuable pre and post data on self-harm.

The studies in this review demonstrated that there is a wide-range of approaches to treating self-harm behaviors in adolescents. Of the nine studies assessed in this review, one study reported on a cognitive analytic therapy program (Chanen et al., 2009), two studies reported on DBT-based treatment programs (Goldstein, Axelson, Birmaher, & Brent, 2007 and James, Taylor, Winmill, & Alfoadari, 2008), three studies assessed a developmental group psychotherapy program (Green et al., 2011; Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001), two studies involved medication plus a therapeutic component (Asarnow et al., 2011 and Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011), and one study looked at combining music therapy with DBT (Plener, Sukale, Ludolph, & Stegemann, 2009).

The findings of studies included in this review showed varying results. Wood, Trainor, Rothwell, Moore, & Harrington's (2001) clinical trial of developmental group therapy versus routine care found that the developmental group therapy format was more effective at decreasing the number of self-harm episodes by the seven-month interview

than the routine care group. In contrast, Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009) and Green et. al., (2011) could not replicate these results and found no benefit of group psychotherapy over routine care. These findings suggest while developmental group therapy initially appeared to be effective in reducing NSSI, its effectiveness could not be duplicated in future trials. The fact that two replication studies (both using a much larger number of participants) have been unsuccessful in finding the same results suggests that maybe other treatment approaches should be considered.

The results of both medication plus therapy trials did not show significant results that these programs were effective at reducing self-harm in adolescents. Asarnow et al.'s (2011) analysis of the TORDIA study found that while adolescents receiving CBT plus a SSRI medication switch led to a decrease in depressive symptoms, when taking into account self-harm history at baseline, there were no significant effects found when assessing for a reduction in self-harm behaviors at the end of the study. Similarly, Wilkinson, Kelvin, Roberts, Dubika, & Goodyer's (2011) study found that 36% of adolescents taking part in the study reported at least one act of self-injury in the month prior to beginning the treatment program (either the Fluoxetine plus CBT group or the Fluoxetine plus standard support group) and 37% reported having engaged in a self-harm act during the 28-week follow-up period.

The Chanen et. al., (2009) study also did not show effective results. This study compared Historical Treatment as Usual (H-TAU), Cognitive Analytic Therapy (CAT), and Good Clinical Care (GCC). They found no statistically significant association comparing baseline data to follow-up data between the treatment groups and the frequency of self-harm behavior. However, this study did find significant results in some

secondary measures that are related to adolescent self-harm. At the 24-month follow-up, CAT had lower standardized levels of and a significantly faster standardized rate of improvement in both internalizing and externalizing psychopathology compared to both H-TAU and GCC. Therefore, further research into how CAT increases improvement in internalizing psychopathology could contribute to effectiveness in future treatment programs aimed at reducing self-harm.

Some studies in this review did report success in reducing rates of self-harm in adolescents. Interestingly, of the 4 studies included in this review that reported successful treatment program, 3 of them were the pilot studies (the Wood, Trainor, Rothwell, Moore, & Harrington, 2001 was the other study reporting a reduction in self-harm rates). Both Goldstein, Axelson, Birmaher, & Brent (2007) and James, Taylor, Winmill, & Alfoadari's (2008) DBT programs reported a marked reduction in self-harm reports taken at baseline and follow-up. Plener, Sukale, Ludolph, and Stegemann's (2009) combination music therapy and DBT program also reported 4 out of 5 of their participants stopped their self-harm behaviors by the end of the treatment program. In addition to the fact that these three studies were pilot studies without the rigorous examination that an RCT trial would provide, these studies were also similar in the fact that they assessed the effectiveness of DBT programs and found these programs to be effective in reducing self-reported self-harm incidences in adolescents. The extent that DBT will be more effective than TAU is still unknown. However, the significant results of the above pilot studies, combined with the effectiveness of this treatment approach with adults suggests that this may be a promising area of future research.

This review also aimed to look at whether or not current researchers are similar in defining self-harm. Previous articles on self-harm have documented the variability of this term in the research literature and the implications of not having professional agreement for this construct can have serious consequences (Rodham & Hawton, 2009). The risk is that researchers might actually be studying different constructs, but using the term “self-harm;” therefore, a consensus in the definition is important.

Most of the studies (7 out of 9) included in this review contained a definition of self-harm and, fortunately, they were very similar. Only Chanen et. al, (2011) and Goldstein, Axelson, Birmaher, & Brent, 2007 did not include a definition of self-harm. All seven of the studies that did include a definition (Asarnow et al., 2011; Green et. al., 2011; Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009; James, Taylor, Winmill, & Alfoadari, 2008; Plener, Sukale, Ludolph, & Stegemann, 2009; Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001) pointed out that self-injury was self-inflicted and that an injury to the body occurred. Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009) and James, Taylor, Winmill, & Alfoadari, (2008) further included self-poisoning if the poisoning did not occur as a result of excessive recreational drug use. There was disagreement among the studies in whether or not to include the motivation behind the self-harm. Only Asarnow et al. (2011), Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, (2009) and Wood, Trainor, Rothwell, Moore, & Harrington (2001) stated that self-harm occurred in the absence of wanting to die, otherwise they considered this act to be a suicide attempt.

In considering the above, it is important that researchers agree on the construct of self-harm (especially self-harm versus suicide attempt) so that future research studies measuring self-harming behaviors are, in fact, studying and measuring the same behaviors. The results of research studies assessing treatment programs aimed at reducing self-harming behaviors in adolescents are only accurate and useful if they are using one common definition of self-harm. Currently, the results of the research studies assessing self-harm must be interpreted according to the individual definition that those particular researchers used at the time of the research study. It is a problem that the clinician reading these studies must go to the extra step in interpreting the results based on the working definition of self-harm in order to evaluate whether or not the treatment program might work for their adolescent population.

The best definition of self-harm is one that explains the distinct, yet subtle, difference between self-harm and a suicide attempt. This is necessary so that future researchers are clear in their measurement and reporting of self-harm behaviors versus suicidal acts. Further, suicidal acts oftentimes require different interventions than repetitive self-injury, so differentiating between the two is important not only from a research perspective, but from a clinical perspective as well (Groholt, Ekeberg, Wichstrom, & Haldorsen, 2000). So, what is that subtle difference? A suicidal act is one that has an underlying intention of dying by means of harming oneself (Lewinsohn et. al., 1996). In contrast, the intent behind self-harm is increasingly understood in the research community as a means of regulating one's uncomfortable emotions in the moment the emotions occur, but with the absence of the intent to die from the injury (Favazza, 1998). Furthermore, the construct of self-harm should also encapsulate the concept that self-

harm can also take on behaviors that do not evidence an obvious physical injury such as putting oneself into risky sexual situations or restricting food intake to feel the pain of hunger. Therefore, a thorough definition of self-harm might best be described as an injury to one's body or permitting oneself to engage in risky situations as a mean of regulating, avoiding, or handling uncomfortable emotions without the intent to die from these injuries or dangerous situations.

This review also sought to report on the theories underlying the therapeutic interventions used to treat adolescent self-harm. It is important to have a theoretical orientation guiding the treatment condition so that the treatment condition is based on scientific knowledge and not on anecdotal knowledge. Eight out of nine studies included in this review described the theory used. Two of the studies based the theory guiding their treatment program on cognitive behavior theory (Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011 and Wood, Trainor, Rothwell, Moore, & Harrington (2001). Three studies (Goldstein, Axelson, Birmaher, & Brent, 2007; James, Taylor, Winmill, & Alfoadari, 2008; Plener, Sukale, Ludolph, & Stegemann, 2009) utilized a specific form of cognitive behavioral theory called dialectical behavior therapy (DBT). This form of therapy has its foundation in CBT but emphasizes the psychosocial aspects of treatment – how an adolescent's biology and environment interact with each other and it teaches skills to effectively deal with this interaction when it becomes disordered. Green et al., (2011), Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009), and Wood, Trainor, Rothwell, Moore, & Harrington (2001) reported using a mix of developmental therapy, cognitive behavioral therapy (CBT), dialectical behavior therapy (DBT), problem

solving, and psychodynamic theories. Finally, Chanen et. al., (2009) based their treatment program on cognitive analytic theory.

Finally, a summary of the quality of the reporting of the nine studies included in this systematic review was provided for the reader using the CONSORT 2010 checklist. As noted in Figure 2, five of the nine studies contained over 50% of the suggested points to report. Of the three studies where the interventions appeared to be successful in reducing self-harming behaviors in adolescents (Asarnow et al., 2001; Goldstein, Axelson, Birmaher, & Brent, 2007; James, Taylor, Winmill, & Alfoadari, 2008; Plener, Sukale, Ludolph, & Stegemann, 2009; Wood, Trainor, Rothwell, Moore, & Harrington, 2001), only two (Asarnow et al., 2001 and Wood, Trainor, Rothwell, Moore, & Harrington, 2001) reported 55% and 75%, respectively, of the recommended CONSORT items. Therefore, it was concluded that future studies of intervention programs aimed at adolescent self-harm needs to include a more thorough reporting of all areas assessed by the CONSORT 2010 checklist (introduction, methods, randomization, blinding methods, statistical methods used, results, etc.) so that readers can better understand the outcomes and clinical implications of the studies.

It is no surprise that the studies that tended to score higher on the CONSORT 2010 checklist were the RCTs. This highlights the fact that pilot studies and comparison studies, while still providing important preliminary information, still do not provide the reader with a complete answer as to whether or not the treatment condition is more effective than treatment as usual or another type of treatment program. These types of studies provide a starting point at looking at new treatment approaches to reducing adolescent self-harm, but they lack many important details in actually assessing the

effectiveness of these programs (i.e. large number of participants, randomization, long-term follow-up with the participants, and a comparison of pre and post data). As such, more RCTs are needed to provide the rigorous examination of assessing whether or not a treatment condition is more effective than treatment as usual.

Limitations

In regards to limitations, a major limitation to this systematic review is the lack of RCTs available in the scientific literature that examines any treatment program (whether it is DBT, CBT, or another type of treatment program) versus treatment as usual or another type of treatment program. Many of the studies included in this review were either pilot studies or comparison studies. These types of research studies are important in evaluating whether or not a certain type of treatment program could be effective and shows promise for a future, long-term study. Therefore, these studies were included in this review because they provided this important preliminary information, but the complete picture of the effectiveness of the treatment condition cannot be fully evaluated until an RCT is conducted on that treatment condition.

An additional limitation to this review is the low statistical power accepted by the studies that made the final cut in this review. The Green et al., (2011) study attempting to replicate Wood, Trainor, Rothwell, Moore, & Harrington's (2001) developmental group psychotherapy trial used the most participants with 366; however, the other 8 studies included far fewer participants. This is an important concern because an evaluation of the effect size of a clinical trial is useful in determining whether a type II error has occurred.

The studies included in this review were also constrained by the fact that these studies utilized several different measures for measuring the same thing. While many studies used either a structured or unstructured clinical interview to track self-injury during the study (Asarnow et al., 2011; Chanen et. al., 2009; Green et al., 2011; Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009; James, Taylor, Winmill, & Alfoadari, 2008; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001), several other studies also used the K-SADS-DRS and K-SADS-PL (Goldstein, Axelson, Birmaher, & Brent, 2007; Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001), Functional Assessment of Self-Mutilation (Plener, Sukale, Ludolph, & Stegemann, 2009), the Self-Harm Behavior Questionnaire (Plener, Sukale, Ludolph, & Stegemann, 2009), and the Health of the Nation Outcome Scales for Children and Adolescents (Wood, Trainor, Rothwell, Moore, & Harrington, 2001). The fact that several different measures were used in the nine final studies to measure the same construct is worrisome because the reader cannot be certain that each study is measuring the same thing. In addition to the fact that the research community has not agreed on a working definition of self-harm, it is also troubling that the community has not also agreed upon a universal way of measuring self harm.

Finally, the fact that so many studies utilized the clinical interview, another major limitation to the studies included in this review is the reliance on self-report measures to both confirm the existence of self-harm in the lives of the participants as well as to track the numbers of incidences of self-harm in the participants over the course of the study is always problematic. For example, Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington (2009) reported that they could not reliably estimate the mean number of self-

harm episodes occurring with their participants between then six and twelve month range because the information in the self-report measures could not be trusted.

Clinical Implications

Some important clinical implications can be gleaned from the information in this review. Some of the studies included in this review showed promise in decreasing self-harming behaviors in adolescents (Asarnow et al., 2011; Goldstein, Axelson, Birmaher, & Brent, 2007; James, Taylor, Winmill, & Alfoadari, 2008; and Wood, Trainor, Rothwell, Moore, & Harrington, 2001), but other studies did not find a significant difference between the targeted intervention program and treatment as usual (Green et al., 2011; Hazell, Martin, McGill, Kay, Wood, Trainor, & Harrington, 2009; and Wilkinson, Kelvin, Roberts, Dubika, & Goodyer, 2011). As such, more research is needed, especially in the area of DBT, as this approach shows promise but needs better quality studies (larger samples, rigorous randomization and long-term follow-up).

Another important point highlighted by the results of this review is that more long-term research needs to be conducted in the area of treatment efficacy. This review only netted 9 final studies, with 2 studies being a replication of an original trial also included in this review. Therefore, in order to understand how clinicians can best help adolescents who self-harm is through long-term, rigorous randomized controlled trials are needed. Researchers need to invest in the time that it would take to implement a long-term trial that would include a large population of adolescents.

This review was also useful in highlighting the fact that the mental health community needs to come together to agree on the definition of self-harm, as well as in

how to universally measure self-harm. There seems to be a wide range of definitions of self-harm – those that include the intent behind the physical injury vs. those that do not, as well as those that include medical reasons behind the physical injury (i.e. Autism) versus those that do not – and this construct needs to be professionally defined. An agreed upon definition of self-harm is extremely important in researching this topic because clinicians considering implementing a treatment program or technique advertised as being useful to adolescents who self-harm need to be assured that this program or technique will actually help their population that need help. In addition, new measures that more accurately gauge self-harm should be developed based on the agreed-upon definition of self-harm so that future research studies are all researching and measuring the same construct.

This review of treatment programs designed for adolescents that self-harm is clear in pointing out that while there may be many different theories on the etiology of self-harm in adolescents, there is little evidence of specific interventions that actually reduce adolescent self-harm behaviors. The fact that only nine studies made it to the final cut in this systematic review is evidence that there are few clinical trials of treatment programs available to help adolescents with this debilitating psychological issue. This review highlighted the fact that of the nine final studies, the ones that examined interventions using a DBT intervention group showed the most promise; however, there still needs to be further studies examining the long-term effects of DBT using a rigorous RCT design. In addition, the research community must come together to agree upon the definition and measurement of self-harm so that future studies are all examining and measuring the same construct. This systematic review should be helpful for future researchers who need

to be aware of what treatment programs have been already been researched in the area of adolescent self-harm, the results of this previous research, and what is needed in terms of definition and measurement in order to build a strong research design.

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