Gender differences in the effectiveness of psychosocial interventions for suicidal ideation and behaviour: A systematic review of randomised controlled trials

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Abstract

The objective of this study was to explore outcomes of preventive programs and psychosocial treatments for suicidal ideation and behaviour in gender sub-groups in mixed gender studies and in studies limited to one gender. The method used was a systematic review of randomized controlled trials (RCTs) which included women or men only, or reported and/or examined outcomes of psychosocial interventions in mixed gender samples. A total of 27 (18%) of RCTs reported or examined differences in intervention outcomes. Of the mixed gender RCTs, 5 (33%) reported greater effectiveness for females than males. The review identified promising interventions in female-only samples. None of the trials reported greater effectiveness of the intervention in men. The majority of reviewed studies looking at treatment outcomes in gender sub-groups showed no differences between women and men or indicated that some psychosocial interventions are effective for women. There is a need for studies which look at gender effects and development of interventions more effective and appealing for men at risk of suicide.

KEYWORDS: gender, psychotherapy, self-harm, suicidal behaviour, treatment

Gender differences have been frequently reported in the epidemiology of fatal and non-fatal suicidal behaviour, suicide means, and risk factors. In 2012, the global age-standardized suicide rate was 11.4 per 100,000, with the male suicide rate almost twice as high as the female rate (15.0 per 100,000 and 8.0 per 100,000, respectively) (World Health Organization, 2014). In almost all countries male suicide rates exceed female rates, although the gender ratios of suicide differ between countries and regions (World Health Organization, 2014). In regards to non-fatal suicidal behaviour, being female is a strong risk factor for suicidal ideation and attempts (Kessler, Borges, & Walters, 1999; Nock et al., 2008), and higher hospitalization rates in women have been frequently reported, especially among adolescents and young adult women (Schmidtke et al., 2004; Ting, Sullivan, Boudreaux, Miller, & Camargo, 2012). General population epidemiological surveys also report differences in the prevalence of suicidal ideation, plans, and attempts among males and females (Borges et al., 2010; Johnston, Pirkis, & Burgess, 2009), although not always (Fairweather, Anstey, Rodgers, Jorm, & Christensen, 2007).

The different prevalence of suicide mortality and morbidity reported in men and women, called the “gender paradox of suicide” (Canetto & Sakinofsky, 1998), may be related to differences in the use of suicide methods (Ajdacic-Gross et al., 2008; Värnik et al., 2008). This difference seems to be unrelated to the level of suicide intent (Denning, Conwell, King, & Cox, 2000), and higher case fatality among males than females has been reported for many suicide methods, including violent means (Elnour & Harrison, 2008). Although some risk factors for suicide seem equally relevant to both genders (McGirr et al., 2006; Qin, Mortensen, Agerbo, Westergaard-Nielsen, & Eriksson, 2000; Shiner, Scourfield, Fincham, & Langer, 2009), there are a number of other factors which may be more gender specific. These include depressive or anxiety disorder in women and alcohol abuse disorder in men (McGirr

et al., 2006; Monnin et al., 2012), work-related and financial problems for men (Chang, Stuckler, Yip, & Gunnell, 2013), and problems with children for women (Shiner et al., 2009). Differences between men and women have been reported in the prevalence, incidence, and morbidity risk of mental disorders (Klose & Jacobi, 2004; Seedat et al., 2009), help-seeking attitudes (Holzinger, Floris, Schomerus, Carta, & Angermeyer, 2012), suicide stigma and knowledge of suicide prevention (Batterham, Calear, & Christensen, 2013), and use of mental health services (Wang et al., 2007). Of particular importance, there may be differences between men and women in mental health treatment outcomes for affective (Bigos, Pollock, Stankevich, & Bies, 2009; Parker, Blanch, & Crawford, 2011), anxiety (Bekker & van Mens-Verhulst, 2007), and substance use disorders (Pelissier & Jones, 2005). These differences have important implications for the effectiveness of psychosocial treatments for mental disorders and suicidal ideation and behaviours.

Yet, despite the accumulating evidence base regarding effective suicide prevention strategies and treatments for at-risk individuals (Brown & Jager-Hyman, 2014; Mann et al., 2005; World Health Organization, 2014), little research attention has been paid to gender differences in response to preventive interventions (Hawton, 2000; Klimes-Dougan, Klingbeil, & Meller, 2013). In a systematic review regarding the effectiveness of interventions to prevent suicide and suicidal behaviour, the majority of studies that included mixed gender groups did not present sub-analyses of outcomes for men and women (Leitner, Barr, & Hobby, 2008). Therefore, the aim of the present study was to address the gap in knowledge regarding possible differences between women and men in outcomes of preventive programs and psychosocial treatments for suicidal ideation and behaviour. The study involved a systematic review of outcomes of randomized controlled trials to assess differences in the effectiveness of psychosocial interventions in the two genders. Such

differences in treatment response for mental health problems have previously been demonstrated (Bigos et al., 2009; Pelissier & Jones, 2005), and may be related to differences in disorder prevalence, types of risk factors, and help-seeking (Bekker & van Mens-Verhulst, 2007; Möller-Leimkühler, 2002). However, to the best of our knowledge differences in treatment response in women and in men have not been systematically quantified previously in regards to suicidal ideation and behaviour.

Method

Search strategy

A database of 154 papers reporting randomized controlled trials of psychosocial interventions for suicidal ideation and behaviour (Christensen et al., 2014) was used to identify studies reporting outcomes of psychosocial interventions in gender sub-groups and in studies limited to one gender. The database has been developed through a comprehensive literature search of three databases (Cochrane Central Register of Controlled Trials [CENTRAL], PsycINFO, and PubMed) conducted for articles published in the period 1800 to 2015 (most recent update of the database). The key word search string used was: “Suicid*” OR “self-harm” OR “self-poisoning” AND “Trial” OR “intervention” OR “prevention.” The search was limited to “humans”, “English”, and “peer-reviewed journals”. No restrictions were placed on participant age, mode of recruitment, medication status, or psychiatric diagnosis. To be included in the database, studies must have included an outcome measure of suicidal behaviour. Where this was a secondary outcome, the primary outcome must have been a mental health measure.

A psychosocial intervention was defined as an intervention that provided psychotherapy, e.g., Cognitive Behaviour Therapy (CBT), Dialectical Behaviour Therapy (DBT),

psychoeducation, supportive counselling, community treatment, or case management (including Assertive Community Treatment). The intervention could be individual or group-based, delivered face-to-face or distally, and in any setting. Studies were excluded if the intervention did not directly target the individual receiving the intervention, such as gatekeeper programs. The full-text articles included in the database were searched to identify trials that included women or men only, or reported and/or examined outcomes of psychosocial interventions in gender sub-groups in a mixed gender sample (Figure 1).

Inclusion and exclusion criteria

The systematic review included studies meeting the following criteria: a) the study was a randomized controlled trial, b) the study trialed a psychosocial intervention, such as psychotherapy, psychoeducation, supportive counselling, community treatment, or case management, c) a primary or secondary outcome of the study was suicidal ideation and/or behaviour (as defined in the study), d) the trials included women or men only, or reported and/or examined outcomes of psychosocial interventions in gender sub-groups, and e) the study was published in a peer-reviewed, English language journal. There was no restriction on the age of participants, medication status or psychiatric diagnosis, mode of recruitment, intervention setting, or mode of delivery (i.e., face to face or distally, individually or in a group). In studies reporting psychotherapy outcomes related to suicidal ideation and/or behaviour the review excluded trials including individuals with no recent (i.e., in the past 12 months) history of suicidal ideation and /or behaviour.

Results

The PRISMA diagram describing the selection of studies for the review is presented in Figure 1. A total of 27 published papers presenting results of 24 RCTs met selection criteria.

Specifically, the search identified 15 mixed gender RCTs (17 papers) that assessed outcomes in gender sub-groups, including four conducted in a school setting and 11 follow-up treatment studies among individuals who had enacted self-harm behaviour, including attempted suicide. We attempted to conduct a meta-analysis of studies included in the review; however, only 4 of 11 follow-up treatment studies in mixed gender samples provided sufficient data. We deemed the number insufficient and with high potential for bias. Additionally, there was inconsistency in samples, settings, measures, and outcomes, and we decided to use a descriptive and tabular approach in the review. The characteristics and findings of these studies are presented in Table 1. Table 2 provides details of an additional eight RCTs (nine papers) that were conducted within an all-female sample, and one RCT that recruited an all-male sample.

The number of male subjects recruited in the mixed gender studies ranged from 37% (SD = 11.55) in follow-up treatment studies to 48% (SD = 2.06) in studies conducted in a school setting. Thirteen of the trials studies were conducted in the US, three in Australia, two in the UK, two in Denmark, and the other four in Iran (N = 1), Israel (N = 1), the Netherlands (N = 1) and Sri Lanka (N = 1).

Reductions in suicidal ideation

Overall, 14 (58%) of the 24 trials included in the review examined suicidal ideation as an outcome, including 8 trials with mixed gender samples and 6 single-gender trials. Two (25%) of the eight studies in mixed gender samples presented statistically significant outcomes regarding effectiveness of the psychosocial intervention in women and men. The other six studies did not find differences between men and women. The study by Hassanian-Moghaddam, Sarjami, Kolahi, and Carter (2011) showed a significant decrease in suicidal

ideation in both genders, and the study by King et al. (2006) showed an effectiveness of the intervention for females but not in males. The remaining six (75%) reported no significant gender-related differences in reduction in suicidal ideation. Among the single-gender studies, only two (40%) of the five female-only trials found a significant reduction in suicidal ideation, including one (Linehan, Comtois, Brown, Heard, & Wagner, 2006) that found a significant reduction in both study groups (i.e., both DBT and treatment as usual, TAU). The male-only study found no significant intervention effect (De Leo & Heller, 2007). In summary, across all 14 studies to examine suicidal ideation, only 4 (29%) found a significant intervention effect, and all these studies reported a significant reduction in suicidal ideation for women and one study for men.

The intervention that was most likely to be effective in reducing suicide ideation in both men and women was a postcard intervention (nine postcards over 12 months plus TAU vs TAU only) for hospital-treated patients after a suicide attempt (Hassanian-Moghaddam et al., 2011). The interventions most effective in reducing suicide ideation in women were manualized culturally informed empowerment-focused psychoeducational group intervention (Nia) for low-socio economic status African American women with a recent history of intimate partner violence (Zhang et al., 2013) and DBT for women diagnosed with Borderline Personality Disorder (BPD) (Linehan, Comtois, Brown et al., 2006). Although Youth-Nominated Support Team-Version 1 (YST-1) plus TAU for hospitalized adolescents with a recent history of suicidal attempt or suicidal ideation was effective in reducing suicidal ideation in adolescent women (King et al., 2006), the intervention was not effective in adolescent men. The only study with a male only sample found no significant intervention effect for Intensive Case Management as compared to TAU in regards to suicidal ideation (De Leo & Heller, 2007).

Reductions in suicide attempt or self-harm behaviours

Overall, 21 (88%) of the 24 RCTs included in the review examined reductions in suicide attempt or self-harm as an outcome, including 14 mixed gender trials and 7 single-gender trials. Only 3 (21%) of the 14 mixed gender RCTs found differences in gender sub-groups in response to psychosocial treatment, and all of those trials reported greater effectiveness for females than males. Five out of six (83%) female-only trials that examined suicidal attempt or self-harm behaviors, found a significant intervention effect, while the male-only study found no significant intervention effect. In addition, in a study looking at the effectiveness of DBT for women with a diagnosis of BPD and a history of multiple episodes of deliberate self-harm (vs TAU plus DBT waiting list) Carter, Willcox, Lewin, Conrad, and Bendit (2010) reported a significant reduction in deliberate self-harm and DSH hospitalizations in both study groups.

Three RCTs found significant differences in female and male patients hospitalized after a suicide attempt, i.e., the interventions were effective in reducing suicide attempt or self-harm behaviors in women, but not in men, when compared to TAU only. These were two postcard interventions: eight postcards over 12 months plus TAU (Postcards from the EDge study; Carter, Clover, Whyte, Dawson, & D'Este, 2005, 2007, 2013) or nine postcards over 12 months plus TAU (Hassanian-Moghaddam et al., 2011), and the OPAC (Outreach, Problem Solving, Adherence, Continuity) Programme (Hvid et al., 2011).

The treatment which was found effective in reducing suicide attempt or self-harm behaviors in female-only studies was DBT for women with BPD and chronic and recent suicidal behavior/deliberate self-harm (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Linehan, Comtois, Brown et al., 2006; Linehan, Heard, & Armstrong, 1993), including DBT

plus DBT Prolonged Exposure for female patients with BPD and post-traumatic stress disorder (PTSD) (Harned, Korslund, & Linehan, 2014). Other effective interventions for women with a BPD diagnosis were Emotion Regulation Group Therapy (ERGT) (Gratz & Gunderson, 2006) and Manual Assisted Cognitive Treatment (MACT) (Weinberg, Gunderson, Hennen, & Cutter, 2006).

Other outcomes

Four RCTs included other outcomes relevant to this review, i.e., assessment of suicidal tendencies/suicide risk and fatal suicidal behaviour. A study of the effectiveness of an introspective suicide prevention program in schools found that this intervention was more effective than the usual school discussion in reducing suicidal tendencies/suicide risk in female students, but not in male students, in two of the six schools (Orbach & Bar-Joseph, 1993). Three mixed gender studies (Hvid et al., 2011; Morthorst, Krogh, Erlangsen, Alberdi, & Nordentoft, 2012; van der Sande et al., 1997) included suicide deaths as an outcome variable; however, the numbers of suicides in the studies were too small to be informative.

Discussion

Our systematic review found that only 18% of RCTs on the effectiveness of psychosocial interventions for suicidal ideation and behaviour reported or examined differences in gender sub-groups in intervention outcomes for mixed gender samples. Eight studies included female-only samples, but only one RCT explored a male sample. The proportion of men included in the trials ranged from 48% in school-based interventions to 37% in follow-up studies. These descriptive results confirm that the study of differences and similarities in outcomes of psychosocial interventions for men and women at risk of suicide is a relatively neglected area of research and clinical practice; an issue flagged previously in the literature

(Hawton, 2000; Leitner et al., 2008). This neglect of gender issues has also been reported in other areas, such as treatment of anxiety disorders (Bekker & van Mens-Verhulst, 2007) and psychological research in general (Sigmon et al., 2007).

The majority of reviewed studies did not find statistically significant differences in gender sub-groups regarding treatment outcomes for suicidal ideation and/or behaviour. Five (33%) of the mixed gender RCTs reported differences between women and men in outcomes. In all five studies, the interventions had greater effectiveness for women than men. Of particular interest, none of the trials reported greater effectiveness for men, and the only trial in male sample found no treatment effects in regard to suicidal ideation or behaviour. It should be noted, however, that more than half of the reviewed studies that did not find significant treatment effects in gender-specific analysis also found no overall significant treatment effects in the whole sample (9 studies, 60%). This is in line with results of earlier reviews (Brown & Jager-Hyman, 2014; Mann et al., 2005) that showed limited effectiveness of available treatments for people at risk of suicide in general. In addition, although three of the reviewed studies reported on suicide mortality, the small numbers of deaths precluded inclusion of this variable in the analysis of intervention effectiveness.

The promising interventions for women with a recent suicide attempt identified in the review were brief contact interventions using a series of postcards (Carter et al., 2005, 2007, 2013; Hassanian-Moghaddam et al., 2011), the OPAC (Outreach, Problem Solving, Adherence, Continuity) Programme (Hvid et al., 2011), and Youth-Nominated Support Team-Version 1 for hospitalized adolescents (King et al., 2006). The empowerment-focused psychoeducational group intervention (Nia) (Zhang et al., 2013) was effective in reducing suicidal ideation in low SES African American women with a recent history of intimate

partner violence and a suicide attempt in the last 12 months. Dialectical Behavior Therapy (Harned, Korslund, & Linehan, 2014; Linehan et al., 1991, 1993; Linehan, Comtois, Brown, et al., 2006), Emotion Regulation Group Therapy (Gratz & Gunderson, 2006) and Manual Assisted Cognitive Treatment (Weinberg et al., 2006) were effective in treatment of women with a diagnosis of BPD and a history of deliberate self-harm. A study of an introspective suicide prevention program in schools found promising outcomes in reducing suicidal tendencies/suicide risk in female students (Orbach & Bar-Joseph, 1993). An intervention that was equally effective for males and females in decreasing suicidal ideation was a postcard intervention for hospital-treated patients after a suicide attempt (Hassanian-Moghaddam et al., 2011).

Although the findings suggest that females tend to respond more to psychosocial treatments than males, a number of other explanations might also be considered. Factors related to gender, including psychological factors, personality factors, and severity of suicidal thoughts and behaviors, might be responsible for the difference in response to intervention rather than gender per se (Bekker & van Mens-Verhulst, 2007). The findings might also be related to adherence. Specifically, males may be less likely to complete and/or participate in a psychotherapeutic program than females (Hawton, 2000).

In addition, the format and the content of the interventions might be responsible for the gender-related differences in response. The mechanism of the effectiveness of the postcard interventions in reducing the number of repeated self-poisoning episodes in women but not men has not been explored; however, the beneficial effect of increased social connectedness and expression of care, a factor that may be of particular importance for women, may be involved (Carter et al., 2013). Of interest, although the postcard study conducted in Australia

only observed benefits for females, a similar study in Iran reported equivalent reductions in suicidal ideation for males and females (Hassanian-Moghaddam et al., 2011). It is possible that variance in the content and the format of the intervention itself, such as the content of messages and the number of cards sent, were related to the different results obtained in the two studies. Improvement due to the intervention in the available support system, including emotional support, and encouragement of open communication, may be also linked to positive outcomes for adolescent women reported in studies included in this review (King et al., 2006; Orbach & Bar-Joseph, 1993).

Nonetheless, the proposed mechanisms should be treated with caution, as other reviewed studies found no differences between men and women in interventions based on active outreach and strengthening of social support (e.g., Hawton et al., 1987; King et al., 2009; Thompson, Eggert, Randell, & Pike, 2001) or were underpowered to study the potential subgroup differences (Milner, Carter, Pirkis, Robinson, & Spittal, 2015). Moreover, although there is a strong evidence-base regarding the effectiveness of DBT in treatment of self-harming behaviour in women with BPD (Rizvi & Linehan, 2005), there is still limited evidence for the effectiveness of other types of interventions, including ERGT and MACT (Stoffers et al., 2012).

Our study confirms that there is a significant gap in knowledge and clinical practice regarding available and effective treatment options for men (Hamilton & Klimes-Dougan, 2015; Kölves, Kumpula, & De Leo, 2013). There is a need to develop interventions that are more appealing to men at risk of suicide to increase adherence and to examine other forms of therapy that may be more effective for males. These may include treatments with more of a practical emphasis, such as problem-solving, more emphasis on social benefits of help-

seeking and framing help-receiving as cognitively, versus emotionally, focused (Hawton, 2000; Johal, Shelupanov, & Norman, 2012).

Limitations

This study uses a narrative, descriptive, and tabular approach to reviewing outcomes of RCTs, and does not include an analysis of the risk of bias in the included studies or an analysis of gender as the basis for modification of effect. We attempted to conduct a meta-analysis of studies reporting the outcomes of interventions following a suicide attempt or a deliberate-self harm episode in mixed gender studies. However, only 4 of 11 studies provided sufficient data to conduct meta-analysis which we deemed insufficient and with high potential for bias. In addition, the samples, settings, measures, and outcomes were inconsistent, further limiting our ability to synthesize data into a meta-analysis. This finding in itself indicates the limitations of the previous research in adequately reporting outcomes by gender. In addition, only 18% of the 154 trials in the database report differences in gender sub-groups, and it is possible that the review would lead to different findings if such differences were reported routinely across all trials. There were differences in study samples, recruitment and intervention settings, follow-up procedures, and measures, which might have influenced the effectiveness of interventions.

The majority of studies were conducted in the United States, Australia, or Western Europe and there is not much known about the effectiveness of suicide prevention interventions and treatments in other parts of the world. In a number of studies the subgroup analyses were not planned a priori and/or the studies lacked power for an in-depth study of the mechanisms of differences between women and men in treatment outcomes. Some of the effectiveness trials of the same or slightly modified interventions reported mixed effects. In addition, only RCTs

from peer-reviewed, English language journals were included in the review, and studies based on a different design could provide additional information on gender-related outcomes of psychosocial interventions.

Conclusions

Only one in five RCTs in a database of psychosocial interventions for suicidal ideation and behaviour reported or examined differences in gender sub-groups or included all-female or all-male samples. Where such analyses were conducted, the majority of trials did not find statistically significant differences in suicide-related treatment outcomes in men and women. In case of differences reported, psychosocial interventions tended to be more effective for women. More systematic reporting of outcomes in male and female sub-groups in RCTs of suicide interventions would provide greater confidence in these findings. Moreover, a greater research focus on identifying the attributes of psychosocial interventions that are most appealing, increase adherence rates, and reduce suicide risk in men is warranted.

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Figure 1. Flow diagram for psychosocial interventions for suicidal behaviour including assessment of gender differences.

Table 1. Characteristics and findings of 15 mixed gender RCTs (17 papers) that assessed gender differences.

Study	Participants/setting	Intervention	Follow-up/assessment	Suicide-related outcome/measure	Intervention effects	Reported gender differences
<i>School-based interventions</i>						
Aseltine et al. (2007) (USA)	N=4,133 high school students; approx. 50% male	Signs of Suicide (SOS) vs waiting list	3m follow-up	SI, SA (CDC YRBS)	S. reduction in SA in intervention group; n.s. treatment effects for SI	N.s.
Eggert et al. (2002) (US)	N=341 potential high school drop-out students; mean age=15.7; 48% male	Counselors-CARE (C-CAST) vs. Coping and Support Training (CAST) vs. usual care	Baseline, 4w/10w/9m follow-up	SI, SA, STR (HSQ)	S. reduction in SI, SA and STR in all treatment conditions	N.s.
Orbach & Bar-Joseph (1993) (Israel)	N= 393 high school juniors in six schools; 45% male	Introspective suicide prevention program vs usual school discussion	Pre-/post-test	ST/SR (IIPS)	S. reduction in ST/SR in intervention group	S. reduction in ST/SR in intervention group in women ($F_{1,91}=7.56$, $p<0.007$; $F_{1,127}=3.71$, $p<0.053$); n.s. in men
Thompson et al. (2001) (US)	N= 460 high-risk youths; 48% male	Counselors CARE (C-CARE) vs Coping and Support Training (CAST) vs usual care	Pre-/post-intervention, 9m follow-up	SI, SA, STR (HSQ)	S. reduction in SI in C-CARE and CAST groups; n.s. treatment effects for SA or STR	N.s.
<i>Interventions following a suicide attempt/DSH episode</i>						
Bennewith et al. (2002) (UK)	N=1,932 A&E patients with DHS; mean age=32.5; 41% male	GP-based intervention vs. usual GP care	12m follow-up	Occurrence, number and time to repeat for DSH	N.s. treatment effects for occurrence, number and time to repeat for DSH	N.s.
Carter et al. (2005, 2007,	N=772 DSP patients; median age=33%	Eight postcards over 12 months plus	12/24/60m follow-up	Proportion of patients with one or	N.s. treatment effects for the	S. lower number of repeat DSP in

2013) (Australia)	male	TAU vs TAU		more repeat episodes of DSP, number of repeat DSP episodes per person (medical service database)	proportion of repeat DSP episodes; significant reduction in the number of DSP per patient in intervention group	intervention group in women (12m: IRR=0.54; 95% CI 0.30-0.96; 24m: IRR=0.49, 95% CI 0.30-0.80; 60m: IRR=0.54, 95% CI 0.34-0.88), n.s. in men
Hassanian-Moghaddam et al. (2011) (Iran)	N=2,113 hospital-treated DSP patients; mean age=24.1; 34% male	Nine postcards over 12 months plus TAU vs TAU	12m follow-up	SI (interview) SA and self-cutting (hospital records)	Significant reduction in SI and SA in intervention group; n.s. treatment effects for self-cutting event rates	S. reduction in SI in both genders; s. reduction in SA in intervention group in women (IRR=0.47, 95% CI 0.27-0.82); n.s. in men
Hawton et al. (1987) (UK)	N=80 overdose patients; mean age=29.5; 33% male	Brief out-patient counselling (OP) vs GP care	Pre-treatment, 2/4/6/9/12m follow-up	Repetition of DSP (self-report, GP report, hospital reports)	N.s. treatment effects for repetition of DSP	N.s.
Huey et al. (2004) (US)	N=156 hospitalised young people with SI/planning/SA, homicidal ideation/behaviour, psychosis, other threat/harm to self/others; mean age=12.9; 65% male	Multisystemic Therapy (MST) vs hospitalisation	Pre-treatment, 4/12m follow-up	SA (YRBS; CBCL) SI (BSI, YRBS)	Significant reduction in SI and SA in intervention group	N.s.
Hvid et al. (2011) (Denmark)	N=133 SA patients; mean age=39.7; 29% male	OPAC (outreach, problem solving, adherence, continuity) Programme vs TAU	6m treatment, 6m follow-up	Repetition of SA, suicide*, total number of suicidal acts (interview, hospital/coroner	Significantly lower proportions of repeat SA in the intervention group	N.s. treatment effect in men; significant reduction in repeat SA in women (Fisher's exact test, p=.013)

				records)		
King et al. (2006) (US)	N=289 hospitalised adolescents with SA or SI/intent during past month; mean age=15.3; 32% male	Youth-Nominated Support Team-Version 1 (YST-1) plus TAU vs TAU	Pre-/post-intervention	SA (SSB) SI (SIQ-JR)	N.s. treatment effects for SI or SA	S. reduction in SI in intervention group for females $F_{1,101}=6.38$, $p=.013$), n.s. in men
King et al. (2009) (US)	N=448 hospitalised adolescents SA or significant SI/intent during the past month; mean age=15.6; 29% male	Youth-Nominated Support Team-Version 2 (YST-2) plus TAU vs TAU	Baseline, 6w/3m/6m/12 m follow-up	SA (NIMH DISC-IV Mood Disorders) SI (SIQ-JR)	N.s. treatment effects for SI or SA	N.s.
Marasinghe et al. (2012) (Sri Lanka)	N=68 hospitalised SA patients; 50% male; mean age=31	Brief Mobile Treatment (BMT) vs TAU (waiting list)	Baseline, 6/12m follow-up	SI (BSSI) SH	S. reductions in SI in intervention group, n.s. effect for SH	N.s.
Morthorst et al. (2012) (Denmark)	N=243 hospitalised patients with SA in past 14 days; mean age=31; 24% male	Assertive outreach intervention for DSH vs standard care	12 m follow-up	Repeat SA, suicide* (hospital records, self-report)	N.s. treatment effects for repeated SA	N.s.
van der Sande et al. (1997) (the Netherlands)	N=274 patients in treatment after SA; mean age=36; 36% male	Intensive psychosocial intervention vs TAU	After discharge, 2/6/12m follow-up	Repeat SA, suicide* (hospital records, municipal records)	N.s. treatment effects for repeated SA	N.s.

BSI: Brief Symptom Inventory (Derogatis, 1992); BSSI: Beck Scale for Suicidal Ideation (Beck et al., 1979); CBCL: Child Behavior Checklist (Achenbach, 1991); CDC YRBS: Centers for Disease Control and Prevention's Youth Risk Behavior Survey (CDC, 2000); HSQ: High School Questionnaire (Eggert et al., 1995); IIPS: Israeli Index of Potential Suicide (Tzuriel & Bar-Joseph, 1989); NIMH DISC-IV: NIMH Diagnostic Interview Schedule for Children Version IV (Shaffer et al., 2000); SIQ-JR: Suicidal Ideation Questionnaire-Junior (Reynolds, 1988); SSB: Spectrum of Suicide Behavior Scale (Pfeffer, 1986); YRBS: Youth Risk Behavior Survey (Kolbe et al., 1993) DSH: deliberate self-harm; DSP: deliberate self-poisoning; GP: General Practitioner; SA: suicide attempt; SH: self-harm; SI: suicidal ideation; SR: suicide risk; ST: suicidal tendencies; STR: suicide threat

* The number of completed suicides was too small to be informative

Table 2. Characteristics and findings of 9 RCTs (10 papers) that were conducted within an all-female or all-male sample.

Study	Participants/setting	Intervention	Follow-up/assessment	Suicide-related-outcome/measure	Intervention effect
<i>All-female sample</i>					
Carter et al. (2010) (Australia)	N=73 women with BPD and history of multiple DSH; at least three self-reported DSH in last 12m; mean age=24.5	DBT vs TAU + DBT waiting list	Baseline, 3/6m	Proportions and event rates of any DSH (LPC, PHI-2) DSH admissions	S. reduction in DSH and DSH hospitalizations in both groups; n.s. treatment effects in proportion of DSH, number of DSH, and DSH admissions
Gratz et al. (2006) (US)	N=20 women with BPD and history of repeated DSH, at least one DSH in past 6m; mean age=33.3	Emotion Regulation Group Therapy (ERGT) + TAU vs. TAU	Pre-/post-treatment	DSH (DSHI)	Significant reduction in DSH in intervention group ($F_{1,18}=5.71$, $p<0.05$)
Harned et al. (2014) (US)	N=26 women with BPD and PTSD, at least two SA and/or NSSI in past 5y, at least one episode in 8w; mean age=32.6	DBT vs. DBT + DBT Prolonged Exposure (DBT PE)	Pre-treatment, 4m intervals during treatment, 3m follow-up	ISI (frequency of SA and NSSI) (SASII)	S. reduction in SA in intervention group (treatment completers: 16.7% in DBT + DBT PE, 40.0% in DBT (g 's =0.6-0.7))
Kaslow et al. (2010) (US)	N=208 low SES African American women with recent IPV history and SA in last year; mean age=34.7	Manualized culturally informed empowerment-focused psycho-educational group intervention (Nia) vs TAU	Pre-/post-intervention, 6/12m follow-up	SI (BSS)	N.s. treatment effects for SI
Zhang et al. (2013) (US)	N=89 low SES African American women with a recent history of IPV and a SA in the last year; mean age=34.7	Manualized culturally informed empowerment-focused psycho-educational group intervention (Nia) vs TAU	Pre-/post-intervention, 6/12m follow-up	SI (BSS)	Significant reduction in SI in intervention group ($t(85) = -1.94$, $p=.03$)
Linehan et al. (1991, 1993) (US)	N= 44 (12m: N=39) women with BPD, at least two PSB incidents	Dialectical Behavior Therapy (DBT) vs. TAU in community	Pre-treatment, 4/8/12/18/24m follow-up	PSB (PHI) SI	S. reduction in PSB in intervention group (4m: $z=2.36$, $p<0.01$; 8m: $z=1.62$, $p<0.05$;

	in last 5y, with one in last 8w			(SSI)	12mo: $z=1.98$, $p<0.05$; 18m: $z=3.78$, $p<0.001$; 24m: n.s.) and less medically severe PSB ($t=1.70$, $df=28.01$, $p<0.05$); n.s. treatment effects for SI
Linehan et al. (2006) (US)	N=101 women with BPD with at least 2 SA or self-injuries in past 5y, at least one in past 8w; mean age=29.3	Dialectical Behaviour Therapy (DBT) vs. TAU in the community	12m follow-up	SI (SBQ) SA (SASII)	S. reduction in SI in both groups ($p<0.001$); significant reduction in SA and non-ambivalent SA in intervention group ($X^2=5.98$, $p=0.01$; $p=0.18$, Fisher exact test); significantly lower medical risk for any SA in intervention group ($F_{1,156}=3.2$, $p=0.04$)
Weinberg et al. (2006) (US)	N=30 women with BPD with a history of repetitive DSH with at least one episode during the past month; mean age=28.17	Manual Assisted Cognitive Treatment (MACT) + TAU vs. TAU	Post-treatment, 6m follow-up	DSH frequency and severity (PHI) SI (SBQ)	N.s. treatment effect for SI and DSH time-to-repeat; s. treatment effect for DSH frequency in intervention group (post: $z=-7.29$, $p<0.001$; 6m: $z=12.50$, $p<0.001$); significantly greater decrease in DSH severity (6m: $z=-3.58$, $p<0.001$; post-test: n.s.)
<i>All-male sample</i>					
De Leo & Heller (2007) (Australia)	N=60 men in psychiatric ward due to severe SI and/or SA; mean age=35.5	Intensive Case Management (ICM) vs TAU	Baseline, 6/12m follow-up	SI (BSS) SHB	N.s. treatment effects for SI and SA

BSS: Beck Scale for Suicidal Ideation (Beck & Steer, 1991; Beck et al., 1979); DSHI: Deliberate Self-Harm Inventory (Gratz, 2001); LPC: Lifetime Parasuicide Count-1 (Linehan et al., 1996); PHI: Parasuicide History Interview (Linehan et al., 1989); PHI-2: Parasuicide History Interview-3 month period (Linehan et al., 1989); SASII: Suicide Attempt Self-Injury Interview (Linehan et al., 2006); SBQ: Suicidal Behaviours Questionnaire (Linehan & Nielsen, 1981); SSI: Scale for Suicide Ideators (Schotte & Clum, 1982)

BPD: borderline personality disorder; DSH: deliberate self-harm; IPV: Intimate Partner Violence; ISI: intentional self-injury; NSSI: non-suicidal self-injury; PSB: parasuicidal behaviour; PTSD: post-traumatic stress disorder; SA: suicide attempt; SES: socio-economic status; SHB: self-harming behaviour; SI: suicidal ideation