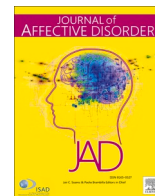


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Associations between non-suicidal self-injury and experiential avoidance: A systematic review and Robust Bayesian Meta-analysis

Sophie B. Haywood^a, Penelope Hasking^{a,b}, Mark E. Boyes^{a,b,*}^a School of Population Health, Faculty of Health Sciences, Curtin University, Perth, Australia^b Curtin enAble Institute, Faculty of Health Sciences, Curtin University, Perth, Australia

ARTICLE INFO

Keywords:

Experiential avoidance
Self-injury
NSSI
Shared variance
Meta-analysis

ABSTRACT

Objectives: Non-suicidal self-injury (NSSI) is the intentional and deliberate damage to an individual's own body tissue without the intent to suicide. Individuals who have higher self-reported levels of experiential avoidance are more likely to report a history of NSSI. The current study systematically reviewed the literature and meta-analysed studies assessing associations between experiential avoidance and self-injury.

Method: An extensive review was conducted of several databases (including ProQuest, Joanna Briggs, Web of Science, PsychArticles, PubMed, Scopus, and Ovid). Nineteen articles (two dissertations) met the inclusion criteria for the systematic review and 14 were analysed in a Robust Bayesian Meta-analysis. This review was registered through PROSPERO (CRD42020198041).

Results: There was a small to medium, pooled effect size ($d = 0.48$, 95 % Credibility Interval 0.00–0.85). There was strong evidence for this effect size (Bayes Factor = 12.16), although there was considerable heterogeneity between studies ($\tau = 0.68$, 95 % CI [0.44, 0.1.05]). The analysis testing whether these findings may be due to publication bias was inconclusive (Bayes Factor = 2.45).

Limitations: The majority of studies included were cross-sectional, in English, and most studies were of university students. While some studies reported on recency/frequency of NSSI there was not enough data to conduct meta-analysis.

Conclusion: These results suggest there is a robust association between history of NSSI and experiential avoidance. However, as most studies operationalise avoidance as a unidimensional construct, it is not clear which aspects of avoidance differentiate individuals with and without a history of NSSI.

Non-suicidal self-injury is the intentional and deliberate damage to an individual's own body tissue in the absence of suicidal intent ([International Society for the Study of Self-injury, 2022](#)). Common methods of self-injury include, but are not limited to, cutting, burning, and scratching ([Klonsky and Muehlenkamp, 2007](#)). Self-injury is a prevalent behaviour within community samples, with 17 % of adolescents, 13 % of young adults, and 5 % of older adults reporting a history of self-injury ([Swannell et al., 2014](#)). The prevalence increases within inpatient samples with 20 % of adults and 40–80 % of adolescents reporting a history of NSSI ([Briere and Gil, 1998](#); [Darche, 1990](#); [DiClemente et al., 1991](#); [Nock and Prinstein, 2004](#)). There are a number of reasons individuals engage in NSSI, including self-punishment and anti-dissociation, but the main reason given for engagement is emotion regulation ([Taylor et al., 2018](#)). Although individuals engage in NSSI without the intention to suicide, it is one of the most salient predictors of

future suicide attempts ([Franklin et al., 2017](#); [Kiekens et al., 2018](#); [Ribeiro et al., 2016](#)). While self-injury is reported to be a robust predictor of future suicide attempts, it is imperative that we also consider that both self-injury and suicide are frequently under reported ([Pompili et al., 2012](#); [Stanley et al., 2018](#)). As such, efforts to understand factors that may initiate and maintain NSSI have been researched, to develop early interventions and treatments.

One such factor is experiential avoidance. Experiential avoidance is defined as an individual's inability or unwillingness to experience uncomfortable internal experiences such as thoughts, feelings, and emotions ([Hayes et al., 1999](#)). These internal experiences are often purported to be distressing for the individual ([Gámez et al., 2011](#)). A number of models of self-injury highlight the role of experiential avoidance in predisposing individuals to engage in NSSI ([Chapman et al., 2006](#); [Hasking et al., 2017](#); [Nock, 2009](#); [Selby and Joiner, 2009](#)).

* Corresponding author at: Curtin enAble Institute & School of Population Health, Faculty of Health Sciences, Curtin University, Perth, Australia.
E-mail address: mark.boyes@curtin.edu.au (M.E. Boyes).

<https://doi.org/10.1016/j.jad.2023.01.027>

Received 10 August 2022; Received in revised form 14 December 2022; Accepted 4 January 2023

Available online 10 January 2023

0165-0327/© 2023 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

The Experiential Avoidance Model suggests that all individuals sit on a continuum of wanting to avoid unpleasant internal experiences and individuals at the higher end of this continuum are posited to be more likely to engage in self-injury to regulate their emotions (Chapman et al., 2006). Engaging in self-injury helps distract from what individuals are feeling, which can in turn create a negative feedback loop with self-injury becoming effective emotion regulation strategy when these unwanted feelings occur.

A number of studies have explored the link between experiential avoidance and NSSI, with mixed results. Studies of the associations between experiential avoidance and history of NSSI, using the Acceptance and Action Questionnaire (AAQ; Anderson and Crowther, 2012; Hayes et al., 2004; Horgan and Martin, 2016), found that individuals with a recent history of NSSI were more likely to report experiential avoidance than those who no longer self-injured, and those who reported no history of engagement in NSSI. In contrast, using the Brief Experiential Avoidance Questionnaire (BEAQ; Gámez et al., 2014; Greene et al. (2019) found that experiential avoidance was not significantly associated a history of engagement in NSSI. Experiential avoidance has also been associated with frequency, recency (within the last 12 months), and severity of engagement in NSSI (Hu et al., 2021; Nielsen et al., 2017; Singhal et al., 2021).

Brereton and McGlinchey (2020) conducted a systematic review of the literature around NSSI, emotion regulation, and experiential avoidance. In their study they found support for the role of experiential avoidance in NSSI engagement. However, due to the search criteria requiring both emotion regulation and experiential avoidance to be included, this may have resulted in the exclusion of studies that only focused on experiential avoidance. Furthermore, this study only provided a qualitative review of the literature; including a quantitative (meta-analysis) summary would allow for a precise indication of size of effect between experiential avoidance and NSSI. A recent study by Angelakis and Gooding (2021) also looked at the role of experiential avoidance in NSSI and suicidal ideation. Overall a small effect size was found between experiential avoidance and NSSI; however, grey literature was excluded from Angelakis and Gooding's (2021) study, which could inflate potential publication bias. Consequently, to date there is still not a systematic review/meta-analysis that focusses purely on the association between experiential avoidance and NSSI. Given that experiential avoidance is purported to play such a central role in our current understanding of why people engage in NSSI, is it important that we provide a synthesis of the existing literature in this area.

To extend on the previous synthesis of literature in this area, the aim of this study is to critically evaluate, meta-analyse using a Bayesian approach, and compare associations between experiential avoidance and NSSI. Specifically, we predict there will be a strong, positive association between experiential avoidance and NSSI. Additionally, potential moderators of the relationship (age, gender, population, measure of experiential avoidance) will be explored.

1. Method

1.1. Procedure

The study was registered with PROSPERO (CRD42020198041) and followed The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). When conducting systematic reviews it is recommended that at least four databases are searched in order to ensure efficient search results (Bramer et al., 2017). Given the overlap between databases and due to our interest in single study designs, the following databases were searched Joanna Briggs, Ovid – All Journals, ProQuest, ProQuest Dissertations, PsycArticles, PubMed, Scopus, and Web of Science. Search terms are listed in Table 1. Initial searches were conducted between the 29th of November and the 2nd of December 2021. A second search was conducted on the 5th April 2022 to capture more recent publications. All

Table 1

Search terms.

| Experiential avoidance | Non-suicidal Self-injury (papers published since 2006) |
|-------------------------------|---|
| Avoid* OR distract* OR escap* | self-injur* OR selfinjur* OR selfharm OR self-harm OR self-mutilat* OR selfmutilat* OR parasuicid* OR parasuicid* |
| Limits applied | Published since 2006 and published in English |

searches were conducted by the first author. Inclusion criteria were as follows: (1) articles published in English; (2) quantitative design that allowed calculation of effect sizes (i.e. means, standard deviations, effect sizes); (3) human participants; (4) articles related to NSSI published after 2006 (when International Society for the Study of Self-injury published a comprehensive definition of NSSI; International Society for the Study of Self-Injury, 2006). Exclusion criteria included: (1) qualitative studies that excluded calculation of effect sizes, (2) NSSI due to genetic disorder, developmental disorder, or psychosis, (3) systematic reviews/meta-analysis, (4) animal studies. Reference lists of articles included in the study were scanned to locate any additional studies not located by the initial searches. Key authors were also contacted for unpublished data and additional information required for inclusion in meta-analysis.

The identification, screening, eligibility, and inclusion procedures are summarised in Fig. 1. At each step of the PRISMA screening protocol, three additional researchers checked 20 % of the eligible studies. Document screening of titles, abstracts, and full text was independently screened by the primary author. As per PRISMA guidelines 20 % of the total documents was screened by three independent reviewers. An agreement rate of 91.74 % was achieved (Fleiss Kappa = 0.45).

1.2. Study quality and risk of bias

Study quality and risk of bias were assessed using a tool adapted from the Agency for Healthcare Research Quality (Williams et al., 2010) that has been used in past NSSI systematic reviews to assess quality of articles (Greene et al., 2019; Taylor et al., 2018). Studies were assessed to determine whether they met methodological safeguards and quality checks that assesses bias (i.e. unbiased selection of sample, adequate description of sample, validated measure of NSSI and experiential avoidance, adequate handling of missing data).

1.3. Data management and extraction

Reported descriptive statistics were used to calculate standardised effect sizes of the mean difference and their variance (Cohen's *d*). If data provided did not allow for calculation of appropriate effect size, authors were contacted. In NSSI literature some studies reported history, recency (within last 12 months), frequency, and severity of NSSI. For the meta-analysis, only history is reported as there were not enough studies to meta-analyse the other variables. However, these are all reported in the systematic review.

1.4. Data analysis strategy

Prior to analysis the relationship between history, frequency, and recency of NSSI (where possible) and experiential avoidance was examined by converting all effect sizes to standardised mean differences (Cohen's *d*) using the "Practical Meta-Analysis Effect Size Calculator" online calculator (www.campbellcollaboration.org). Robust Bayesian Meta-analysis was conducted in JASP v0.14 (JASP Team, 2022). Robust Bayesian analysis allows for prior distributions of specific biases to be considered (Higgins et al., 2019). It also allows for the stimulation of studies that may have not been published thereby allowing for a more accurate reporting of publication bias (Givens et al., 1997). The predictive quality of two rival hypotheses is quantified with Bayes factors

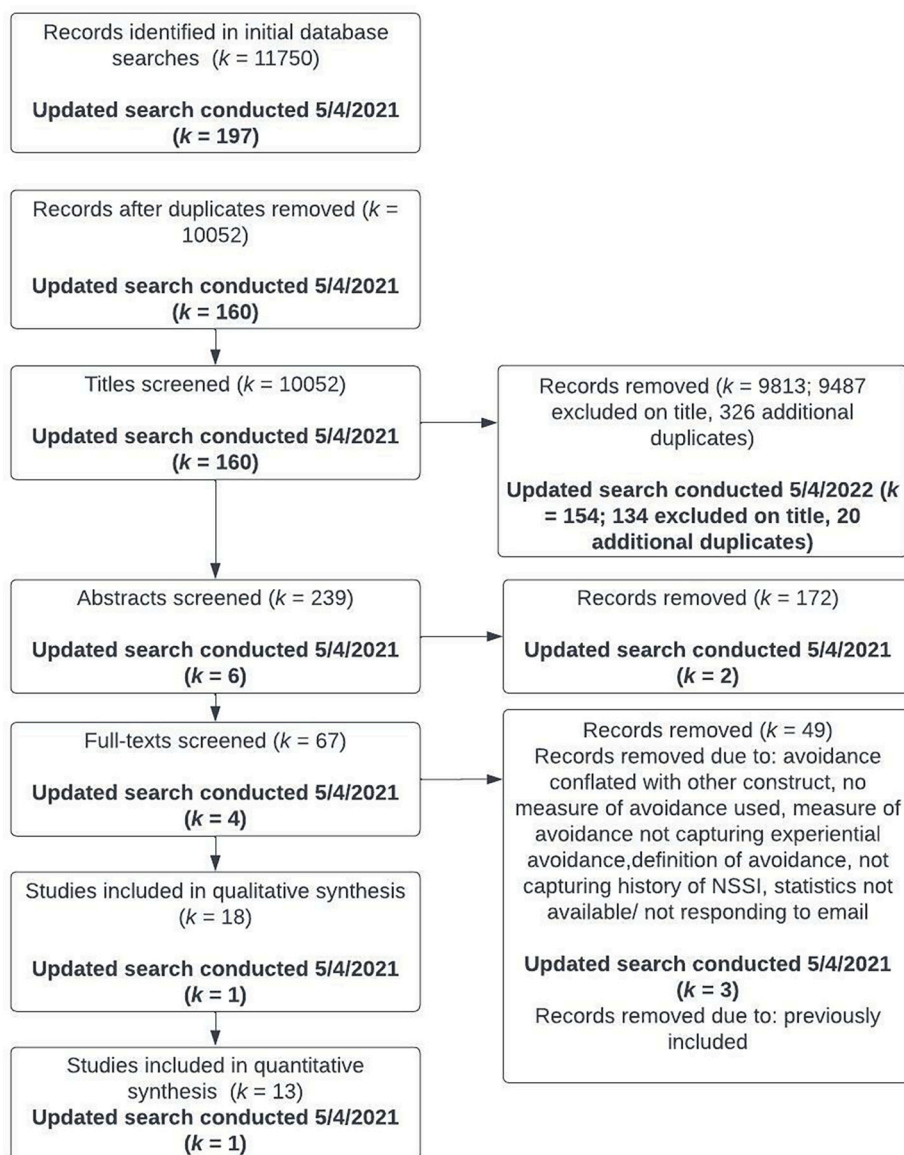


Fig. 1. PRISMA study screening procedure.

(van Doorn et al., 2021). Bayes factors between 1 and 3 are considered weak evidence, 3 to 10 moderate evidence, and Bayes factors greater than 10 are considered strong evidence for the proposed hypothesis (Jeffreys, 1939). Strength and interpretation of effect sizes was assessed in accordance with Cohen's guidelines (Cohen, 1988).

2. Results

2.1. Qualitative reviews

Overall, our search strategy identified 11,750 results. After removal of duplicates, screening of titles, abstracts, and full text 19 articles (two dissertations) were retained. Of these 14 met the criteria for the quantitative synthesis (Fig. 1). Fourteen studies contributed 16 independent effect sizes for the relationship between experiential avoidance and history of NSSI.

A total sample size of 13,820 with a weighted mean age of 20.08 ($SD = 3.90$; this excludes Hu et al. (2021) who did not provide mean age or standard deviation). Of the total sample 5,012 (36.27 %) reported a history of NSSI. Participants were primarily university students and studies were predominantly conducted in the USA and Australia (see

Table 2). Findings have been categorised by sample population.

2.1.1. University students

Seven research groups published 12 studies that examined the association between NSSI and experiential avoidance among university students (Anderson, 2009; Anderson et al., 2018; Anderson and Crowther, 2012; Bentley et al., 2015; Gratz et al., 2010; Greene et al., 2019; Haywood et al., 2022; Horgan and Martin, 2016; Liu et al., 2021; Singhal et al., 2021; Steele, 2017; Turner et al., 2015). Experiential avoidance was positively associated with NSSI (Anderson et al., 2018; Anderson and Crowther, 2012; Gratz et al., 2010; Haywood et al., 2022; Horgan and Martin, 2016; Liu et al., 2021; Turner et al., 2015). Anderson and Crowther (2012) and Greene et al. (2019) reported that participants with a history of NSSI reported higher scores on measures of experiential avoidance than those with no history of NSSI. Turner et al. (2015) reported positive associations between experiential avoidance and NSSI among Asian and Caucasian participants, but these were only significant among Asian participants. Likewise, Horgan and Martin (2016) reported significant differences in experiential avoidance among individuals who had recently engaged in NSSI and those who had no history of NSSI, as well as individuals with a current history of NSSI and

Table 2
Document inclusion.

| # | Author | Year | Country | Type of article | C or NC | Population | N | Age M(SD) | Gender | NSSI N (% of total sample) | Measure of NSSI | Measure of EA | Results |
|---|-----------------------|------|-----------|-----------------|---------|--|------|--|----------|----------------------------|-----------------|---------------|---|
| # | Anderson | 2009 | USA | Thesis | NC | Undergrad | 95 | 18.97 (1.90) | 67 % F | 95 (100 %) | DSHI | AAQ | Experiential avoidance was not significantly correlated with NSSI ($r = 0-.05, p = .62$) |
| # | Anderson and Crowther | 2012 | USA | Journal | NC | Undergrad | 214 | 18.86 (1.97) | 70 % F | 95 (44 %) | DSHI | AAQ | $d = -0.10, SE = 0.01$ $d = 0.43, SE = 0.14$ |
| # | Anderson et al. | 2018 | USA | Journal | NC | Undergrad | 230 | 18.76 (2.99) | 100 % F | 230 (100 %) | DSHI | AAQ | $d = 0.37, SE = 0.09$ |
| # | Bentley et al. | 2015 | USA | Journal | NC | Undergrad | 150 | 18.77 (0.97) | 71.3 % F | 150 (100 %) | ISAS | MEAQ | No overall score of experiential avoidance and NSSI. Reported on frequency, recency, and severity. Used the MEAQ and reported only procrastination was correlated with NSSI severity. Frequency and recency of NSSI were not associated with any other aspects of experiential avoidance. |
| # | Brausch and Woods | 2019 | USA | Journal | NC | Adolescents | 436 | 13.19 (1.19) | 52.7 % F | 75 (17.2 %) | ISAS | AAQ-II | |
| # | Gratz et al. | 2010 | USA | Journal | NC | Undergrad | 392 | 20.25 (2.46) | 74 % F | 101 (26 %) | DHSI | AAQ | Categorised as high BPD and Low BPD. Experiential avoidance was associated with DSH frequency in low BPD group ($r = 0.35, p < .01$). $d = 0.32, SE = 0.12$ $d = 0.40, SE = 0.10$ |
| # | Greene et al. | 2019 | Australia | Journal | NC | Undergrad | 778 | 22.27 (6.71) | 77.1 % F | 126 (16 %) | ISAS | BEAQ | |
| # | Haywood et al. | 2022 | Australia | Journal | NC | Undergrad | 487 | 21.36 (2.48) | 74 % F | 191 (40 %) | ISAS | BEAQ | $d = 0.41, SE = 0.09$ |
| # | Horgan and Martin | 2016 | Australia | Journal | NC | Community and University students (96.5% students) | 215 | 20.09 (4.23) | 79.1 % F | 63 (29.3 %) | NSM | AAQ | $d = 0.02, SE = 0.15$ |
| # | Howe-Martin et al. | 2012 | USA | Journal | NC | School children | 211 | 16.22 (1.23) | 50.7 % F | 72 (34 %) | m-DSHI | RAFQY | $d = 0.29, SE = 0.15$ |
| # | Hu et al. | 2021 | China | Journal | C | Adolescents | 250 | not specified but selection criteria 12 - 18 | 62 % F | 120 (48 %) | ANSBQ | AAQ-II | $d = 1.90, SE = 0.15$ |
| # | Liu et al. | 2021 | China | Journal | NC | Undergrad (College) | 6763 | 21.00 (3.51) | 56.6 % F | 1404 (20.8 %) | NSSQ | AAQ - II | $d = 0.37, SE = 0.03$ |
| # | Nielsen et al. | 2016 | UK | Journal | NC | University students and community | 1332 | 19.57 (6.22) | 75.2 % F | 1173 (88.1 %) | ISAS | AAQ-II | $d = 0.07, SE = 0.03$ |
| # | Nielsen et al. | 2017 | UK | Journal | NC | Community | 313 | 19.78 (3.48) | 81 % F | 313 (100 %) | ISAS | MEAQ | |
| # | Singhal et al. | 2021 | India | Journal | NC | Undergrad & Postgrad | 353 | 20.69 (1.72) | 58.3 % F | 352 (100 %) | ISAS | BEAQ | |
| # | Steele | 2017 | USA | Thesis | NC | Undergrad | 100 | 21.6 (5.43) | 87.7 % F | 35 (35 %) | ISAS | AAQ | $d = 2.92, SE = 0.39$ |
| # | Turner et al. | 2015 | Canada | Journal | NC | Undergrad | 931 | 20.26 (3.22) | 71.3 % F | 202 (21.7 %) | DSHI | AAQ | $d = 0.28, SE = 0.10$ (Asian) |

(continued on next page)

Table 2 (continued)

| Author | Year | Country | Type of article | C or NC | Population | N | Age M(SD) | Gender | NSSI N (% of total sample) | Measure of NSSI | Measure of EA | Results |
|-----------------|------|----------|-----------------|---------|---|-----|--------------|----------|----------------------------|-----------------|---------------|--|
| Vorous | 2009 | USA | Thesis | C | Individuals with BPD attending mental health facilities | 44 | 35.3 (12.6) | 95 % F | 44 (100 %) | SHI | AAQ | d = 0.20, SE = 0.10 (Caucasian) |
| # Xavier et al. | 2018 | Portugal | Journal | NC | Adolescents - School | 776 | 14.44 (1.76) | 52.4 % F | 171 (22 %) | RSIA - PORT | AFQ-Y | d = 0.85, SE = 0.15 (Male) d = 0.61, SE = 0.11 (Female) |

Notes: # - included in meta-analysis; NC – Non-clinical, C- clinical; DSHI – Deliberate Self-harm Inventory, ISAS – Inventory of Statements about Self-injury, NSSQ – Non-suicidal Self-injury Questionnaire, RSIA - PORT - Risk-taking and Self-harm Inventory for Adolescents - Portuguese Version, SHI – Self-harm Inventory, NSM – Non-standardised Measure, m-DSHI – Modified version of Deliberate Self-harm Inventory, ANSBQ – Adolescent Nonsuicidal Self-injury Behaviour Questionnaire, AAQ -Acceptance and Action Questionnaire, AAQ -II – Acceptance and Action Questionnaire II, MEAQ – Multi-dimensional Experiential Avoidance Questionnaire, BEAQ – Brief Experiential Avoidance Questionnaire, RAFQY – Revised Avoidance and Fusion Questionnaire for Youth, EAQ – Emotional Avoidance Questionnaire, AFQ-Y – Avoidance and Fusion Questionnaire – Youth; All studies were correlational.

individuals had previously engaged in NSSI. However, no differences were found between individuals who no longer engaged and individuals with no history of NSSI. Steele (2017) reported that individuals with a history of NSSI reported significantly more experiential avoidance than individuals with no history of self-injury. Significant positive correlations were reported between experiential avoidance and frequency of NSSI engagement (Anderson et al., 2018; Gratz et al., 2010).

In contrast, experiential avoidance and NSSI were not significantly correlated in a study by Anderson (2009). Singhal et al. (2021) also reported no associations between experiential avoidance and NSSI, all participants in this study reported a history of self-injury.

2.1.2. Adolescents

Four studies explored the association between experiential avoidance and self-injury among adolescents (Brausch and Woods, 2019; Howe-Martin et al., 2012; Hu et al., 2021; Xavier et al., 2018). All studies looked at the relationship between experiential avoidance and history of self-injury and found positive associations. Howe-Martin et al. (2012) also explored the association between experiential avoidance and frequency of engagement in NSSI. There was a significant, positive association between frequency of engagement in NSSI for females, but not for males. Conversely Xavier et al. (2018) found significant, positive associations between experiential avoidance and NSSI for both males and females. Hu et al. (2021) also found a positive association between experiential avoidance and severity of NSSI. Brausch and Woods (2019) reported a positive interaction between experiential avoidance and NSSI, when exploring if NSSI moderated the relationship between experiential avoidance and suicidal ideation.

2.1.3. Adults

2.1.3.1. *Community.* Two studies explored the association between experiential avoidance and NSSI among community samples (Nielsen et al., 2016, 2017). Nielsen et al.' (2016) initial study looked at history of NSSI, whereas the 2017 study explored the association between experiential avoidance and both recency and frequency of engagement in NSSI. Experiential avoidance was associated with history of engagement in NSSI but not recency or frequency.

2.1.4. Clinical samples

Vorous (2009) looked at the relationship between experiential avoidance and NSSI within clinical populations (participants recruited from mental health facilities). Frequency of engagement of NSSI was positively associated with experiential avoidance among participants with a diagnosis of borderline personality disorder.

2.2. Robust Bayesian Meta-analysis

Fourteen articles were included in the Bayesian meta-analysis. All studies were cross sectional and examined the relationship between experiential avoidance and history of engagement in self-injury and were of reasonable to good quality (Table 3). While some studies did report on the link between experiential avoidance and recency (3; Anderson and Crowther, 2012; Nielsen et al., 2016), frequency (5; Gratz et al., 2010; Howe-Martin et al., 2012; Nielsen et al., 2016; Turner et al., 2015; Vorous, 2009), and severity (2; Anderson and Crowther, 2012; Hu et al., 2021) of self-injury, there were either too few studies or insufficient quantitative information to calculate pooled effect sizes. As such, analyses were only conducted to explore the relationship between experiential avoidance and history of NSSI.

2.2.1. Weighted related outcomes

The output from the Robust Bayesian Meta-analysis demonstrated strong support for an association between experiential avoidance and history of NSSI (Bayes factor = 12.16), rather than for the alternative hypothesis that there is no association. Bayes factors were greater than 10, which as discussed previously indicate strong support for the proposed hypothesis (Jeffreys, 1939; see Table 4). The forest plot indicated a small to medium overall effect size (Fig. 2; Cohen, 1988).

There was strong evidence that heterogeneity was present within the pooled studies (Bayes factor = 2.891e102). We are unable to say with certainty if publication bias was present (Bayes factor = 2.39). Funnel plots have been reported to be an overall measure of small study effects, with publication bias being a component of that (Sterne and Harbord, 2004). Given this, in Bayesian meta-analysis the publication bias is assessed via the publication bias reported in the model output and not funnel plots. Average estimates for effect size and homogeneity are reported in Table 5.

2.2.2. Moderators

To assess potential moderators a meta-regression analysis using Hedges method was conducted, using traditional meta-analysis, to test if the measure of experiential avoidance, country of study (USA/Canada, UK/Europe, China, and Australia), population (university, adolescents, and community), and age (under 18, over 18) were moderators. Measure

Table 3
Document quality checks.

| Authors | Unbiased selection of sample | Adequate description of sample | Validated measure for determining NSSI | Validated measure for determining EA | Adequate handling of missing data |
|------------------------------|------------------------------|--------------------------------|--|--------------------------------------|-----------------------------------|
| Anderson (2009) | Yes | Yes | Yes | Yes | Yes |
| Anderson and Crowther (2012) | Yes | Yes | Yes | Yes | Not reported |
| Anderson et al. (2018) | Yes | Yes | Yes | Yes | Yes |
| Bentley et al. (2015) | Yes | Yes | Yes | Yes | Not reported |
| Gratz et al. (2010) | Yes | Yes | Yes | Yes | Not reported |
| Greene et al. (2019) | Yes | Yes | Yes | Yes | Yes |
| Haywood et al. (2022) | Yes | Yes | Yes | Yes | Yes |
| Horgan and Martin (2016) | Yes | Yes | No | Yes | Not reported |
| Howe-Martin et al. (2012) | Yes | Yes | Partial | Yes | Partial |
| Hu et al. (2021) | Yes | Yes | Yes | Yes | Not reported |
| Liu et al. (2021) | Yes | Partial | Partial | Yes | Not reported |
| Nielsen et al. (2016) | Yes | Yes | Yes | Yes | Partial |
| Nielsen et al. (2017) | Yes | Yes | Yes | Yes | Partial |
| Singhal et al. (2021) | Yes | Yes | Yes | Yes | Yes |
| Steele (2017) | Yes | Yes | Partial | Yes | Partial |
| Turner et al. (2015) | Yes | Yes | Yes | Yes | Not reported |
| Xavier et al. (2018) | Yes | Yes | Yes | Partial | Yes |

Table 4
Model summary table of Bayes factors for effect size, heterogeneity, and publication bias.

| | P(M data) ^a | Inclusion BF ^b |
|------------------|------------------------|---------------------------|
| Effect | 0.92 | 12.16 |
| Heterogeneity | 1.00 | 2.891e+102 |
| Publication bias | 0.71 | 2.45 |

^a P(M|Data) is the level of certainty that we have in the model after we have included our data. Data close to 1 tells us that we can be confident in our results. For example, in the above instance we can be certain that there is an effect size and heterogeneity present in our meta-analysis. However, the publication bias is still ambiguous as it could still only slightly higher than the original prediction of 0.50.

^b Inclusion Bayes factors are a continuous measure to the strength of evidence for the models.

of NSSI¹ was not included as a moderator due to only using endorsement of history rather than the entire measure. Overall I^2 was 99.51 % supporting the results of the Robust Bayesian Meta-analysis that there was a large percentage of heterogeneity present within the studies. No moderation effect was found for age, country, or population. Moderation effects were found for measure of experiential avoidance, specifically the AAQ-II demonstrated a stronger relationship. However, this only produced a minimal reduction to the I^2 value (98.90; see Table 6), therefore not substantially reducing the heterogeneity present across the studies. Moderating effects for gender were not tested as most participants were female.

3. Discussion

The current systematic review and Robust Bayesian Meta-analysis extends previous reviews and provides additional support for the small to moderate association between experiential avoidance and NSSI (Angelakis and Gooding, 2021; Brereton and McGlinchey, 2020). We also found that these associations were moderated measure of experiential avoidance (Acceptance and Action Questionnaire – II). Additionally, we were unable to rule out publication bias which may suggest

¹ Measures of NSSI that include checklists of NSSI methods often report higher prevalence of NSSI (Swannell et al., 2014), however for this study we generated a dichotomous variable based on endorsement of checklists or specifying prior engagement in NSSI.

that studies finding negative associations or no significant associations are not being published. However, while an association was found between experiential avoidance and NSSI, the findings also raise questions regarding our current understanding of the relationship between the two. Overall, our findings support the association between experiential avoidance and NSSI. However, they do highlight the need for more nuanced measures of capturing experiential avoidance within other populations (e.g. older adults, in-patients) to provide clarity regarding the role of experiential avoidance in the onset and maintenance of self-injury. These more nuanced ways of capturing the construct of experiential avoidance will allow for refinements of existing models of self-injury and thereby allow for the improvement of targeted interventions to reduce experiential avoidance.

The Experiential Avoidance Model of NSSI was published in 2006 (Chapman et al., 2006), and highlighted the central role that experiential avoidance is purported to play in the onset and maintenance of NSSI. However, only 19 studies investigating associations between experiential avoidance and NSSI have been published in the last 16 years (14 of which provided sufficient quantitative data for inclusion in the meta-analysis). Although a strength of our study was the inclusion of grey literature, we were only able to find two such studies. Given we were unable to rule out publication bias, this raises the possibility that null findings are not being published.

Additionally, the two versions of the Acceptance and Avoidance Questionnaire (AAQ and AAQ-II; Bond et al., 2011; Hayes et al., 2004) were used in 70 % of the studies. The AAQ and AAQ-II were developed out of Acceptance and Commitment therapy (Hayes et al., 1999; Hayes et al., 2004) and reportedly focus on experiential avoidance/psychological inflexibility (Bond et al., 2011; Hayes et al., 2004; Tyndall et al., 2019). The Acceptance and Avoidance Questionnaire (Hayes et al., 2004) has been criticised for not uniquely capturing experiential avoidance and low construct validity. However, the majority of studies included in the meta-analysis that identified an association between experiential avoidance and NSSI use this measure. The AAQ has also been criticised for not capturing experiential avoidance as a construct but rather being a more a general measure of Acceptance and Commitment Therapy processes (Chawla and Ostafin, 2007). Furthermore, Chawla and Ostafin (2007) highlighted that the issue was not only with that lack of specificity of the measure capturing experiential avoidance but also how experiential avoidance is conceptualised. The Revised Acceptance and Avoidance Questionnaire (AAQ-II) was created to address the limitations of the AAQ (Wolgast, 2014). However, this has also been critiqued for its lack of discriminant validity with the Positive

Forest Plot of studies included in meta-analysis

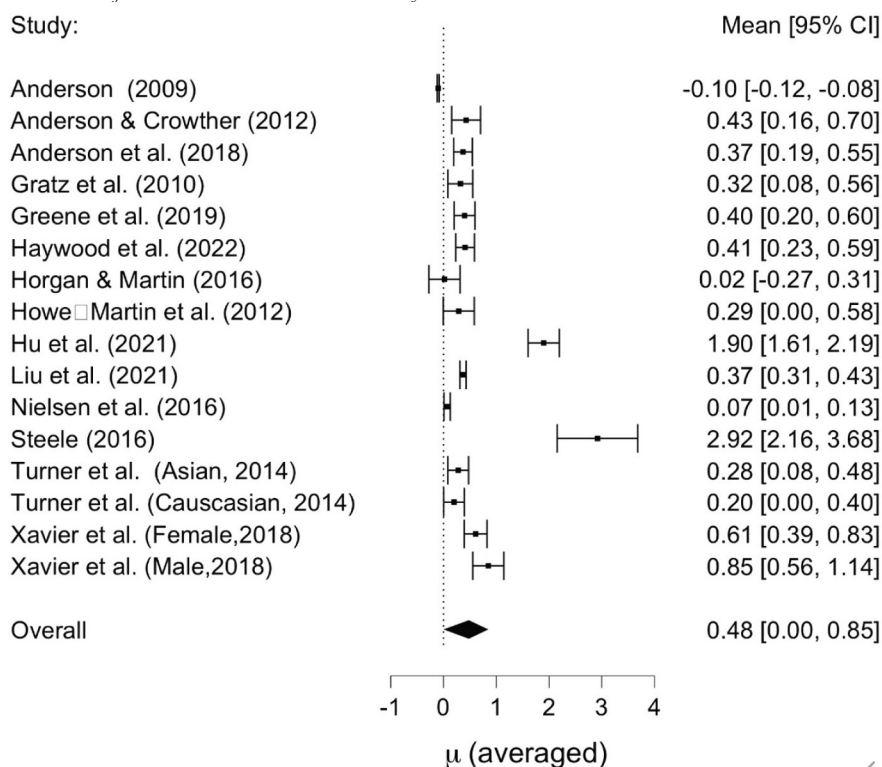


Fig. 2. Forest Plot of studies included in meta-analysis.

Table 5

Model averaged estimates for effect size and heterogeneity.

| | Mean | Median | 95 % CI | |
|--------------------------|------|--------|---------|-------|
| | | | Lower | Upper |
| Effect size (μ) | 0.48 | 0.50 | 0.00 | 0.85 |
| Heterogeneity (τ) | 0.68 | 0.65 | 0.44 | 1.05 |

Table 6

Moderation effects for measure of experiential avoidance.

| | Estimate | Standard error | z | p | 95 % confidence interval | |
|--|----------|----------------|------|-------------|--------------------------|-------|
| | | | | | Lower | Upper |
| Intercept | 0.21 | 0.26 | 0.84 | .404 | -0.29 | 0.72 |
| Acceptance and Action Questionnaire- II | 0.98 | 0.44 | 2.25 | .024 | 0.13 | 1.84 |
| Brief Experiential Avoidance Questionnaire | 0.19 | 0.55 | 0.34 | .731 | -0.89 | 1.26 |
| Avoidance and Fusion Questionnaire - Youth | 0.37 | 0.48 | 0.77 | .440 | -0.56 | 1.30 |

Note. Wald test. Acceptance and Action Questionnaire is the comparator. $I^2 = 98.90$, 95 % CI [97.33, 99.59].

The p value was in bold as it is the only significant moderator.

and Negative Affect Schedule (PANAS; Watson et al., 1988; Wolgast, 2014). Both the AAQ and the AAQ-II use a unidimensional score for the measure, which could be conflating psychological inflexibility and experiential avoidance (Wolgast, 2014).

Psychological inflexibility is defined as an individual’s inability to

fully connect to the present moment without the need for defences and to remain adaptable while in pursuit of their goals and values (Hayes et al., 2006). Thus, while experiential avoidance and psychological inflexibility are close-related constructs, they are different and should not be grouped together in a unidimensional measure, as this prevents us from identifying whether it is the shared variance that explains the association or whether they are uniquely associated with NSSI. Items on the measure such as “My painful memories prevent me from having a good life.” or “Worries get in the way of my success.” do not appear to capture any form of experiential avoidance. Similar concerns regarding overlapping constructs have been recently raised in the broader emotion regulation literature (Haywood et al., 2022; Juarascio et al., 2020). If the AAQ-II is being used as a measure to capture experiential avoidance but it is actually a measure of psychological inflexibility, further studies are required with other measures of experiential avoidance, particularly studies that allow for comparisons between experiential avoidance and psychological inflexibility. Additionally, most of the measures assess experiential avoidance as a unidimensional construct (AAQ, AAQ-II, BEAQ; Bond et al., 2011; Gámez et al., 2014; Hayes et al., 2004). Unfortunately, only two studies (Bentley et al., 2015; Nielsen et al., 2017) utilised the Multidimensional Experiential Avoidance Questionnaire (Gámez et al., 2011) however did not report on data in a way that allowed inclusion in the meta-analysis. Bentley et al. (2015) found that only procrastination was significantly associated with severity of engagement in NSSI. Whereas Nielsen et al. (2017) found that only repression/denial was associated with NSSI in ordered effects (control < NSSI < NSSI and suicidal behaviour).

Furthermore, of the studies analysed, 70 % were conducted among university students. Population of sample did not have a moderating effect within this study, suggesting that the association holds true for all groups within the meta-analysis. However, as previously mentioned, we know that the rates of self-injury among clinical samples are elevated and yet none of the studies included in the meta-analysis were

conducted within clinical populations (inpatients in psychiatric units/mental health facilities). Only one study within clinical populations was found. [Vorous \(2009\)](#) found a significant, positive association between frequency of NSSI and experiential avoidance within individuals in a mental health facility with a diagnosis of borderline personality disorder. However, this study was not able to be included in the meta-analysis due to looking at frequency of NSSI rather than history of NSSI. This also highlights that perhaps the relationship may be dependent on the outcome of NSSI we are measuring such as history, frequency, recency, and severity.

3.1. Limitations

First, all included studies are cross sectional in design so temporal ordering of associations cannot be assumed; longitudinal research is clearly needed to drive the field forward. Additionally, there is a dearth of experimental research within the literature. This severely constrains any conclusions regarding causation, and future experimental work is needed to address this limitation. Second, most of the participants were university students; while self-injury is known to be prevalent in this population ([Kiekens et al., 2019](#)), we know that these associations are also reported to be high among individuals in clinical settings ([Briere and Gil, 1998](#); [Darche, 1990](#); [DiClemente et al., 1991](#); [Nock and Prinstein, 2004](#)). Given elevated emotional distress among individuals seeking treatment, investigating experiential avoidance and NSSI within this population may be particularly important and should be a priority for future research. Third, a number of measures are used to assess experiential avoidance, and some of these have been criticised (e.g., AAQ and AAQ-II, [Wolgast, 2014](#)). The use of more specific and nuanced measures of experiential avoidance such as the Multidimensional Experiential Avoidance Questionnaire ([Gámez et al., 2011](#)) could shed light on the specific aspects of avoidance that are associated with NSSI. Finally, our review was limited to studies published in English. Given our analyses were unable to rule out the possibility of publication bias, more research is needed to ensure confidence that the association between experiential avoidance and NSSI is robust.

3.2. Future directions and clinical implications

Future research within other samples including adolescents, older adults, and clinical populations will provide clarity around the role of experiential avoidance beyond the current study. Additionally, experimental studies are required to further advance our understanding of the mechanisms associated with experiential avoidance and its influence on NSSI. Furthermore, while engaging in NSSI is associated with risks, it is imperative the clinical/therapeutic interventions are person-focused and assess the client's needs. Clinical interventions should look at reducing experiential avoidance, which in turn may prevent or reduce engagement in NSSI. Techniques from Dialectical Behaviour Therapy (DBT; [Linehan, 1993](#)) including improving distress tolerance, radical acceptance, and mindfulness may assist in reducing experiential avoidance. Like NSSI, major depression has also been associated with suicide ([Moitra et al., 2021](#)). Interventions that focus on increasing exercise have been found to be effective in reducing depression ([Murri et al., 2019](#)).

4. Conclusion

In conclusion, we found support for a small to medium association between experiential avoidance and history of engagement in NSSI. However, findings also raised important questions to address moving forward. Additional research using more nuanced measures of experiential avoidance, in more varied populations (such as clinical and other age groups), will help provide further clarity on the role that experiential avoidance plays in of the onset and maintenance of NSSI. Furthermore, additional studies looking at the association between experiential

avoidance and severity/frequency of NSSI and utilising experimental designs will also allow for a deeper understanding of the role of experiential avoidance. This will allow for further refinement of existing models of self-injury and provide clarity around targeted intervention for reducing experiential avoidance. Overall, these findings support the role of experiential avoidance in self-injury, in community samples, but highlight the need for more nuanced ways of detailing the role of experiential avoidance in order to provide more specific models of NSSI and targeted interventions for clinicians working with individuals with high levels of experiential avoidance.

Funding

Sophie Haywood is supported by a Research Training Program (RTP) Scholarship from Curtin University. Mark Boyes is supported by the National Health and Medical Research Council Australia (Investigator Grant 1173043).

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We would like to acknowledge Adie Wilmot, Indita Dorina, and Kirsty Hird for assisting with inter-rater reliability tasks. We also acknowledge Danyelle Greene's contribution to understanding how to conduct a meta-analysis.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2023.01.027>.

References

- [Anderson, N.L., 2009. A Test of Two Models of Non-suicidal Self-injury, Vol. 1.](#)
- [Anderson, N.L., Crowther, J.H., 2012. Using the experiential avoidance model of non-suicidal self-injury: understanding who stops and who continues. Arch. Suicide Res. 16 \(2\), 124–134. <https://doi.org/10.1080/13811118.2012.667329>.](#)
- [Anderson, N.L., Smith, K.E., Mason, T.B., Crowther, J.H., 2018. Testing an integrative model of affect regulation and avoidance in non-suicidal self-injury and disordered eating. Arch. Suicide Res. 22 \(2\), 295–310. <https://doi.org/10.1080/13811118.2017.1340854>.](#)
- [Angelakis, I., Gooding, P., 2021. Experiential avoidance in non-suicidal self-injury and suicide experiences: a systematic review and meta-analysis. Suicide Life Threat. Behav. 51 \(5\), 978–992. <https://doi.org/10.1111/sltb.12784>.](#)
- [Bentley, K.H., Sauer-Zavala, S., Wilner, J., 2015. The unique contributions of distinct experiential avoidance domains to severity and functionality of non-suicidal self-injury. J. Exp. Psychopathol. 6 \(1\), 40–57. <https://doi.org/10.5127/jep.040613>.](#)
- [Bond, F.W., Hayes, S.C., Baer, R.A., Carpenter, K.M., Guenole, N., Orcutt, H.K., Waltz, T., Zettle, R.D., 2011. Preliminary psychometric properties of the acceptance and action questionnaire-II: a revised measure of psychological inflexibility and experiential avoidance. Behav. Ther. 42 \(4\), 676–688. <https://doi.org/10.1016/j.beth.2011.03.007>.](#)
- [Bramer, W.M., Rethlefsen, M.L., Kleijnen, J., Franco, O.H., 2017. Optimal database combinations for literature searches in systematic reviews: a prospective exploratory study. Syst. Rev. 6 \(1\), 1–12. <https://doi.org/10.1186/s13643-017-0644-y>.](#)
- [Brausch, A.M., Woods, S.E., 2019. Emotion Regulation Deficits and Nonsuicidal Self-Injury Prospectively Predict Suicide Ideation in Adolescents. Suicide and Life-Threatening Behavior 49 \(3\), 868–880. <https://doi.org/10.1111/sltb.12478>.](#)
- [Brereton, A., McGlinchey, E., 2020. Self-harm, emotion regulation, and experiential avoidance: a systematic review. Arch. Suicide Res. 24 \(sup1\), 1–24. <https://doi.org/10.1080/13811118.2018.1563575>.](#)
- [Briere, J., Gil, E., 1998. Self-mutilation in clinical and general population samples: prevalence, correlates, and functions. Am. J. Orthopsychiatry 68 \(4\), 609–620. <https://doi.org/10.1037/h0080369>.](#)
- [Chapman, A.L., Gratz, K.L., Brown, M.Z., 2006. Solving the puzzle of deliberate self-harm: the experiential avoidance model. Behav. Res. Ther. 44 \(3\), 371–394. <https://doi.org/10.1016/j.brat.2005.03.005>.](#)

- Chawla, N., Ostafin, B., 2007. Experiential avoidance as a functional dimensional approach to psychopathology: an empirical review. *J. Clin. Psychol.* 63 (9), 871–890. <https://doi.org/10.1002/jclp.20400>.
- Cohen, J., 1988. *Statistical Power for the Behavioural Sciences*, 2nd ed. Lawrence Erlbaum, NY.
- Darce, M.A., 1990. Psychological factors differentiating self-mutilating and non-self-mutilating adolescent inpatient females. *Psychiatr. Hosp.* 21, 31–35.
- DiClemente, R.J., Ponton, L.E., Hartley, D., 1991. Prevalence and correlates of cutting behavior: risk for HIV transmission. *J. Am. Acad. Child Adolesc. Psychiatry* 30 (5), 735–739. [https://doi.org/10.1016/S0890-8567\(10\)80007-3](https://doi.org/10.1016/S0890-8567(10)80007-3).
- Franklin, J.C., Ribeiro, J.D., Fox, K.R., Bentley, K.H., Kleiman, E.M., Huang, X., Musacchio, K.M., Jaroszewski, A.C., Chang, B.P., Nock, M.K., 2017. Risk factors for suicidal thoughts and behaviors: a meta-analysis of 50 years of research. *Psychol. Bull.* 143 (2), 187–232. <https://doi.org/10.1037/bul0000084>.
- Gómez, W., Chmielewski, M., Kotov, R., Ruggero, C., Watson, D., 2011. Development of a measure of experiential avoidance: the multidimensional experiential avoidance questionnaire. *Psychol. Assess.* 23 (3), 692–713. <https://doi.org/10.1037/a0023242>.
- Gómez, W., Chmielewski, M., Kotov, R., Ruggero, C., Suzuki, N., Watson, D., 2014. The brief experiential avoidance questionnaire: development and initial validation. *Psychol. Assess.* 26 (1), 35–45. <https://doi.org/10.1037/a0034473>.
- Givens, S.H., Smith, D.D., Tweedie, R.L., Begg, C.B., DuMouchel, W., Harris, J., Dobson, A., Dear, K., Givens, S.H., Smith, D.D., Tweedie, R.L., 1997. Publication bias in meta-analysis: a bayesian data-augmentation approach to account for issues exemplified in the passive smoking debate. *Stat. Sci.* 12 (4), 221–250. <http://projecteuclid.org/euclid.ss/1030037958>.
- Gratz, K.L.M.L., Breetz, A., Tull, M.T., 2010. The moderating role of borderline personality in the relationships between deliberate self-harm and emotion-related factors. *Personal. Ment. Health* 4 (2), 96–107. <https://doi.org/10.1002/pmh>.
- Greene, D., Hasking, P., Boyes, M., 2019. The associations between alexithymia, non-suicidal self-injury, and risky drinking: the moderating roles of experiential avoidance and biological sex. *Stress. Health* 35 (4), 457–467. <https://doi.org/10.1002/smi.2879>.
- Hasking, P., Whitlock, J., Voon, D., Rose, A., 2017. A cognitive-emotional model of NSSI: using emotion regulation and cognitive processes to explain why people self-injure. *Cognit. Emot.* 31 (8), 1543–1556. <https://doi.org/10.1080/02699931.2016.1241219>.
- Hayes, S., Strosahl, K., Wilson, K., 1999. *Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change*. Guilford Press, New York.
- Hayes, S.C., Strosahl, K., Wilson, K.G., Bissett, R.T., Pistorello, J., Toarmino, D., Polusny, M.A., Dykstra, E.A., Batten, S.V., Bergan, J., Stewart, S.H., Zvolensky, M.J., Eifert, G.H., Bond, F.W., Forsyth, J.P., Karekla, M., McCurry, S.M., 2004. Measuring experiential avoidance: a preliminary test of a working model. *Psychol. Rec.* 54 (4), 553–578. <https://doi.org/10.1007/BF03395492>.
- Hayes, Steven C., Luoma, J.B., Bond, F.W., Masuda, A., Lillis, J., 2006. Acceptance and commitment therapy: model, processes and outcomes. *Behav. Res. Ther.* 44 (1), 1–25. <https://doi.org/10.1016/j.brat.2005.06.006>.
- Haywood, S.B., Hasking, P., Boyes, M.E., 2022. We have so much in common: does shared variance between emotion-related constructs account for relationships with self-injury? *J. Affect. Disord. Rep.* 8, 100332. <https://doi.org/10.1016/j.jadr.2022.100332>.
- Higgins, J.P., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M.J., Welch, V.A., 2019. *Cochrane Handbook for Systematic Reviews of Interventions*, 2nd ed. John Wiley & Sons.
- Horgan, M., Martin, G., 2016. Differences between current and past self-injurers: how and why do people stop? *Arch. Suicide Res.* 20 (2), 142–152. <https://doi.org/10.1080/13811118.2015.1004479>.
- Howe-Martin, L.S., Murrell, A.R., Guarnaccia, C.A., 2012. Repetitive nonsuicidal self-injury as experiential avoidance among a community sample of adolescents. *J. Clin. Psychol.* 68 (7), 809–829. <https://doi.org/10.1002/jclp.21868>.
- Hu, Z., Yu, H., Zou, J., Zhang, Y., Lu, Z., Hu, M., 2021. Relationship among self-injury, experiential avoidance, cognitive fusion, anxiety, and depression in Chinese adolescent patients with nonsuicidal self-injury. *Brain Behav.* 11 (12), e2419. <https://doi.org/10.1002/brb3.2419>.
- International Society for the Study of Self-Injury, 2006. What is non-suicidal self-injury? <https://itriples.org/about-self-injury/what-is-self-injury>.
- International Society for the Study of Self-injury, 2022. What is self-injury? <https://itriples.org/about-self-injury/what-is-self-injury>.
- JASP Team, 2022. JASP (v0.14) [computer software]. <https://jasp-stats.org>.
- Jeffreys, H., 1939. *Theory of Probability*, 1st ed. Oxford University Press.
- Juarascio, A., Manasse, S., Clark, K.E., Schaumberg, K., Kerrigan, S., Goldstein, S.P., Evans, B.C., Wyckoff, E., Murray, H.B., Felonis, C.R., Forman, E., Wyckoff, E., Murray, H.B., Felonis, C.R., Forman, E., 2020. Understanding the overlap and differences in terms describing patterns of maladaptive avoidance and intolerance of negative emotional states. *Personal. Individ. Differ.* 158, 109859. <https://doi.org/10.1016/j.paid.2020.109859>.
- Kiekens, G., Hasking, P., Boyes, M., Claes, L., Mortier, P., Auerbach, R.P., Cuijpers, P., Demyttenaere, K., Green, J.G., Kessler, R.C., Myin-Germeys, I., Nock, M.K., Bruffaerts, R., 2018. The associations between non-suicidal self-injury and first onset suicidal thoughts and behaviors. *J. Affect. Disord.* 239, 171–179. <https://doi.org/10.1016/j.jad.2018.06.033>.
- Kiekens, G., Hasking, P., Claes, L., Boyes, M., Mortier, P., Auerbach, R.P., Cuijpers, P., Demyttenaere, K., Green, J.G., Kessler, R.C., Myin-Germeys, I., Nock, M.K., Bruffaerts, R., 2019. Predicting the incidence of non-suicidal self-injury in college students. *Eur. Psychiatry* 59, 44–51. <https://doi.org/10.1016/j.eurpsy.2019.04.002>.
- Klonsky, E.D., Muehlenkamp, J.J., 2007. Self-injury: a research review for the practitioner. *J. Clin. Psychol.* 63 (11), 1045–1056. <https://doi.org/10.1002/jclp>.
- Linehan, M.M., 1993. *Cognitive-behavioural Treatment of Borderline Personality Disorder*. Guilford Press.
- Liu, H., Wang, W., Yang, J., Guo, F., Yin, Z., 2021. The effects of alexithymia, experiential avoidance, and childhood sexual abuse on non-suicidal self-injury and suicidal ideation among Chinese college students with a history of childhood sexual abuse. *J. Affect. Disord.* 282 (March 2020), 272–279. <https://doi.org/10.1016/j.jad.2020.12.181>.
- Moitra, M., Santomauro, D., Degenhardt, L., Collins, P.Y., Whiteford, H., Vos, T., Ferrari, A., 2021. Estimating the risk of suicide associated with mental disorders: a systematic review and meta-regression analysis. *J. Psychiatr. Res.* 137 (December 2020), 242–249. <https://doi.org/10.1016/j.jpsychires.2021.02.053>.
- Murri, M.B., Ekkekakis, P., Magagnoli, M., Zampogna, D., Cattedra, S., Capobianco, L., Serafini, G., Calcagno, P., Zanetidou, S., Amore, M., 2019. Physical exercise in major depression: reducing the mortality gap while improving clinical outcomes. *Front Psychiatry* 9 (January), 1–10. <https://doi.org/10.3389/fpsy.2018.00762>.
- Nielsen, E., Sayal, K., Townsend, E., 2016. Exploring the relationship between experiential avoidance, coping functions and the recency and frequency of self-harm. *PLoS ONE* 11 (7), e0159854. <https://doi.org/10.1371/journal.pone.0159854>.
- Nielsen, E., Sayal, K., Townsend, E., 2017. Functional coping dynamics and experiential avoidance in a community sample with no self-injury vs. non-suicidal self-injury only vs. those with both non-suicidal self-injury and suicidal behavior. *Int. J. Environ. Res. Public Health* 14 (6). <https://doi.org/10.3390/ijerph14060575>.
- Nock, M.K., 2009. Why do people hurt themselves? New insights into the nature and functions of self-injury. *Curr. Dir. Psychol. Sci.* 18 (2), 78–83. <https://doi.org/10.1111/j.1467-8721.2009.01613.x>.
- Nock, M.K., Prinstein, M.J., 2004. A functional approach to the assessment of self-mutilative behavior. *J. Consult. Clin. Psychol.* 72 (5), 885–890. <https://doi.org/10.1037/0022-006X.72.5.885>.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., Moher, D., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Int. J. Surg.* 88 (March) <https://doi.org/10.1016/j.ijsu.2021.105906>.
- Pompili, M., Serafini, G., Innamorati, M., Monteboni, F., Palermo, M., Campi, S., Stefani, H., Giordano, G., Telesforo, L., Amore, M., Girardi, P., 2012. Car accidents as a method of suicide: a comprehensive overview. *Forensic Sci. Int.* 223 (1–3), 1–9. <https://doi.org/10.1016/j.forsciint.2012.04.012>.
- Ribeiro, J.D., Franklin, J.C., Fox, K.R., Bentley, K.H., Kleiman, E.M., Chang, B.P., Nock, M.K., 2016. Self-injurious thoughts and behaviors as risk factors for future suicide ideation, attempts, and death: a meta-analysis of longitudinal studies. *Psychol. Med.* 46 (2), 225–236. <https://doi.org/10.1017/S003329715001804>.
- Selby, E.A., Joiner, T.E., 2009. Cascades of emotion: the emergence of borderline personality disorder from emotional and behavioral dysregulation. *Rev. Gen. Psychol.* 13 (3), 219–229. <https://doi.org/10.1037/a0015687>.
- Singhal, N., Bholia, P., Reddi, V.S.K., Bhaskarapillai, B., Joseph, S., 2021. Non-suicidal self-injury (NSSI) among emerging adults: sub-group profiles and their clinical relevance. *Psychiatry Res.* 300 (October 2020), 113877. <https://doi.org/10.1016/j.psychres.2021.113877>.
- Stanley, B., Currier, G.W., Chesin, M., Chaudhury, S., Jager-Hyman, S., Gafalvy, H., Brown, G.K., 2018. Suicidal behavior and non-suicidal self-injury in emergency departments underestimated by administrative claims data. *Crisis* 39 (5), 318–325. <https://doi.org/10.1027/0227-5910/a000499>.
- Steele, A.M., 2017. Nonsuicidal self-injury and the association of experiential avoidance with psychophysiological responding during stress induction. [ProQuest Information & Learning]. Issues 2-B(E). In: *Dissertation Abstracts International: Section B: The Sciences and Engineering*, Vol. 78. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc14&NEWS=N&AN=2017-01060-065>.
- Sterne, J.A.C., Harbord, R.M., 2004. Funnel plots in meta-analysis. *Stata J.* 4 (2), 127–141. <https://doi.org/10.1177/1536867x0400400204>.
- Swannell, S.V., Martin, G.E., Page, A., Hasking, P., St John, N.J., 2014. Prevalence of nonsuicidal self-injury in nonclinical samples: systematic review, meta-analysis and meta-regression. *Suicide Life Threat. Behav.* 44 (3), 273–303. <https://doi.org/10.1111/sltb.12070>.
- Taylor, P.J., Jomar, K., Dhir, K., Forrester, R., Shahmalak, U., Dickson, J.M., 2018. A meta-analysis of the prevalence of different functions of non-suicidal self-injury. *J. Affect. Disord.* 227 (November 2017), 759–769. <https://doi.org/10.1016/j.jad.2017.11.073>.
- Turner, B.J., Arya, S., Chapman, A.L., 2015. Nonsuicidal self-injury in asian versus caucasian university students: who, how, and why? *Suicide Life Threat. Behav.* 45 (2), 199–216. <https://doi.org/10.1111/sltb.12113>.
- Tyndall, I., Waldeck, D., Pancani, L., Whelan, R., Roche, B., Dawson, D.L., 2019. The acceptance and action questionnaire-II (AAQ-II) as a measure of experiential avoidance: concerns over discriminant validity. *Journal of Contextual. Behav. Sci.* 12 (January 2018), 278–284. <https://doi.org/10.1016/j.jcbs.2018.09.005>.
- van Doorn, J., van den Bergh, D., Böhm, U., Dablander, F., Derks, K., Draws, T., Etz, A., Evans, N.J., Gronau, Q.F., Haff, J.M., Hinne, M., Kucharsky, S., Ly, A., Marsman, M., Matzke, D., Komarlu Narendra Gupta, A.R., Sarrafoglou, A., Stefan, A., Voelkel, J., Wagenmakers, E.-J., 2021. The JASP guidelines for conducting and reporting a Bayesian analysis. *Psychon. Bull. Rev.* 28, 813–826. <https://doi.org/10.3758/s13423-020-01798-5>.
- Vorotus, M.A., 2009. The effects of experiential avoidance and distress tolerance on self-harm in individuals diagnosed with borderline personality disorder. In: *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 70(3-B), p. 1960.

- <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc6&NEWS=N&AN=2009-99180-330>.
- Watson, D., Clark, L.A., Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J. Pers. Soc. Psychol.* 54 (6), 1063–1070.
- Williams, J.W., Plassman, B.L., Burke, J., Holsinger, T., Benjamin, S., 2010. Preventing Alzheimer's disease and cognitive decline. In: Evidence Report/technology Assessment No. 193. (Prepared by the Duke Evidence-based Practice Center under Contract No. HHS 290-2007-10066-1).
- Wolgast, M., 2014. What does the acceptance and action questionnaire (AAQ-II) really measure? *Behav. Ther.* 45 (6), 831–839. <https://doi.org/10.1016/j.beth.2014.07.002>.
- Xavier, A., Cunha, M., Ana, P.-G., 2018. Daily peer hassles and non-suicidal self-injury in adolescence: gender differences in avoidance-focused emotion regulation processes. *J. Child Fam. Stud.* 27 (1), 59–68. <https://doi.org/10.1007/s10826-017-0871-9>.
- Sophie B Haywood** is undertaking a PhD in Psychology at Curtin University. Her research interests lie in avoidance, non-suicidal self-injury (NSSI), and alcohol and other substances.
- Penelope Hasking** is a Professor in the Curtin enAble Institute and the School of Population Health at Curtin University. The focus of her research is on high-risk behaviours, particularly alcohol misuse and non-suicidal self-injury, exhibited by young people.
- Mark E Boyes** is an Associate Professor in the Curtin enAble Institute and the School of Population Health at Curtin University. He is particularly interested in understanding how individual differences, as well as social and community related variables, are related to psychological, social, educational, and health related outcomes across the lifespan.