

The Prevalence of Non-suicidal Self-injury (NSSI): Protocol for a Systematic Review and Meta-analysis

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Protocol

Keywords: NSSI, Non-Suicidal Self-injury, self-harm, prevalence, systematic review protocol

Posted Date: August 3rd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-750342/v1>

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Abstract

Background: Non-suicidal self-injury (NSSI) is one of the most important public health concerns. NSSI usually begins in adolescence and is associated with several psychiatric, interpersonal, and intrapersonal problems. Prevalence estimates of NSSI has been reported globally and locally. However, the prevalence of NSSI even in similar populations is diverse in the literature. Most previous reports on NSSI prevalence originate from primary studies which usually have selection bias. Therefore, the objective of the current study is to estimate the prevalence of NSSI while considering the limitations of previous studies.

Methods: All studies that have reported the prevalence of NSSI published from 1990 until the search date will be eligible to be included. This includes observational, survey, cohort, cross-sectional, and correlational studies. NSSI with any definition will be eligible to be included. There will be no language limitation. Special populations such as natives, minorities, or particular disorders will be excluded. Also, there will be no restriction regarding age, gender, nationality, and sexual orientation of the participants. To assess the methodological quality of the primary articles, a form will be used.

Discussion: Considering the limitations of previous studies on the prevalence of NSSI, conducting a systematic review and meta-analysis to provide estimates of different types of NSSI. A better understanding of the prevalence of NSSI and related complications will point to gaps in research and help set preclude for future analyses. The results of this review will be applied by patients, healthcare providers, and policymakers.

Systematic review registration: CRD42020180887

Background

Non-suicidal self-injury (NSSI) has become a great concern globally. This behavior has been known as one of the most important public health issues(1-3). In older editions of Diagnostic and Statistical Manual of Mental Disorders (DSM), self-injury was recognized only as a symptom of borderline personality disorder (BPD)(4); however, recent studies have indicated that self-injury is seen frequently in patients who do not fulfill diagnostic criteria of BPD(5, 6). Therefore, in the fifth edition of DSM (DSM-5) (7), NSSI has been considered as a distinct disorder which requires more investigations(5, 6, 8, 9).

Using the disability-adjusted life year (DALY), which measures number of years lost due to disability, illness or death, systematic analysis for the Global Burden of Disease Study (2015) reported the age-standardized rate for NSSI as 551.9 per 100,000 persons in 2005 and 457.9 per 100,000 persons in 2015. Therefore, NSSI was ranked as the 19th and 21st prevalent disorder respectively in years 2005 and 2015 (10). Moreover, systematic analysis for the Global Burden of Disease mortality (2013) has reported age-standardized death rates of NSSI as 15.8 per 100,000 persons in 1990 and 12.2 per 100,000 persons in 2013 (11).

Research studies indicate that NSSI usually manifests itself for the first time during adolescence. It is associated with a wide range of psychiatric problems, extreme interpersonal and intrapersonal problems and is significantly related to increased risk of suicidal behaviors (12). The risk of suicide in the first year following NSSI was 66 times higher than the annual risk of suicide in the general population. The risk of suicide reaches 1.7%, 2.4%, and 3% respectively after 5 years, 10 years, and 15 years (13). There is evidence in the literature that this behavior has association with anxiety and mood disorders (14), BPD (15), substance abuse (14), problems related to negative emotion (16), disappointment, self-criticism, distorted body image, and low self-esteem (17). NSSI would also cause clinically significant conditions the most common ones are physical injuries. Other long-term and short-term consequences such as excitability and hateful feelings like anger, guilt and shame as well as educational problems have also been observed in patients with NSSI disorder. Self-injury behavior could lead to medical problems (for example, increased risk of exposure to infectious diseases like HIV) as well as impaired general function of the patients (16, 18).

To date, no transparent and exact definition of self-harm behaviors has been introduced. . Menninger described such behaviors for the first time in 1938. He defined NSSI as “partial suicide”. Klonsky (19) and Nock & Favazza (20) defined NSSI as a direct injury made deliberately to one’s body tissue without intention of suicide. This includes a vast spectrum of behaviors like cutting, burning, biting, hitting, peeling and scratching of the skin; however, this definition may not be limited to the mentioned behaviors. The comprehensive definition for NSSI provided by the International Society for the Study of Self Injury describes this disorder as a self-inflicted damage of body tissue made deliberately without any intention of suicide. This definition adds that this behavior is made by the patients for purposes that are not socially accepted (17). As the final definition which is more inclusive among various definitions, the DSM-5 diagnostic criteria declares that one would diagnosed with NSSI if the patient has engaged in intentional self-injury behaviors (such as cutting, burning, biting, excessive scratching) to his/her body surface for at least five days in the preceding year to induce bleeding, bruising, or pain with expectation that these self-inflicted injuries will cause only mild to moderate injury (i.e., without suicidal intention) (7).

There is no general consensus regarding the exact terminology of this behavior and different terms (e.g., deliberate self-harm (DSH), self-wounding, and self-mutilation) have been used in the literature to describe this behavior over time (12). Some of the previously introduced terms may also include suicidal behaviors, high-risk behaviors, and some forms of direct self-harm behaviors. For instance, NSSI is distinct from self-injurious behaviors (SIBs) such as stereotyped and repetitive behaviors seen among youth who suffer from developmental disabilities (7). NSSI is also distinct from DSH, which encompasses harming one’s body with or without suicidal intent (21, 22), with regard to lethality, motivations, patterns, and requirements for management or treatment. Lack of agreement regarding the definitions and terminology of this phenomenon makes these behaviors hard to understand (23, 24).

Global and regional prevalence estimates of NSSI have been reported in the literature. However, there is controversy regarding the prevalence of NSSI, even between studies with homogenous samples. Much of

the relevant evidence available originates from the primary studies whose results may be subjected to selection bias during recruitment of the participants (19, 25-30).

To the best of our knowledge, two systematic reviews, one meta-analysis, and one systematic review and meta-analysis have been conducted to determine the prevalence of self-injury in the general population. Moreover, one meta-analysis and one systematic review have been done to determine the regional prevalence of this behavior (12, 24, 31-33). The systematic review and meta-analysis by Swannell and her colleagues (24) included 119 primary studies in English and Spanish and estimated the prevalence of NSSI as 17.2% among adolescents, 13.4% among young adults, and 5.5% among adults. However, processes in conducting this review were not repeated by a second reviewer and no explanation was provided regarding the reasons for the observed heterogeneity in the prevalence estimates. The authors investigated the influence of methodological factors on the prevalence estimate of NSSI worldwide and its heterogeneity and concluded that such factors were responsible for 51.6% of the observed heterogeneity. By adjusting the prevalence estimate for the studied methodological factors, they reported that there was no increase in the prevalence of NSSI over time (24). Another systematic review without meta-analysis on the prevalence of NSSI included 52 primary studies. According to the results of this study, the prevalence of NSSI was estimated as 7.5 to 46.5% among adolescents, 38.9% among university students, and 4 to 23% in adults. However, processes in conducting this review was not repeated by a second reviewer and also number of bibliographic databases as well as the keywords used to search the databases were too limited (23). Another systematic review without meta-analysis, which determined the prevalence of NSSI and DSH in adolescents from 2005 to 2011, included 53 primary studies published in English. This review estimated the prevalence of NSSI as 18% among adolescents. However, similar to previous studies mentioned earlier, review processes were not repeated by a second reviewer and no assessment was done to explain the heterogeneity in pooled prevalence rates. This systematic review did not find any significant difference between the pooled prevalence of NSSI (18%) and DSH (16%) (12).

Gillies et al. (32) in their meta-analysis study investigated all cross-sectional and cohort community-based studies conducted between 1990 and 2015 in order to estimate prevalence of self-harm, suicide risk rate, age-related characteristics, self-harm type, help-seeking types, and self-harm reasons among adolescents 12 to 18 years of age. Through investigating 172 primary studies from 41 countries, the authors estimated the lifetime prevalence of self-harm as 16.9%. Furthermore, they reported higher prevalence of self-harm in girls and noted that relief from unpleasant thoughts and feelings was the most common reported reason to self-harm. Their findings showed that suicidal ideation and attempt to suicide were more likely in adolescents who self-harmed. It should be noted, however, that the processes to perform the systematic review were done once only and were not repeated by a second reviewer. In addition, the number of bibliographic databases searched as well as the keywords used to search the databases was too limited. A meta-analysis without systematic review on the prevalence of NSSI among school-age adolescents in China included 420 primary studies published in English and Chinese with 160,348 students. This meta-analysis estimated the prevalence of self-harm as 22.37% (95% CI: 18.84% to 25.70%). Subgroup analyses showed that the lifetime prevalence of NSSI was 14.5% (95% CI: 0.06% to

22.7%) and 6 to 24 months prevalence was 23.3% (95%CI: 20.5% to 26.1(33). Another systematic review without meta-analysis to determine the prevalence of NSSI among indigenous people of Australia and New Zealand included seven primary studies published in English. The authors reported NSSI prevalence as 9 to 22%. The processes of conducting this review were done only once (31).

Considering the limitations stated regarding the previous reviews on the prevalence of NSSI, it seems necessary to conduct more vigorous reviews on this topic. Therefore, the authors will conduct a systematic review and meta-analysis to estimate the prevalence of NSSI with consideration of a priori principle and investigating a wider range of bibliographic databases as well as the gray literature.

Objectives

The primary objective of this systematic review is to estimate the prevalence of NSSI. The secondary objectives are as follows:

1. To estimate the prevalence of NSSI based on different definitions (NSSI, DSH, etc)
2. To estimate the prevalence of NSSI based on different types of NSSI (cutting, scratching, biting, peeling of the skin, etc)
3. To estimate the prevalence of NSSI based on the motives to self-harm (e.g., getting attention, relief of bad feelings, self-punishment, relaxation, etc)
4. To estimate the prevalence of NSSI based on the prevalence type (point prevalence, annual prevalence, and lifetime prevalence)
5. To estimate the prevalence of NSSI based on gender
6. To estimate the prevalence of NSSI based on different age groups
7. To estimate the prevalence of NSSI based on different nationalities
8. To explore the heterogeneity of NSSI prevalence across the primary studies and determine its sources

Methods

This systematic review will be conducted according to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist. The protocol of this systematic review has been registered in PROSPERO (No. CRD42020180887)

Eligibility Criteria

Study types

All primary studies that have reported the prevalence of NSSI will be eligible to be included. This includes observational, cohort, cross-sectional, correlational studies that have investigated NSSI prevalence in the general population. The studies with any definition of self-harm will be eligible. There will be no language

restriction. Those studies that determine NSSI prevalence in specific population groups such as natives, minorities, or among patients with particular psychiatric disorders will not be eligible.

Population

Studies with the subjects of any age group (children, adolescents, youth, and adults) and of any gender (male or female) and any nationality will be eligible to be included.

Definitions

This systematic review will determine point prevalence, annual prevalence, and lifetime prevalence of NSSI. The therapeutic interventions to manage NSSI will not be considered. Studies with any definition used to describe self-harm behavior (mentioned earlier in the introduction part) will be eligible. Any study that has used the diagnostic criteria provided by the DSM-5 to describe self-harm behavior will be eligible.

Sampling methods

Studies with a minimum of 25 subjects with any type of sampling (random or non-random sampling) will be eligible.

Search strategy

Electronic databases

The electronic databases that will be used to conduct the search include PubMed, PsycINFO, MEDLINE, Embase, Scopus, ProQuest, Web of Science and Google scholar. The search will be conducted in the time period from 1990 to 31/12/2019.

The appropriate keywords were determined using controlled vocabularies of MeSH (Medical Subject Headings) and Emtree as well as the three-step search method. The keywords include the following:

(Self-Injurious Behavior) OR (self-injury) OR (self-destructive Behavior) OR (self-harm) OR (self-mutilation) OR (NSSI) OR (self-inflicted wound) OR (self-inflicted injury) OR (self-poisoning) OR (skin-cutting) OR (parasuicide) OR (self-cutting)

The search syntax developed to be used for PsycINFO database is presented in additional file 2. This search syntax will be modified and will be used for other electronic databases.

Other sources

In addition to electronic databases, other sources such as articles, conferences, dissertations, previous reviews studies, key journals, reference list of previous reviews, and reference list of the included studies will be considered.

Screening and selection

After completing the systematic search of the mentioned bibliographic databases, the search results will be entered into the Mendeley reference manager program. Then, two reviewers will screen the search results separately and independently. In the screening process, using titles and abstracts of the citations, the search results will be categorized as relevant, irrelevant, or indeterminate. Any disagreement will be resolved through discussion and consensus, and finally if disagreement remains, a third reviewer will be consulted.

At the next step, the full-texts of the relevant as well as indeterminate studies will be reviewed by two reviewers and considering the inclusion and exclusion criteria, they will be selected. In case of any disagreement regarding meeting inclusion and exclusion criteria, a third reviewer will be consulted. There will be no language limitation and in case of languages other than English, the full text of the citation will be translated into English.

Methodological Quality Assessment

To assess the methodological quality of the primary articles, a form will be used. This process will be done by two reviewers independently. The reviewers will be asked to fill out the required form for each article separately. Any disagreement will be resolved through discussion and consensus and finally if disagreement remains, a third reviewer will be consulted.

Data extraction and Data synthesis

Data extraction process will be accomplished independently by two reviewers using a designed data collection form. The required data that will be collected include the following:

1. Study identification data (first author, publication date, journal name, type of the study, location)
2. Background data (age, gender, number of participants studied, specific population groups, inclusion and exclusion criteria of the studies, education level of the participants)
3. Data related to the primary objective of the systematic review (NSSI prevalence rate), secondary objectives (prevalence of NSSI based on different definitions, types, and motives of self-harm, gender, and age groups)

The main data that will be used for meta-analysis includes denominator of a proportion (the number of subjects diagnosed with NSSI to the total number of subjects). If the required data are not presented appropriately in the article, the figures will be reviewed. If the data are presented in a figure, we will use online WebPlotDigitizer tool to extract the required data.

In case that the required data are not presented in the text or in the figures, we will contact the corresponding author of the article via email (maximum of three times every 7-10 days). If the authors do not reply and provide the required data, that particular article will be excluded.

The main size in this study is the prevalence, and meta-analysis will be conducted only if there are at least 4 studies.

The main data of meta-analysis will be consisted of the denominator of the prevalence measure (The numerators of affected people to the total number). If the studies presented details on the prevalence with respect to gender, age, kind of primary relationship and kind of extra-dyadic behavior, the information will be investigated in the same basic form.

The meta-analysis of prevalence estimates will be accomplished using “metaprop” command by Stata (Ver. 13.0, StataCorp, College Station, TX, US) statistical package. In order to determine the combination model, considering similarities and differences between the primary studies, fixed-effects or random-effects model will be applied to summarize the prevalence rates. In addition, forest plots will be used to depict the prevalence estimates.

In order to determine heterogeneity between the results of the primary studies, the Cochran’s Q test (P values less than 0.05 indicate notable variability) and inconsistency index (I^2) will be used. Based on categories proposed by Higgins et al. to define heterogeneity, I^2 values of 0 to 24.5% indicate low heterogeneity, values of 25% to 49.5% indicate moderate heterogeneity, and values between 50 and 74.5% indicate severe heterogeneity, and values higher than 75% will indicate very severe heterogeneity.

In order to assess the publication bias, the following methods will be used sequentially:

1. Inspection of funnel diagram: if the total number of the included studies is less than 10, this method will not be used. In case of asymmetry in the funnel plot, the next two methods will be used.
2. In the second step, the nonparametric Begg's test and parametric Egger's test will be used. If P value of any of these tests is less than 0.1, then the next method will be used.
3. The third method is “fill and trim” method which identifies and corrects asymmetry of the funnel plot.

In order to measure quality of evidence, the GRADE (Grading of Recommendations Assessment, Development and Evaluation) tool will be used. In order to perform sensitivity analysis, “one-out remove” method will be applied using the “metaninf” command by Stata software. In addition, in order to determine the effect of methodological quality on the combined results, “subgroup analysis” or “meta-regression” will be used. In case of significant differences are observed regarding the prevalence estimates of NSSI between high-quality and low-quality studies, the final results will be presented using the results of high-quality studies.

Discussion

In the present systematic review and meta-analysis, we will determine the prevalence of NSSI in all age groups among studies published from 1990 to 2019. The sources of heterogeneity among the results of primary studies will be explored. In addition, prevalence estimates of different forms of NSSI (based on NSSI types and motives, gender, age group, and nationality) will be determined. We believe that such data will help us in understanding the variability between the primary studies. The results of this review will be useful for patients, families, caretakers, mental health specialists, researchers, scientists and decision

makers. Prevalence estimates of NSSI over time will provide opportunities to assess the burden of this disease and improve evidence-based measures and will consequently help to improve mental health. Finally the results of this article will published in journals.

Abbreviations

NSSI: Non-suicidal self-injury

DSM: Diagnostic and Statistical Manual of Mental Disorders

DALY: Disability-adjusted Life Year

DSH: Deliberate Self-harm

SIBs: Self-injurious Behaviors

BPD: Borderline Personality Disorder

MeSH: Medical Subject Headings

PROSPRO: Prospective Register of Systematic Reviews

NO: Number

GRADE: Grading of Recommendations Assessment

Declarations

Ethics approval and consent to participate

Not applicable

Consent to publish

Not applicable as no personal information is provided in the manuscript.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

Not applicable

Authors` contributions

SA and MN conceived the study idea and design. All authors drafted the first protocol. SA and MN reviewed the protocol. All authors have developed the search strategy and methods of the systematic review. AB have extensively reviewed the manuscript and incorporated intellectual inputs. All authors have read, and approved the final version of the manuscript.

Acknowledgements

Not applicable

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