Establishing Components of Programmes to Reduce Restrictive Practices in Adult Mental Health Inpatient Services: A Behaviour Change Technique Analysis

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Abstract

Background: Incidents that threaten service user and staff safety occur frequently in adult mental health inpatient settings, often resulting in restrictive practices such as restraint and seclusion. These carry significant risks, including physical and psychological harms to service users and staff, as well as costs to the NHS. Numerous complex interventions have been developed which aim to reduce the use of restrictive practices.

Aims: The aims were to identify, standardise and report the effectiveness of components of interventions that seek to reduce restrictive practices in adult mental health inpatient settings, using the Behaviour Change Technique taxonomy.

Methods: A systematic mapping review of literature identified in health and social care research databases and unpublished sources (including social media) was undertaken. Records were quality appraised using the MMAT. Records of interventions to reduce any form of restrictive practice used with adults in mental health services were included. The resulting dataset for extraction was guided by WIDER, Cochrane and theory coding guidelines. The BCT taxonomy was systematically applied to each identified intervention.

Results: The final dataset comprised 175 records reporting 150 interventions, 109 of which had been formally evaluated. The most common intervention targets were seclusion and/or restraint reduction. The most common evaluation approach was a non-randomised design. There were only six randomised controlled trials. The number of BCTs identified per intervention ranged from 1-33 (mean:8). The most common strategy was staff training. BCTs from 14 of a possible 16 clusters were detected. Over two thirds of the BCTs mapped onto four of the 14 clusters: 'Goals and planning'; 'Antecedents'; 'Shaping knowledge'; 'Feedback and monitoring'. Those BCTs which were found in all the interventions were similar to those found in those interventions which demonstrated statistically significant effects.

Conclusions: Studies of interventions to reduce restrictive practices appear to be diverse quality. Interventions tended to contain multiple components delivered in multiple ways. Further research could enhance the evidence base prior to future commissioning decisions. Separate testing of individual procedures, for example, audit and feedback, could ascertain the more effective intervention components and improve understanding of content and delivery.

Registration: The study is registered as PROSPERO 2018 CRD42018086985 Available from: http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018086985

Contributions To The Literature

- Restrictive practices (e.g., restraint or seclusion) in mental healthcare are harmful. As such, there are numerous interventions in use that aim to reduce their use.
- No previous research has described what procedures and behaviour change techniques (BCT) are used in these interventions and whether some might be more effective than others.
- Findings show most interventions try to change staff behaviour by providing instruction on how to perform a behaviour (e.g. teaching de-escalation); there is little difference in the BCT content of effective and non-effective interventions.
- We recommend that intervention components are tested individually to ascertain effectiveness.

Background

Incidents that threaten service user and staff safety, such as violence, aggression and self-harm, are common in mental health inpatient settings.[1] They are often managed using restrictive practices, e.g., restraint; seclusion; coerced intramuscular injections and constant observation. Restrictive practices are widely used internationally[2] although obtaining reliable prevalence data is complicated by discrepancies in definitions and recording methods[3] there is international consensus that they are overused.[4]

Restrictive practices can cause serious, even lethal, physical injury as well as psychological harm[5] and can have a detrimental effect on therapeutic relationships.[6] Furthermore, substantial costs arise from resulting staff sickness[7] and resource-intensive observation of service users.[8]

Previous reviews[9–16] have highlighted the paucity and poor quality of the evidence[16]. For example, there is no evidence to demonstrate that one form of restrictive practice is more effective than another in terms of safety or preference; and furthermore, where one restrictive practice is reduced, another may increase. There have been repeated calls for better description and evaluation of interventions to reduce use of restrictive practices; and for guidance on their reduction to be informed by robust, transparent studies[17, 18].

Mental health services have heavily invested in interventions to reduce restrictive practices. Some, such as *Safewards*[19], have been evaluated and reported in the literature; but other interventions are being developed ad hoc, and implemented locally. Many are complex interventions with multiple procedures, such their behavioural change mechanisms are unclear. Furthermore, it is unknown whether interventions that have reduced the use of restrictive practices have features in common. These limitations hamper the future development of interventions to reduce restrictive practices.

Synthesis of the existing literature could identify common features and whether they are associated with the reduction of restrictive practices. In this regard, the Behaviour Change Technique (BCT) taxonomy offers a reliable method of specifying intervention components and the mechanisms by which behaviour is changed.[20–22] A BCT is defined as *'an observable, replicable, and irreducible* component *of a programme designed to alter or redirect causal processes that regulate behaviour'*(p23).[20]. Use of standardised language promotes transparency through more accurate reporting and replication[23] as well as more successful implementation.[17] Although developed to be used prospectively in intervention design[24, 25] it can also been used retrospectively, and has been used internationally to report interventions[26] and synthesise evidence[27–29] including reanalysing interventions to explore their components.[29] The BCT taxonomy comprises 93 '**behaviour change techniques**', e.g., giving feedback on a behaviour or demonstrating a behaviour. The techniques are organised into 16 **clusters** such as '*Goals and planning'* (solving problems by planning actions, setting and reviewing goals)' and *Shaping knowledge'* (including instructions on performing behaviour and information about antecedents). The BCT taxonomy therefore facilitates robust synthesis and analysis of heterogeneous evidence.

This study takes an essential first step in future intervention development by aiming to identify, standardise and explore the effectiveness of components of interventions that seek to reduce restrictive practices in adult mental health inpatient settings, using the BCT taxonomy.

Methods

Design

Systematic mapping review and BCT synthesis, incorporating three stages: (1) sensitive literature search to identify relevant records; (2) data extraction; (3) analysis, including description of interventions using the BCT taxonomy, quality assessment and exploration of effectiveness.

Data sources

A search restricted to published research would not identify one-off interventions implemented by individual services. The search strategy drew on the increasingly used method of mapping[30–34] augmented by an 'Environmental scan'[35] to assist with the identification of one-off interventions. Search strategies incorporated consulting experts; searching academic databases, grey literature, social media (Twitter, Facebook and YouTube) and 57 relevant websites; backward and forward citation searching using Google and PubMed; and contact with authors to access fuller descriptions of interventions. This approach facilitated the identification of a more diverse range of records than could have otherwise been achieved. The results of the published and grey literature database and website searches were stored and de-duplicated in EndNote

libraries[36]. Social media searches results were stored in spreadsheets. Searches were conducted February-June 2018 and updated in April 2019. Details of sources and search strategies are in the additional file.

Study selection

The inclusion criteria were broad: English language records (1999–2019) of interventions aiming to reduce the use of restrictive practices by staff in adult (including older people) inpatient mental health services (including Psychiatric Intensive Care Units, acute and forensic services). Interventions may or may not have been implemented. No restrictions on study design or quality were imposed.

Data management

Retrieved references were imported into free online artificial intelligence software Abstrakr[37] to assist with screening, using the following options: a pilot phase of 100; double-screening; display-all (i.e. title, authors, abstract); order by relevance. Two researchers (KC and KB) independently screened the first 100 references, documenting decision-making. Terms were discussed to ensure coherence after screening the first 100, then 600 and again after 1000. In total, 55 terms indicating relevance (e.g., restraint, seclusion) and 78 terms indicating irrelevance (e.g., child, dementia) were entered. Once 1500 references had been screened, no further references appeared relevant. Following Rathbone *et al.*'s recommendation,[38] references without abstracts were screened separately (n = 998), to avoid compromising Abstrakr predictions. Conflicts were discussed and resolved between KC and KB. This process generated a subset of full texts to retrieve for further screening.

Data extraction and analysis

The literature was diverse and WIDER[39]was used to inform modifications to a standardised extraction tool. The extraction category 'Mode of delivery' required a high level of interpretation because of the numerous descriptions of delivery mode, so the constant comparison technique[40] was used to inform judgements about whether one delivery mode was the same as another. Other headings for extraction, e.g., publication type; year of publication, were drawn from modifiable Cochrane extraction templates[41] and developed with reference to the study objectives. MMAT[42] was used to screen records and identify evaluations. Evaluations were further interrogated for intervention outcomes.

Two researchers (KB and KC) independently coded the included records using the BCT Taxonomy v1[20] in NVivo[43]. The processes generated auditable trails with clear links to original datasets. For a BCT to be identified there had to be evidence of its presence within the intervention materials, therefore, a BCT might be used in an intervention yet remain unidentified due to lack of evidence within the records.

Where there was evidence of a BCT being used the text was coded, e.g., when staff on a training course undertook role-play practising de-escalation, the BCT 'Behavioural practice or rehearsal' was coded. Range and frequency of BCT*s* were identified across the interventions as a whole, their procedures (e.g., training) and outcomes.

Results

Screening

The searches identified 18,451 records in the published literature and 1,985 from grey literature, including 99 from social media [see Fig. 1]. Forward searching and contact with authors yielded a further 31. Of the 426 full texts retrieved 175 were included, these records varied in type, e.g., journal article and slides. These are reported elsewhere[44reference redacted] and in the Additional file 1.

This study identified 150 unique interventions, the majority of which aimed to reduce the use of seclusion or restraint or both. Eleven aimed to reduce the use of *pro re nata* (prn) psychotropic medication. None targeted rapid tranquilisation. Most interventions comprised multiple procedures (range 1–10; mean = 3), the most common were training and changes to nursing approaches (e.g., implementing *trauma-informed care*).

The MMAT screening questions identified 109 evaluations measuring 78 different interventions. Almost all evaluations were non-randomised designs(n = 103). Of the six randomised controlled trials, five reported complete outcome data. Only 70% of the non-randomised studies discussed possible confounders. There was little reporting of modifications and fidelity to protocols.

Seventy(64%) of the 109 evaluations reported multiple outcome measures (e.g., number of restraints and use of prn). Forty different standardised measures were reported, in addition to non-standardised meaures and routinely collected data. Service users were involved in 48 interventions, with type and extent of involvement varying greatly. Eighteen evaluations reported some cost data.

Analysis of BCTs within interventions

The 150 interventions contained 43 of a possible 93 BCTs from 14 of the taxonomy's 16 clusters. BCTs were identified on 1160 occasions ranging from 1−33(mean 8) per intervention. Each BCT was counted once in each intervention regardless of how frequently it was identified. The most frequently occurring BCTs are shown in Table 1. Four clusters contained two thirds of the BCTs identified: 22%(n = 257) in *Goals and Planning*; 17%(n = 193) in *Shaping Knowledge*; 15%(n = 171) in *Antecedents*; and 11%(n = 133) in *Feedback and Monitoring*.

Table 1
Description of commonly identified BCTs

BCT	Example	%	n
4.1 Instruction on how to perform the behaviour	Receive tuition about performing effective de-escalation. E.g., as part of a course	91	136
1.2 Problem solving	Person/team is prompted to analyse factors influencing the behaviour (unsuccessful de-escalation resulting in restrictive practice) and find solutions to overcome the problem. E.g., people become frustrated due to boredom so funding sought to provide ward activities.	73	110
12.2 Restructuring the social environment	Change social environment to increase the potential for de-escalation. E.g., promote socialisation between service users and staff via communal meals.	70	105
1.4 Action planning	Planning how de-escalation will be carried out at either individual or general level. E.g., when a service user is distressed, they inform staff in advance they would prefer to be allowed time off the ward.	55	82
13.2 Framing/reframing perspective on performing the behaviour	Suggesting the adoption of a (new) perspective on behaviour to change cognitions about performing the behaviour. E.g., seeing aggression as a manifestation of trauma.	47	70
4.2 Information about antecedents	Provide information about antecedents that predict the unwanted outcome. E.g., discussion about what often happens prior to incidents of restrictive practices.	40	60
7.1 Prompts/cues	Introduce a stimulus with the purpose of prompting the behaviour. E.g., Introducing a new risk assessment on admission.	39	58
2.7 Feedback on outcome(s) of behaviour	Monitor and provide feedback on the outcome of performance of the behaviour. E.g., number of restraints per month.	36	54
3.2 Social support (practical)	Advise on, arrange, or provide practical help. E.g., De-escalation rapid-response team available to provide support to prevent an incident escalating.	29	43
12.5 Adding objects to the environment	Add objects to the environment in order to facilitate performance of the behaviour. E.g., Sensory box with equipment to help staff to assist service users manage distress.	28	42
13.1 Identification of self as role model	Awareness that one's own behaviour may be an example to others. E.g., Staff attending training encouraged to promote de-escalation in their everyday practice.	28	42
2.4 Self-monitoring of outcome(s) of behaviour	Establish a method for the person/team to monitor and record the outcome(s) of their behaviour. E.g., Ward decides to monitor restrictive practice use with more detail than centrally requested.	23	34
12.1 Restructuring the physical environment	Change the physical environment to facilitate successful de-escalation. E.g., Converting seclusion room into sensory room.	20	30

BCT clusters

Goals and Planning: BCTs 'Problem solving', 'Action planning' and 'Goal setting' appeared most frequently. Examples of problem solving occurred during nursing handovers (e.g., McEwan *et al.*[45]) or clinical supervision. 'Action planning' and 'Goal setting' often followed on from 'Problem solving', e.g., target setting by staff to reduce the number of episodes of

restrictive practices, Lo[46]. There were no examples of 'Goal setting' with individual staff to reduce their use of restrictive practices.

Shaping Knowledge: This cluster included 'Instruction on performing behaviour' and the provision of 'Information about antecedents'. 'Information about antecedents' was provided at the theoretical level, such as discussing possible reasoning around the use of restrictive practices; or discussion at service, ward and service user level about what usually happened prior to the use of restrictive practices (e.g., Georgieva *et al.*[47]).

Antecedents: This cluster captures factors that influence whether restrictive practices can be avoided by identifying what precedes them, typically involving ward-level changes to the physical and social environment intended to reduce conflict. Three BCTs were identified: 'Restructuring the physical environment' (e.g., Lombardo *et al.*[48]), 'Adding objects to the environment' (e.g., Reimer and Corwith[49]) and 'Restructuring the social environment', e.g., via stakeholder involvement, or improving interaction between staff and service users (e.g., Visalli and McNasser [50]).

Feedback and Monitoring: The BCTs identified in this cluster related primarily to outcomes of the behaviour, most commonly 'Feedback on outcomes of behaviour', i.e. informing staff of rates of use of restrictive practices (outcomes) following increased use of de-escalation (the behaviour)(e.g., Qurashi et al, [51]).

BCTs identified in common intervention procedures

Most interventions (88%) used multiple procedures. Staff training was the most commonly used (90% of interventions). The most frequent BCT coded to training was 'Instruction on how to perform the behaviour'. The procedure audit and feedback (35% of interventions) typically consisted of data about use of restrictive practices being fed back to staff. The most common BCT identified here was feedback on outcomes of behaviour (e.g., restraint incidents). Changes to nursing approaches were used in 32% of interventions, the BCT most frequently identified being 'Restructuring the social environment', often through making staff more accessible, as well as introducing new meetings to discuss safety e.g., safety huddles.

BCTs and outcomes

A study objective was to identify BCTs showing potential effectiveness for future testing. One hundred and nine interventions had been evaluated but using a wide range of outcome measures (most commonly reported outcomes were those relating to the frequency and duration of seclusion and restraint). Ninety percent of evaluations reported at least one positive finding although only 58 studies supported these claims by reporting statistical significance (five of the six RCTs reported positive findings). The BCTs identified most frequently in these groups of interventions compared with those most frequently identified in all interventions are shown in Table 2.

Table 2
BCTs identified by outcome compared with all interventions

	BCTs used in:				
Ranked order	All interventions	Interventions with statistically significant findings	Interventions that significantly reduced restraint	Interventions that significantly reduced seclusion	RCTs reporting significant findings
1	Instruction on how to perform behaviour	Instruction on how to perform behaviour	Instruction on how to perform behaviour	Restructuring: social environment	Instruction on how to perform behaviour
2	Problem solving	Restructuring: social environment	Restructuring: social environment	Instruction on how to perform behaviour	Action planning
3	Restructuring: social environment	Problem solving	Problem solving	Problem solving	Prompts/cues
4	Action planning	Action planning	Action planning	Action planning	Problem solving
5	Framing/reframing	Prompts/cues	Feedback on outcomes of behaviour	Prompts/cues	Information about antecedents
6	Information about antecedents	Framing/reframing	Framing/reframing	Restructuring: physical environment	Social support (practical)
7	Prompts/cues	Feedback on outcomes of behaviour	Information about antecedents	Feedback on outcomes of behaviour	Credible source
8	Feedback on outcomes of behaviour	Information about antecedents	Identification of self as role model	Framing/reframing	Restructuring: social environment
9	Social support (practical)	Adding objects to the environment	Feedback on behaviour	Adding objects to the environment	Self-monitoring of outcomes of behaviour
10	Adding objects to the environment	Restructuring: physical environment	Prompts/cues	Information about antecedents	Framing/reframing

Many of the same BCTs were detected across all the intervention groups, 'Instruction on how to perform behaviour' being first or second in all categories. Interventions that significantly reduced restraint were more likely to use role modelling and feedback on behaviour. RCTs with significant findings looked different to the others with the inclusion of 'Credible source', 'Prompts and cues' being higher ranked and 'Restructuring the social environment' not being as common, however this was only five interventions. This similarity in content meant that is was not possible to make inferences about which BCTs might be more likely to result in significant improvements in reducing restrictive practices.

Discussion

This paper presents a rigorous assessment of BCTs that underpin interventions to reduce restrictive practices in adult mental health inpatient settings. Unlike previous reviews this study was broad in scope, not limited to a single restrictive practice or type of intervention. It is the first to comprehensively describe content in terms of BCTs and explore evidence of effectiveness.

The study demonstrated that it is feasible to apply the BCT taxonomy to a set of interventions that vary widely regarding conceptualisation, development, evaluation and reporting although the paucity of randomised designs hampered assessment of intervention effectiveness. Although these limitations in the literature prevented the identification of BCTs that show promise in terms of effectiveness, the review did identify a narrow range of BCTs used across all interventions.

There is little previous research with which to compare the results of the current study. Previous research modified the taxonomy definitions to enable a better fit, a process also required in the current study.[52] Presseau et al.[52] reported some similar findings in interventions for staff delivering diabetes care, identifying fewer BCTs (21 BCTs in 11 clusters) but were reviewing a smaller number of studies. The BCTs identified most frequently in Pressau et al.[52] differed from those reported here, which is not unexpected as the two studies concerned very different interventions.

Most of the 43 identified BCTs could be applied directly to the interventions, but some were complicated by featuring in a number of scenarios, e.g., 'Restructuring the social environment'. These difficulties were addressed by introducing additional sub-coding, in essence tailoring the method for the context. Therefore, in addition to generating new insights into interventions, the review adds to knowledge around the systematic application of the taxonomy with complex data.

Targeting behaviour of staff vs behaviour of service users

One of the challenges of using the BCT taxonomy was ascertaining whose behaviour (e.g., staff or service user) was the target of the intervention. Within the interventions there were many instances detected where a BCT could be considered to target service user behaviour, but also had the potential to change staff behaviour. One example was the introduction of a sensory room: whilst aiming to change service user behaviour by facilitating self-care to reduce distress, it also changed staff behaviour by providing an additional resource to use to support people and hence facilitate de-escalatory behaviour. This was usually coded as 'Restructuring the physical environment' either to reduce conflict antecedents, or to promote de-escalatory behaviour, if conflict should arise. A further complexity is illustrated by the BCT 'Action planning'. This often included individualised care planning to change a service user's behaviour if they became distressed; yet may also triggered staff behaviour change towards the service user facilitating an informed response, which in turn can successfully avoid the use of restrictive practices. It is important to acknowledge the various influences of interventions on the behaviour of staff, service users and visitors in the therapeutic milieu.

Detail retention vs clarity of description

The BCT that lacked specificity in this study was also one of the most frequently used. 'Restructuring the social environment' captured a broad range of changes implemented by interventions, from a strategic level to everyday interactions between staff and service users. The decision to retain this detail through the creation of sub-categories (e.g., access to staff; management support) addressed the difficulty to some degree for the present study, but added additional layers of complexity that may hinder comparisons between the BCTs coded in this study. The tension between achieving clarity while retaining detail for BCT coding reflects tensions in the literature as a whole, since bespoke interventions confuse attempts to standardise descriptions. Some of this information could be seen as contextual rather than relating to a specific BCT: for instance, it is unclear whether a new type of staff meeting is a behaviour change technique in itself; or whether the BCT is only what happens during the meeting, e.g., problem solving and practical social support. This may be a grey area that was specific to this data and not easily addressed through the use of subcategories. Presseau et al.,[52] also found this code to require more specificity when coding system-level interventions, and recommended the addition of what is 'restructured', preferably within an explicit programme theory.

Behaviour' vs 'outcomes of behaviour

The study identified a lack of process or implementation data across the studies. In the context of the review the target *outcome* of the behaviour was an absence of something happening, i.e. fewer restraints. The target *behaviour* was successful de-escalation, which is itself not an absence of carrying out restrictive practice but a proactive attempt to avoid it

by using other strategies. While it was clear for this study that the desired 'behaviour' was that which sought to reduce the use of restrictive practice, this was almost never measured or even accounted for amongst the interventions. The focus was always on the *outcomes* of behaviour, i.e. the number of restraints. This meant that feedback about the 'behaviour' could rarely be identified, as the focus was on feedback on 'outcomes of behaviour' and fails to capture successful de-escalation. This study shows how BCTs can be usefully deployed by future research to unpick these issues.

BCT Dosage

The frequency of BCT use was summarised in terms of whether they were present or not within an intervention, and not how many times evidence of their use was detected. As such, this does not reflect the 'dose' of each BCT. It is possible to report this cumulatively using NVivo software, but this would not be meaningful across a large number of interventions. The lack of explicit use of theory in intervention design and of accompanying detail about fidelity to the intervention further challenges dose identification.

Arguably, these examples illustrate theoretical weaknesses in the intervention literature and reinforce that without a theoretical model, it is difficult to understand what assumption interventions are based on, how they are supposed to have an effect and how effective they were. Using BCTs appears to be a helpful way of identifying where these shortcomings are pertinent. It is recommended that developers of future interventions make more explicit use of theory by using established reporting frameworks[53].

Limitations

The search strategy combined traditional systematic search techniques for retrieving research and grey literature, with a scanning approach to identify alternative sources of material. This had the advantage of enabling the retrieval of diverse records that reported intervention content and was useful for mapping the number and range of interventions; however, the diverse quality of reporting in some records presented a challenge for the meaningful assimilation of findings. For example, lack of detailed description of interventions hampered the detection of BCTs.

Implications for policy and practice

Service providers require high-quality evidence regarding the effectiveness of interventions to reduce restrictive practices. At present, these findings suggest that individual providers are developing and delivering ad-hoc untested interventions, or inconsistently implementing known interventions, without attention to how interventions will bring about change to staff behaviour. Evaluations of such interventions often report positive findings that imply that they are effective but the trustworthiness of such claims is undermined by poor reporting of intervention content, measurement of fidelity, little use of theory and testing using the least robust methodologies. Without reliable evidence, service providers may be using scarce resources to implement ineffective interventions.

Research recommendations

Existing evaluations reveal little about which procedures of an intervention are effective with commonly occurring procedures and BCTs identified across interventions. Without rigorous theory-driven testing of individual intervention procedures and components, it remains unclear which might be effective and whether that effect applies to which restrictive practices. The evaluations identified in this review used a variety of outcome measures reported in different ways, e.g., incidents per service user, or per day. This heterogeneity makes it difficult to compare studies and meta-analyse outcome data. Additionally, one gap that remains is the underuse of service user-reported outcome measures. Development of such outcome measures could add a useful dimension that may shed further light on intervention effectiveness. Future interventions should test individual procedures (and their constituent components) in isolation and be thoroughly described.

Conclusions

This review revealed that many interventions have been implemented over the past two decades targeting multiple restrictive practices, using multiple procedures and, where they have been evaluated, multiple outcome measures. Very few were theory-based and most reported positive findings. Many interventions have clusters of BCTs in common suggesting that interventions have been developed based on an unstated set of assumptions of how they are intended to work. Making these assumptions explicit through the use of theory would enable the testing, measurement and refinement of interventions to maximise their effectiveness.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

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

Competing interests

The authors declare they have no competing interests.

Authors' contributions

All contributed to the protocol development. JD, DS and IB provided expertise on restrictive interventions, IK on behaviour change theory, JW and RRL developed and advised on the search strategies, KB, KC and SK contributed to literature searches, data extraction and analysis, BCT mapping. All contributed to writing and editing the manuscript. JB leading the study. KB co-ordinated the study.

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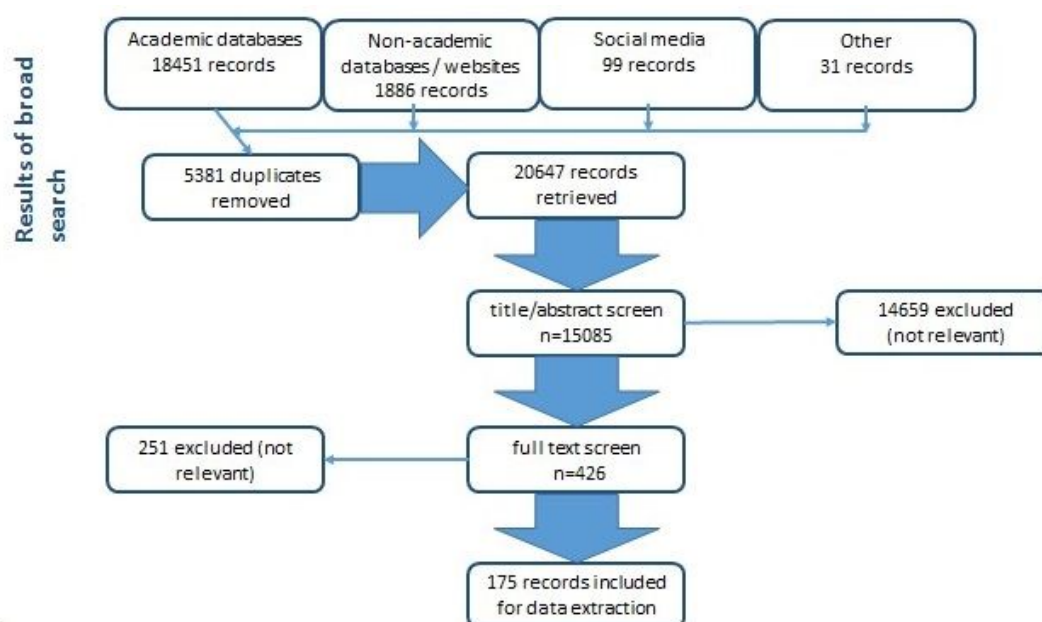
Figures

Figure 1

Result of broad search. The searches identified 18,451 records in the published literature and 1,985 from grey literature, including 99 from social media

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