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Background

Worldwide, 1.3% of deaths are from suicide (WHO, 2021) and rates of non-fatal self-harm are increasing, particularly in young girls (Morgan et al., 2017). Prospective studies show that self-harm is a major risk factor for subsequent suicide (Carroll et al., 2014) and the majority of those who die by suicide have a previous history of self-harm, and yet only a minority seek professional help following self-harm. Many people who die by suicide have not had recent contact with services (National Confidential Inquiry, 2021), so there is a need to understand more about informal help-seeking, including use of online resources.

Online access to good quality advice and support is important given that self-harm and suicidal thinking are often difficult to talk about directly. Many people who self-harm have never talked about it with anyone (Armiento et al., 2014) and for those who do, the internet is often the first medium for self-disclosure (Rowe et al., 2014). Social media, in particular, are widely used as a resource to share experience and seek support (Lavis and Winter, 2020). Reviews have highlighted the potential benefits of posting and viewing content - such as reduction in feelings of isolation, increased access to peer support and a resulting sense of community (Dyson et al., 2016).

However, there is concern that some online content may be contributing to increased rates of self-harm and may be linked to suicides, for example through so-called normalising of behaviour, reinforcing negative thoughts and feelings or connecting people with others who encourage it (Lewis and Seko, 2016). Recent research suggests that the time spent online may be associated with mental health problems in young people, although this seems to be related at least in part to loss of displaced activities, lack of sleep or increased sedentary behaviour (Viner et al., 2019). A review published in 2017 suggested that there was significant potential for harm with the best evidence for high internet use and internet addiction as having negative influences and some evidence to suggest that searching for suicide content online may be associated with self-harm and suicidal thinking (Marchant et al., 2017).

There are two aspects to the conundrum posed by this observation that accessing self-harm and suicidal content online may offer either benefits or potential harms. First, it is unclear why the same material (pictures of scars for example) may be experienced as helpful by some and harmful by others, or helpful by an individual on one occasion and harmful on another. Second, there is no consensus about what it is exactly about content or how it is being used that contributes to potential harm or benefit. For example, while explicit verbal encouragement of suicide or self-harm is universally seen as bad, as is bullying or trolling, it is less clear what ideas like normalising mean - since awareness of the self-harm of others might either promote similar behaviour or might encourage a participant to talk more freely and lead to a reduction of stigma. Graphic content is frequently referred to and assumed to be harmful but is not defined consistently; for some it includes any scars or self-injury paraphernalia (Miguel et al., 2017), others define it as deep wounds (Shanahan et al., 2019).

The latest evidence included in prior reviews was published in 2015. Given the rapid development of the online space and the proliferation of research focused particularly on social media, there is a need for an updated review of evidence on the impact of viewing and interacting with self-harm and suicidal content online - where possible unpicking the evidence to explore potential pathways to harm or benefit.

For this review, we have chosen to look across the range of content that would fall under a broad definition of self-harm that covers acts that include an intent to die and acts without such intent. Psychological and social risks for non-fatal self-harm and for suicide are similar and self-harm, even when not explicitly described as attempted suicide, is often accompanied by suicidal thinking (Kapur et al., 2013). With user-generated content in particular it is often difficult to identify clear distinctions between that which is solely about suicide and that which is about self-harm without suicidal intent (Shanahan, Brennan and House, 2019).

For these reasons we did not wish to draw a sharp distinction between self-harm and suicide content online and therefore the primary research question for our review was: What is the published evidence on the nature of the association between interacting online with self-harm or suicidal content, and mental health outcomes? Our aim in asking this question was to develop an initial theoretical framework to understand how online content may influence mental health outcomes, to help focus future research and policy development.

Method

The review was conducted in line with guidelines for the classification of reviews as systematic (Krnic Martinic et al., 2019)

Study identification: An information specialist designed and ran expert search strategies using the two concepts self-harm/suicidal behaviours and internet use/social media. We ran customised searches in CINAHL, Embase, Medline, PsycInfo, Scopus, Social Care Online and Web of Science core collection. The searches were initially run in January 2020 and updated February 2021.

We performed supplementary searches in Ethos, Clinical trials.gov, ICTRP, NICE Evidence and Social Care Institute for Excellence (SCIE)and 23 websites.

Study selection: Records were screened against the inclusion criteria (table 1) initially by title and abstract and then on full text of potentially relevant studies by one reviewer. A second reviewer checked the list of excluded studies. Uncertain cases were discussed and resolved by consensus.

Table I: Inclusion and exclusion criteria here

Data extraction and quality assessment: Each included study received a quality rating out of 5 using the Mixed Methods Appraisal Tool (MMAT) version 2018 (Hong et al., 2018).

For each study we tabulated study identifiers; aims; type of study; methods; definition of self-harm/suicidal behaviour; participant demographics and sample size; research setting; key findings.

Data synthesis: The results for each included study were scrutinised and detail on potential harms or benefits were extracted. We noted the nature of the harm or benefit, any information on the subject of the harm or benefit, the mechanism of action (for example passive viewing of content or active and interactive use responding to others) and the nature of the media. Synthesis was a collaborative process using a thematic approach but with attendance to mechanisms of action rather than simply the potential harm or benefit itself.

Results

The database searches identified 9549 records and a further 262 records were found in the supplementary searches. Once duplicates were removed there were 4493 unique records. After screening by title and abstract and full text review, 87 studies met our inclusion criteria and have been included in the data synthesis (see figure 1 PRISMA flow diagram). Most of the evidence was rated as medium quality or above; 38% achieved a score of 4 or 5, 36% a score of 3 and 25% scored below 3. A table of included studies is not included but is available on request.

Figure 1 here

In 61 of the studies, the content under investigation or discussed in the results, could be classified as self-harm including suicidal thoughts or behaviours even where the subject in the title of the study was suicide or non-suicidal self-injury. Some studies (26) were focused exclusively on suicide-related content, for example results of searches for methods of suicide, reactions to live streams of suicide attempts or expressions of suicidal thoughts. We use the term self-harm in the results to identify content that is broad in nature and suicide where the content is explicitly and exclusively about suicidal thoughts or actions.

The majority of the included studies were descriptive in nature; exploring the nature of the content found online (51 studies), describing user knowledge (2 studies) or exploring user experiences (28 studies). There were only six experimental studies (An and Lee, 2019; Cheng and Yom-Tov, 2019; Corbitt-Hall et al., 2016; Corbitt-Hall et al., 2019; Lewis et al., 2018; Till et al., 2017). Only four of the included studies had a longitudinal element (Arendt et al., 2019; Cheng and Yom-Tov, 2019; Scherr and Reinemann, 2016; Till et al., 2017). Of the 36 studies focused on users rather than content, 16 of these were in populations with direct experience of self-harm or thoughts of self-harm.

One of the difficulties in making sense of the evidence related to our question is the heterogeneity of the studies. Firstly, there is much diversity in the nature of the form and content itself including that which comes from the types of platform that is hosting content. Recent theory in this field has proposed a framework for describing and exploring host-related features that may be relevant in understanding the effect of online interventions (Moreno and d'Angelo 2018), but we found no evidence of the systematic use of so-called site affordances as a way of understanding their impact. There is added complexity from the nature of the users accessing content, as well as the nature of the interactions with the content. Table 2 summarises the main variables we identified as relevant to answering our research question.

Table 2:

A key design issue is the availability of longitudinal or experimental studies. The majority of the studies were cross-sectional or qualitative. Only three of the studies included a participant-level temporal assessment (Arendt et al., 2019; Scherr and Reinemann, 2016; Till et al., 2017) and only one of these suggested that exposure to content (on Instagram) may lead to increased risk of self-harm or suicidal thinking one month later (Arendt et al., 2019). Interestingly, a longitudinal panel survey of 1377 young people and adults in Germany found that "suicidality" was associated with cross sectional data on accessing forums but that this association was not evident at follow-up one month later (Scherr and Reinemann, 2016). An experimental study in a sample of 61 participants who had a history of self-harm found that exposure to hopeful messages on YouTube improved positive attitudes about recovery whereas exposure to hopeless messages did not increase hopeless attitudes to recovery (Lewis et al., 2018).

The Person and the Nature of User Experience

Of the studies that described the nature of user experience related to content online, 17 (61%) were in populations who were, or had been, active users of such content or had personal experience of self-harm. Active use involves posting, consuming or interacting purposefully with online content. Used in this way the online environment can be an important place for conversations about self-harm. Online communities provide opportunities for expression of feelings and can facilitate better communication about suicide and self-harm with individuals more willing to initiate and participate in conversations. Social media is sometimes a safe space to express thoughts of self-harm or suicide (Davis and Lewis, 2019; Gargiulo and Margherita, 2019; Gibson et al., 2019; Mars et al., 2015) or ask for sensitive advice for example about scar management (Jacob et al., 2017). This may be particularly salient for socially anxious young people (Bell et al., 2018). There is some evidence that such active use is associated with lower levels of mood disturbance than more passive (reading only, or "lurking") use (eg Escobar-Viera et al., 2018), but findings come from cross-sectional studies and are therefore unable to clarify the direction of cause of any effect.

The remaining 11 studies were surveys (Arendt et al., 2019; Keipi et al., 2017; Liu et al., 2017; Mars et al., 2015; Minkkinen et al., 2017) or focus group (Gibson et al., 2019; Gritton et al., 2017) studies with young people, or surveys in general adult populations (Choi and Noh, 2019; Harris et al., 2017; Scherr and Reinemann, 2016) . These studies were less helpful in shedding light on the nature of online use and experience from the individual's perspective.

For some in these studies it is the possibility of anonymity that is important when either searching for information or sharing feelings (Bell et al., 2018; Coulson et al., 2017; Davis and Lewis, 2019; Giacchero Vedana et al., 2018; Gibson et al., 2019; Lewis and Michal, 2016; Yukari et al., 2018; Wiggins et al., 2016). A further important feature is that the online world is available and easily accessible when needed in times of crisis (Seko, et al, 2015; Tucker and Lavis, 2019; Williams et al., 2020) as opposed to professional services for which there is often a long waiting list (Coulson et al., 2017).

There is little evidence to quantify the extent of incidental, or unintended, exposure to self-harm content. A study using data from the ALSPAC survey of young people reported self-harm related internet use in 14.9% of the sample who had never self-harmed (Mars et al., 2015). A survey of Finnish (n=555) and American (n=1032) youth reported that about 12% had seen internet sites about self-harm and 9% had seen sites about suicide in the previous 12 months (Keipi et al., 2017). However, neither of these studies quantified incidental versus active exposure. While there is some evidence to suggest that exposure to content is associated with increased feelings of self-harm and/or suicide (Branley and Covey, 2017; Harris et al., 2017), this evidence is cross-sectional and cannot give us information on causality. One study found that those who went online for suicide related purposes were more likely to be willing to seek help (Harris et al., 2017) and a further study found that exposure is just as likely to be to helpful sites as to harmful ones (Mars et al., 2015).

The Medium and the Nature of Form and Content

Over half of the included studies (51 studies) focused solely on the nature and form of the content found online. Of these, 28 studies focused on an element of the content itself as the unit of analysis, either on particular platforms (for example videos about recovery from self-harm on YouTube (Ryan-Vig et al., 2019) or tweets about self-harm or suicide (Hilton, 2017; Lee and Kwon, 2018; Spates et al., 2020) or posted content across different media (for example images tagged as self-harm (Shanahan et al., 2019) or posts tagged with #cutting (Miguel et al., 2017). The remaining 23 studies engaged to some extent with the interactivity of platforms by following particular threads on discussion boards or chats (Niederkrotenthaler, et al, 2016; Niederkrotenthaler and Till, 2019; Williams et al., 2020) or analysing comments and responses in addition to the original posts (Carlyle, et al, 2018; Dagar and Falcone, 2020; Tao and Jacobs, 2019).

Some studies highlighted content they regarded as explicitly harmful, such as the use of Twitter to make suicide pacts (Lee and Kwon, 2018), active encouragement to suicide in response to expression of suicidal thoughts (Brown et al., 2019; O'Dea et al., 2018) and baiting or jeering in response to suicide attempts (Li et al., 2015; Ma, et al, 2016; Phillips and Mann, 2019; Westerlund et al., 2015). Some studies noted websites or discussion boards that were focused on encouraging self-harm or suicide and included discussion on methods (Biddle, et al, 2018; T. Niederkrotenthaler et al., 2016; Niederkrotenthaler and Till, 2019). It is unclear whether in this category should be included milder expressions of positivity about self-harm or suicide, that did not include active explicit encouragement. For example, one study noted that some images tagged as self-harm included comments that depicted scars as cool or attractive (Shanahan et al., 2019), and discussions about particular suicides in one study found comments that talked of interest and excitement in the act (Westerlund et al., 2015). Otherwise the diversity across the form, content and site characteristics makes it difficult to give definitive answers to what might be harmful about content.

However, many of the studies exploring the nature of content found that much of the content could be classified as expressing distress, offering or seeking support (Davis and

Lewis, 2019; Eichenberg and Schott, 2017; Guidry, et al, 2021; Spates et al., 2020). In the studies that explored comments on posts there were examples of jeering and baiting but the majority of interaction was offering support or suggestions for help-seeking (Brown et al., 2019; Carlyle et al., 2018; Li et al., 2019; Phillips and Mann, 2019).

Studies that explored the nature of images found that not all images tagged with labels related to self-harm were pictures of injury. Images depicting injury ranged from pictures of healed scars to pictures of recent severe wounds. The proportion of images of injury varied across studies: 8.8% of pictures found using common German # for NSSI on Instagram, 12.6% of which were characterised as graphic (Brown et al., 2018); 29% of images found across Twitter, Instagram and Tumblr found using common search terms for self-harm, none of which were classed as graphic (Shanahan et al., 2019); 75% of images on Instagram with the #selfharn, no rating of severity given (Fulcher, et al 2020). How the studies operationalised the searches for content is likely to be a factor in the subsequent results.

The Outcomes: Positives versus negatives

There are many positives reported from being in these online spaces. For some, posting online helped to reduce their symptoms of distress (Eichenberg and Schott, 2017), was used as an alternative to the act itself (Margherita and Gargiulo, 2018) or put them in a place to stop self-harm completely (Lewis and Michal, 2016). Posting within online communities can help users to understand and make sense of some of their own emotions in relation to urges and acts of self-harm (Coulson et al., 2017; Gargiulo and Margherita, 2019; Lewis and Michal, 2016; Shanahan et al., 2019; Williams et al., 2020 Lavis and Winter 2020) as well as gain a sense of identity (Shanahan et al., 2019) or self-worth (Seko and Lewis, 2018). Individuals posting to message boards and other online communities also frequently talked about drawing benefit from knowing that the narration of their own story may also be useful to others (Coulson et al., 2017; Eichenberg and Schott, 2017; Lewis and Michal, 2016; Y. Seko et al., 2015; Tucker and Lavis, 2019). It should be noted that in considering potentially positive outcomes, our search excluded studies of online resources developed as part of an intervention (see eg Romeu et al., 2020).

However, the opposite can also be true. The process of posting about experiences can entail a distressing reliving of painful situations (O'Dea et al., 2018; Tucker and Lavis, 2019), and providing support to other posters can be a heavy responsibility (Lavis and Winter, 2020). Users have reported being triggered to harm themselves when viewing posts (Brown et al., 2020; Y. Seko et al., 2015) or using online images as part of their self-harm ritual (Jacob et al., 2017). Online spaces can exert social pressures that escalate self-harm (Lavis and Winter, 2020), and users have reported being harassed or bullied because of posts (Brown et al., 2020).

The person and the place

Our synthesis suggests that, in thinking about the nature of encounters with self-harm or suicide content online, there are two broad areas of importance – the person who is online and the medium they are engaging with. Both of these areas are multi-faceted and the potential outcomes, either positive or negative, are the result of inter-play between multiple

variables. The variables identified in table 2 don't reside in particular types of users (the same person can be a passive browser at one time and an active creator of content at other times; can be seeking support at one time yet providing advice at another) nor do they reside in specific content (an image of healed scars can be a 'trigger' for one person yet a reminder of recovery for another). Except for content that is explicitly offering instruction or encouragement to act, our results suggest that for most content the power to affect outcomes does not lie in the content itself; the same content can have different effects on different users and even on the same user at different time points depending on their current emotional state. It is also the case that the posting of similar content can have very different functions that are not evident from focusing on the nature of the content itself. As Lavis and Winter (2020) note, posting an image of cuts may signify that a young person feels at risk of injuring themselves and is seeking help.

Discussion

The main finding of this review is that the issue of the effect self-harm and suicide material found on line cannot be reduced to a simple descriptive treatment of form or content. The nature of content that is tagged as self-harm is diverse and much does not have explicit self-harm or suicide content despite the tag. There are a multitude of users in these spaces; those creating the content, interacting with content or just passively consuming content or simply browsing the spaces. Content cannot be separated from the person (both the person posting and the person consuming) and it is likely to be the interaction between content, person and space that determines outcomes.

There is content easily accessible online that most commentaries would regard as undesirable: quasi-instructional description and discussion of methods, active explicit encouragement, bullying of those who express distress. Such content is widely recognised as likely to be harmful while at the same time having no evidence to suggest it might benefit those who access it: it should be removed where possible (John et al., 2018). Content that suggests self-harm or suicide is positive or desirable may also be harmful, although the pathway to this harm is less clear. There has been some discussion about this being through 'normalising' the behaviour (Dyson et al., 2016). However, the concept of normalising is ill-defined and often refers not just to content that promotes a positive angle on such behaviour, but to any content that discusses self-harm or suicide, suggesting that familiarity is a pathway to harm (Daine et al., 2013). More investigation is needed to unpick this if, as in other aspects of mental health, talking about the issues is widely regarded as positive. Help-seeking in those who self-harm is hindered by concerns about the potential reaction of others (Rowe et al., 2014) so the labelling of any expression of self-harm online as harmful is problematic if it inhibits those who are seeking support.

For the majority of online material, it is impossible to place a label of either helpful or harmful on the content *per se*. This is because users are not simply passive victims of toxic exposure - it is the interaction with content by users in time and place that is likely to explain most outcomes. This is particularly true of social media where the environment is that of a

performative space (Bechmann and Lomborg, 2013). Content is generated by users – curated in a variety of ways to reflect communicative desires at particular times and in diverse, fluctuating, personal circumstances.

Current discourse on safer online spaces overemphasises the power invested in the content itself, with a resulting push for blanket suppression of that content. The evidence suggests that such regulation may cause harm – shutting down conversations and leading to increasing stigmatisation of self-harm; increasing shame and feelings of low self-worth in those posting content; pushing those who are struggling with feelings into more unregulated, darker spaces where the content is likely to be less diverse and more intense.

Limitations of this review

We used a broad, inclusive search strategy to identify relevant studies. This created a challenge for synthesis as the nature of the studies was extremely diverse. It is therefore impossible to present here a breakdown of the contribution of all studies to the results and the key themes are instead presented thematically.

We included evidence on content regardless of any established intent to end life and our synthesis cuts across both self-harm and suicide content. This may have masked key differences in pathways to harm.

Implications

For policy a more nuanced approach is necessary to encourage safer online spaces. A focus on indiscriminate removal of content about self-harm or suicide is likely to cause harm to those users who are struggling with their feelings and seeking support or solace.

There is a role for regulation of content, but it will be more usefully focused on the removal of explicit harmful material as defined above. To be successful, careful attention will be needed to the definition of terms – for example as we have noted for graphic imagery and the idea of encouragement.

Better regulation of algorithmic pushing of content is needed, to reduce the intensity of content that is suggested to users based on their prior use.

Since duration of exposure seems important, regulation should be aimed at ensuring that there are time limits on the ability to access material about self-harm and suicide.

For research, by far the most important need is for studies that use longitudinal designs and capture the complexity of the space – those that can triangulate data from the person, place and context.

In relation to content, the concept of 'normalising' needs elucidation; we need to understand what is it about the content that promotes self-harm and how does such content lead to increased rates.

We need more research into what constitutes harmful imagery – moving beyond the idea that "graphic" is a self-explanatory descriptor or that pictures of injuries are necessarily harmful.

In relation to the online experience, more attention is needed to its interactive nature: how individually-tailored content may be harmful, especially when based upon algorithmic pushing, and how it may be helpful especially when curated actively by the individual on line.

And importantly, research needs to include exploration of factors that increase the ability of the individual to manage their own experience so that it benefits them, responding to the needs that led them online in the first place.

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Figure 1: PRISMA Flow diagram

Identification of studies via databases and registers

Identification

Records identified from:
  Databases (n = 9677)
  Registers (n = 96)
  23 Websites (n = 38)
  Total: 9811

Records removed *before screening*:
  Duplicate records removed
  (n = 5318)

Screening

Records screened
(n = 4493)

Records excluded
(n = 4248)

Reports sought for retrieval
(n = 245)

Reports not retrieved
(n = 0)

Reports assessed for eligibility
(n = 245)

Reports excluded:
  Not primary research
  (n = 15)
  Not about online content
  (n = 76)
  Studies on content detection
  (n = 45)
  Studies of clinical intervention
  (n = 5)
  Studies of online traffic trends
  (n = 17)

Included
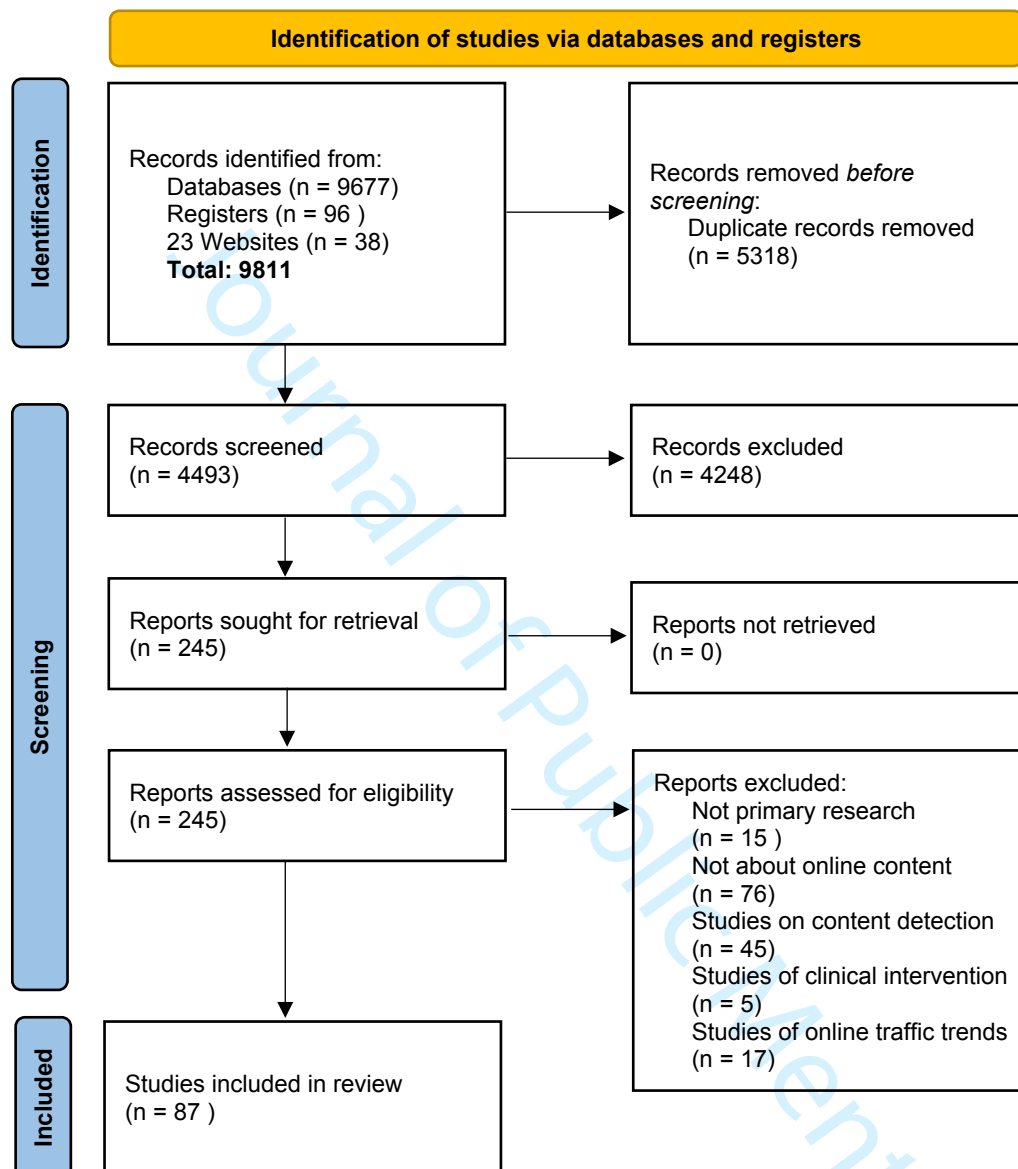
Studies included in review
(n = 87)

Table I: Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
• Studies that report empirical research on internet/online use and self-harm or suicide content, either:- …nature of the exposure, or …user experience, or …mental health outcomes • Studies of individuals of any age, gender, or ethnicity. • Studies from any country	• Case reports, opinion pieces, discussion papers • Studies not written in English • Studies indexed prior to 2015 • Studies on algorithm detection of content • Studies on trends in online traffic • Studies of clinical interventions delivered online

Table II: Variables of importance

The Person		
Who is online?	**Why online?**	**When online?**
- Individuals who have/are self-harming - Individuals who have thoughts of self-harm - Individuals with no thoughts of self-harm but who are unhappy or feel isolated - Friends/family of above - People with no direct experience of self-harm	- Narrating/illustrating own story - Presenting self - Engaging in conversation/making connections - Actively seeking/purposefully consuming content of others - Passively browsing general social media content (incidental exposure)	- in crisis - feeling isolated/unhappy - general browsing
The Medium		
What form of material?	**What type of content?**	**What characteristics of sites hosting content?**
- Images - Videos - Blogs - Short posts - Threads - Discussion boards - Games - memes	- information - personal stories - Celebrity news - Supportive - Abusive/bullying/trolling - inciting - Graphic	- Anonymity - Privacy - Interactivity - Moderation - Regulation - Algorithmic
The Outcomes		
Positive	**Negative**	
- Support - Reduced isolation - Acceptance/reduced stigma - Self-understanding - Practical advice	- Reliving experiences - Stimulus to self-harm - Feeling of pressure - to help others - Feeling of social pressure to present self in certain way	